

Ecological site R042BB036NM Salt Flats, 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

R042BB006NM	Gyp Upland, Desert Shrub
R042BB014NM	Loamy, Desert Shrub

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site usually occurs on level to gently sloping, broad alluvial flats. Slopes usually do not exceed 3 percent. Elevations range from 3,800 feet to 5,000 feet.

Table 2. Representative physiographic features

Landforms	(1) Alluvial flat (2) Basin floor (3) Fan piedmont
Flooding duration	Extremely brief (0.1 to 4 hours) to brief (2 to 7 days)
Flooding frequency	Very rare to rare
Ponding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Ponding frequency	Rare to occasional
Elevation	1,158–1,524 m
Slope	0–3%
Ponding depth	3–10 cm
Water table depth	0 cm
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 wetlands or streams.

Soil features

The soils of this site are deep to shallow, medium to moderately fine-textured in the surface and have moderately to slowly permeable subsoils. Soils contain varying amounts of salt and alkali accumulations which are inhibitory to certain plant species.

Table 4. Representative soil features

Surface texture	(1) Silty clay loam (2) Loam (3) Clay loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Slow to moderate
Soil depth	51–183 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	7.62–17.78 cm
Electrical conductivity (0-101.6cm)	2–16 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	1–13
Soil reaction (1:1 water) (0-101.6cm)	7.9–9.6
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

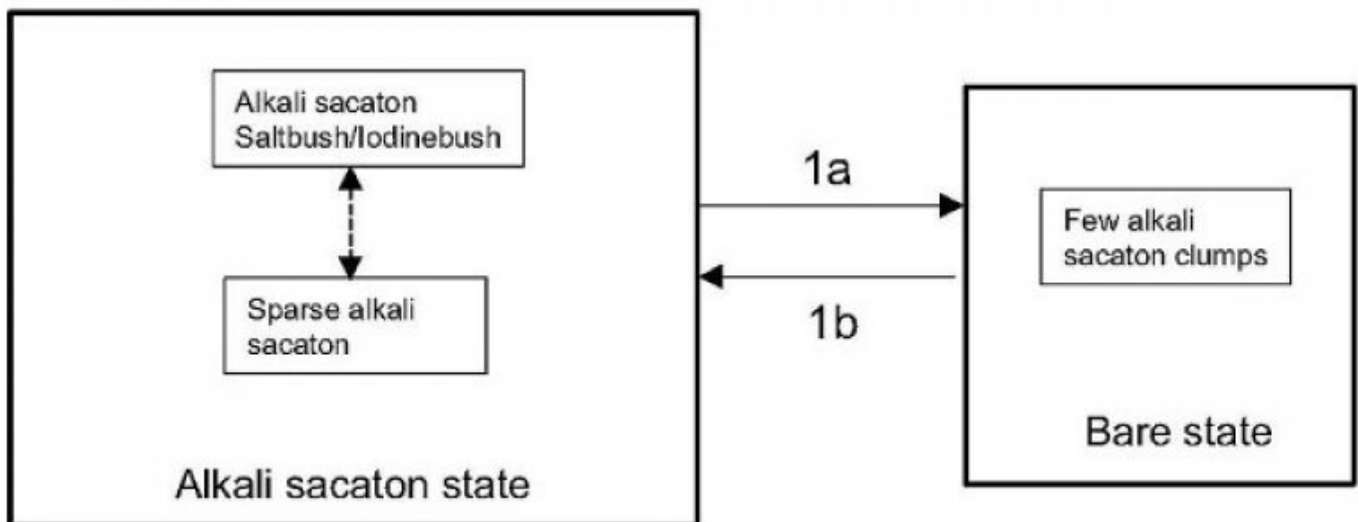
Ecological dynamics

Overview

The soils and vegetation of this site intergrades with that of the Gyp Upland (the “gyp flats” type) and Loamy sites, depending on the levels of gypsum and sodicity/salinity, respectively. Salt flats can be associated with playas that are barren because they are inundated for long periods. Differences in sodicity within the Salt Flats site have important effects on soil properties. Differences in salinity control plant composition directly. The historic plant community type of the salt flats site is dominated by alkali sacaton (*Sporobolus airoides*) and scattered small shrubs, especially four-wing saltbush (*Atriplex canescens*), other *Atriplex* species, and iodinebush (*Allenrolfea occidentalis*). Alkali sacaton is patchily distributed in this site, and large patches of bare ground may be common. Fluctuations in sacaton cover may occur in response to drought or grazing pressure. Drought and/or overgrazing may lead to plant mortality. Subsequent reductions of water infiltration through the soil surface may inhibit reestablishment. The concentration of sodium and/or salts at the soil surface may also play a role in retarding sacaton establishment in patches and larger areas. Bare areas may persist for decades or longer. Alteration of surface hydrology, such that run-in water is diverted away from grass patches, may also lead to grass loss. No systematic studies of communities, states or transitions have been performed in the salt flats site.

State and transition model

State-Transition model: MLRA 42, SD-2 and 3, Salt flats



1a. Interruption of run-in water, soil sealing

1b. Restore run-in water, increase soil permeability, seeding

State 1

Historic Climax Plant Community

Community 1.1

Historic Climax Plant Community

MLRA 42; SD-2 and 3; Salt flats

Alkali sacaton state



- Alkali sacaton, iodinebush, saltbush
- Ungrazed by cattle for over 50 yr
- Sacaton stature low, large bare patches common, salt accumulation
- Marcial-Ubar association, White Sands Missile Range

Alkali sacaton state



- Alkali sacaton, saltbush, mesquite
- Note tall sacaton stature
- Salt accumulation at surface
- Intergradation of salt flats and Gyp Upland ("gypsum flats")
- White Sand Missile Range

Alkali sacaton state



- Pure alkali sacaton
- Bare patches of up to a few meters in diameter
- Hondale silt loam, near Lordsburg playa, Hidalgo, Co., NM

Bare state



- Mostly bare, few sacaton clumps
- Hondale silt loam, near Lordsburg playa, Hidalgo, Co., NM

Figure 4. stateMLRA 42; SD-2 and 3; Salt flats

Alkali sacaton State Alkali sacaton grassland: Alkali sacaton is dominant and four-wing saltbush and/or iodinebush are scattered throughout. Iodinebush may be considered as an index species for this site. Other *Atriplex* species may also be present (some are rare, such as *Atriplex griffithsii*). In some cases, a moderate diversity of grasses may be present, including vine mesquite (*Panicum obtusum*) and tobosa (*Pleuraphis mutica*). In other cases (e.g. soils with higher salinity), alkali sacaton is the sole perennial grass. In some cases, mesquite (*Prosopis glandulosa*) may be present but this shrub should be limited on saline soils. Mesquite increases may be associated with soils more closely allied to loamy ecological sites. Bare patches or even large, continuous areas may naturally occur, perhaps reflecting the consequences of past drought events, areas with very high salinity (e.g. greater than ca. 3% dry soil weight in the top 10 cm; Ungar 1966), or areas in which water ponds for long periods. Heavy grazing may result in the loss of alkali sacaton plants and, in some cases, increases in the relative abundance of other grasses such as burrograss (*Scleropogon brevifolius*). Distinguishing human-caused bare areas from naturally bare areas may be difficult in this site. Diagnosis: Alkali sacaton cover is high in favorable topographic positions. Some bare patches are present. Additional States: Transition to bare state (1a): Factors leading to the loss of sacaton, such as drought, grazing, or other disturbances can set this transition in motion. Once grasses are lost, the loss of soil organic matter, root channels and structures that intercept water may lead to soil sealing and reduced infiltration. Furthermore, the sodic (alkali) subsoil layers that are exposed following loss of topsoil are highly susceptible to soil sealing. Once soil sealing occurs, salts can accumulate at the soil surface and increase to toxic levels. Soil compaction and degradation by trampling may also contribute to soil sealing. In addition, interruption of overland water flow (e.g. by a road) may reduce soil water availability to the point where sacaton plants die and cannot reestablish. These factors inhibit grass reestablishment and may lead to long-term soil degradation. Key indicators of approach to transition: Decadence and mortality in alkali sacaton, reduced litter, increased bare ground, increases in topsoil salinity and sodicity.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	291	547	801
Shrub/Vine	108	202	296
Forb	49	92	136
Total	448	841	1233

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	0%
Grass/grasslike basal cover	20%
Forb basal cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	15%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	60%

Figure 6. Plant community growth curve (percent production by month). NM2518, R042XB036NM-Salt Flats-Warm Season Plant-HCPC. SD-3 Warm Season Plant Community.

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

State 2 Bare

Community 2.1 Bare

Bare: These communities are largely barren with a variable cover of alkali sacaton or perhaps other grasses. Sacaton plants often appear decadent. Diagnosis: Bare ground predominates. Transition to alkali sacaton grassland (1b): Run-in water must be restored if it was interrupted. If erosion, high surface salinity, and reduced infiltration restrict grass abundance, restoration is probably impossible. Flushing and leaching of salts is limited by natric horizons. Accumulation of non-saline sediments that have eroded from areas upslope may facilitate grass recolonization over time. Seed germination seems to be favored by cracks in the soil (De Alba-Avila and Cox 1988), so such sites could be favorable for seeding attempts where salinity is not limiting. Information sources and theoretical background: Communities, states, and transitions are based upon information in the ecological site description and observations by Brandon Bestelmeyer, Jornada Experimental Range and Arlene Tugel, NRCS. Information on the causes of patchiness in alkali sacaton is sorely needed.

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	Warm Season			295–379	
	alkali sacaton	SPAI	<i>Sporobolus airoides</i>	295–379	–
2	Warm Season			26–67	
	vine mesquite	PAOB	<i>Panicum obtusum</i>	26–67	–
3	Warm Season			9–43	
	black grama	BOER4	<i>Bouteloua eriopoda</i>	9–43	–
4	Warm Season			26–67	
	cane bluestem	BOBA3	<i>Bothriochloa barbinodis</i>	26–67	–
	plains bristlegrass	SEVU2	<i>Setaria vulpiseta</i>	26–67	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	26–67	–
	big sacaton	SPWR2	<i>Sporobolus wrightii</i>	26–67	–
5	Warm Season			9–43	
	saltgrass	DISP	<i>Distichlis spicata</i>	9–43	–
6	Warm Season			26–67	
	threeawn	ARIST	<i>Aristida</i>	26–67	–
	low woollygrass	DAPU7	<i>Dasyochloa pulchella</i>	26–67	–
	tobosagrass	PLMU3	<i>Pleuraphis mutica</i>	26–67	–
	burrograss	SCBR2	<i>Scleropogon brevifolius</i>	26–67	–
7	Warm Season			9–26	
	Graminoid (grass or grass-like)	2GRAM	Graminoid (grass or grass-like)	9–26	–
Shrub/Vine					
8	Shrub			26–67	
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	26–67	–
9	Shrub			67–101	
	iodinebush	ALOC2	<i>Allenrolfea occidentalis</i>	67–101	–
	saltbush	ATRIP	<i>Atriplex</i>	67–101	–
10	Shrub			9–26	
	crown of thorns	KOSP	<i>Koeberlinia spinosa</i>	9–26	–
11	Shrub			9–26	
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	9–26	–
12	Shrub			9–26	
	baccharis	BACCH	<i>Baccharis</i>	9–26	–
	mormon tea	EPVI	<i>Ephedra viridis</i>	9–26	–
Forb					
13	Forb			26–67	
	dwarf desertpeony	ACNA2	<i>Acourtia nana</i>	26–67	–
	goldenbush	ISOCO	<i>Isocoma</i>	26–67	–
	southern goldenbush	ISPL	<i>Isocoma pluriflora</i>	26–67	–
	desert seepweed	SUSU	<i>Suaeda suffrutescens</i>	26–67	–
	crinklemat	TIQUI	<i>Tiquilia</i>	26–67	–
14	Annual Forbs			9–43	
	Forb, annual	2FA	Forb, annual	9–43	–
15	Perennial Forbs			9–43	

	Forb, perennial	2FP	<i>Forb, perennial</i>	9-43	-
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Animal community

This site provides habitat which support a resident animal community that is characterized by coyote, black-tailed jackrabbit, desert cottontail, bannertail kangaroo rat, scaled quail, loggerhead shrike, horned lark, meadowlark, little striped whiptail lizard, and Texas horned lizard.

Hydrological functions

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

Hydrologic Interpretations

Soil Series-----Hydrologic Group

Hondale-----D

Mimbres-----C

Recreational uses

Suitability for camping and picnicking is fair to poor, limited mostly by weather extremes. 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. 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

This site is suitable for grazing in all seasons of the year. Most of the palatable green forage for livestock is produced in the summer months and lends the site to seasonal use. It is suited to grazing by cattle, sheep, goats, and horses, generally without regard to class of livestock. Retrogression caused by inadequately managed grazing usually results in such plants as black grama, and fourwing saltbush being replaced by burrograss, tobosa, other Atriplex species, and seepweed. Mesquite and allthorn may dominate the site eventually, and recovery may be slow under grazing management alone.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Similarity Index-----Ac/AUM

100 - 76-----2.8 - 3.7

75 - 51-----3.5 - 5.5

50 - 26-----5.0 - 10.5

25 - 0-----10.5 - +

Other references

Other References:

Data collection for this site was done in conjunction with the progressive soil surveys within the Southern Deseritic 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:

- Hondale silt loam, strongly alkali
- Hondale loam, strongly alkali
- Hondale soils, strongly alkali
- Hondale sandy clay loam
- Mimbres silty clay loam, alkali, not flooded

Other Soils included are:

- Marcial silty clay loam
- Ubar silt loam
- Mead silt oam
- Reagan loam, saline
- Hurley loam, saline
- Reeves loam, saline
- Karro loam, saline
- Bigetty loam, moderately saline

Contributors

- Don Sylvester
- Dr. Brandon Bestelmeyer

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:**

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

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

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

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

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

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:

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

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

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

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:

17. Perennial plant reproductive capability:
