

Ecological site R042BB001NM

Alkali Flat, Desert Shrub

Accessed: 05/17/2024

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

R042BB002NM	<b>Gyp Duneland Barren, Desert Shrub</b> The Alkali Flat site is the source of gypsum for the dunefields of White Sands National Monument and White Sands Missile Range.
R042BB003NM	<b>Vegetated Gypsum Dunes, Desert Shrub</b> The Alkali Flat site is the source of gypsum for the Vegetated Dunes of White Sands National Monument and White Sands Missile Range.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs in basins on relict lakebeds. Slopes are flat averaging less than 2 percent. Elevation ranges from about 3500-4000 feet above sea level.

This site receives salts from groundwater inflow sources and runoff from adjoining piedmont slopes. These salts are concentrated on the surface by way of evaporation and act as a supply source for downwind gypsum dune formations.

Table 2. Representative physiographic features

Landforms	(1) Pluvial lake (relict)
Ponding duration	Long (7 to 30 days) to very long (more than 30 days)
Ponding frequency	Occasional to frequent
Elevation	1,067–1,219 m
Slope	0–2%
Water table depth	76–152 cm
Aspect	Aspect is not a significant factor

Climatic features

Annual average precipitation ranges from 7 to 12 inches. Wide fluctuations from year to year are common. 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

### Soil features

The soils of this site are crystalline gypsiferous loamy coarse sands overlying a petrogypsic horizon. They are very poorly drained and will occasionally pond water for a month or longer. They are strongly saline with Ec values ranging from 50 to well over 100.

Characteristic Soils Are:

MU-359 Gypsic Haplosalids, 0-1 percent slope. NM688-White Sands Soil Survey

MU-360 Petrogypsic haplosalid, 0-2 percent slopes. NM688-White Sands Soil Survey

**Table 4. Representative soil features**

Surface texture	(1) Gypsiferous loamy coarse sand
Family particle size	(1) Sandy
Drainage class	Poorly drained
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Electrical conductivity (0-101.6cm)	50–150 mmhos/cm
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

## Ecological dynamics

The alkali flat site occurs on large deflation basins where the sediments consist mostly of gypsum and other evaporites. Erosion, high salt content, ponding and seasonal high water tables combine to make this site an extremely harsh environment. The lowest elevations of the Alkali Flat are devoid of vegetation. These areas can occasionally be subjected to extended periods of ponding, and seasonal fluctuations in ground water depth. Those areas of this ecological site that sit slightly higher topographically typically display scattered iodinebush. However, following instance of high rainfall, portions of these slightly higher areas can also become susceptible to ponding. Ponding duration and extent varies spatially and by rainfall event.

## State and transition model

### MLRA-42, SD-2, Alkali Flat

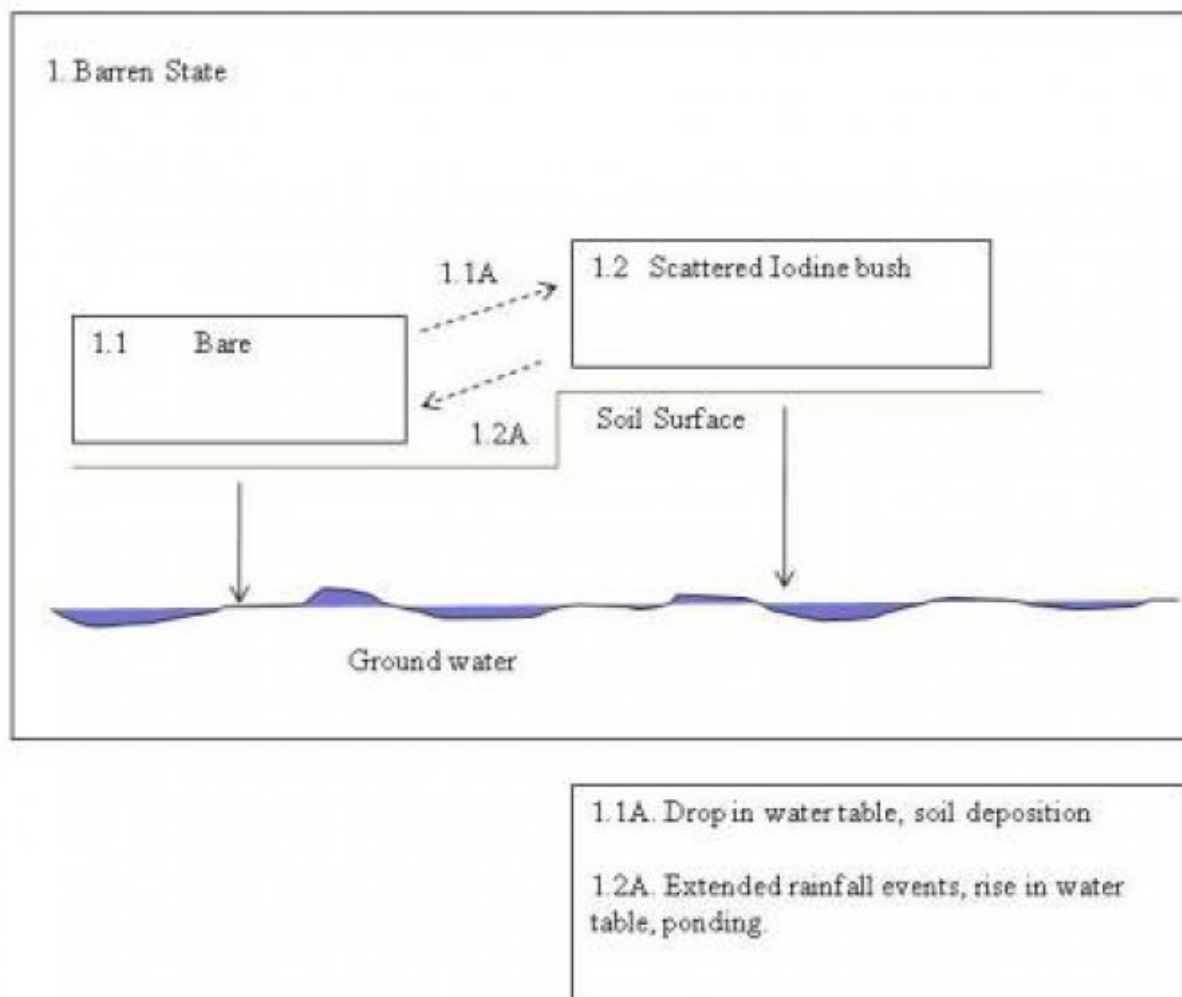


Figure 4. Alkali Flat Ecological Site Model

#### State 1 Barren

This state is characterized by the general lack of vegetation. The lowest areas are completely devoid of vegetation while areas that are slightly topographically higher may contain widely scattered plants.

#### Community 1.1 Bare



**Figure 5. Bare**

This area encompasses the lowest elevations across the Alkali Flat site and is devoid of vegetation. Ponding, erosion, high salt content, and seasonal high water tables prevent the establishment and growth of vegetation.

## **Community 1.2 Scattered Iodinebush**



**Figure 6. Scattered Iodinebush**



**Figure 7. Ponded**

The higher portions of this site typically display sparse iodine bush. These areas are most common on the downwind side of the Alkali Flat. On the downwind side sands tend to accumulate in scattered patches across the flat. These areas provide niches for seedling catchment and establishment. Following high rainfall events, these areas may pond water and plants on higher ground are favored. Additionally, small vegetated islands are occasionally found along the outside edges of the Alkali Flat. These areas form where wind patterns allow some deposition. Surface salt crusts on the edges tend to be heavy, and may facilitate deposition. Species usually consist

of alkali sacton and iodine bush.

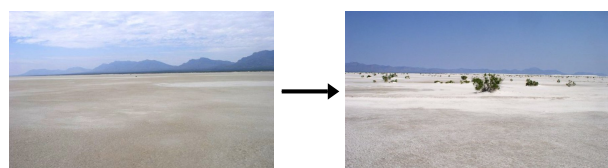
**Table 5. Annual production by plant type**

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	—	11	28
Forb	—	—	—
Grass/Grasslike	—	—	—
Microbiotic Crusts	—	—	—
<b>Total</b>	—	<b>11</b>	<b>28</b>

**Table 6. Soil surface cover**

Tree basal cover	0%
Shrub/vine/liana basal cover	0-1%
Grass/grasslike basal cover	0%
Forb basal cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	99-100%

## Pathway 1.1A Community 1.1 to 1.2



**Bare**

**Scattered Iodinebush**

On areas of this site that are slightly topographically higher, a drop in the water table, soil deposition, and seed dispersal may help to establish plants on previously bare areas. These conditions may result following periods of drought and high evaporation.

## Pathway 1.2A Community 1.2 to 1.1



**Scattered Iodinebush**

**Bare**

Extended rainfall events and the associated ponding and rise in the water table can cause the the shift back to the bare community.

## Additional community tables

Table 7. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Shrub/Vine</b>					
1	<b>Perennial Shrubs</b>			0–28	
	iodinebush	ALOC2	<i>Allenrolfea occidentalis</i>	0–28	0

## Animal community

The scarcity of vegetation, shallow groundwater, and high salinity combine to make this site provide only limited use to wildlife.

## Hydrological functions

The groundwater table of the Alkali Flat is shallow most of the time. It fluctuates from the surface to a few feet deep. It contains high concentrations of evaporites resulting from the subsurface inflow of saline groundwater.

## Recreational uses

This site is currently used for educational purposes by White Sands National Monument.

## Wood products

This site has no significant value for wood products.

## Other products

Gypsum

## Other references

Bennett, J., Wilder, D., 2009. Physical resources foundation report, White Sands National Monunent, Natural Resource Report NPS/NRPC/NRR—2009/166. National Park Service, Fort Collins, Colorado.

Fryberger, S.G., 2000. Geological overview of White Sands National Monument.  
<http://www.nature.nps.gov/geology/parks/whsa/geows/index.htm>

Langford, R.P., Rose, J.M., White, D.E., 2009. Groundwater salinity as a control on development of eolian landscape: An example from White Sands of New Mexico. *Geomorphology* 105(2009) 39-49.

## Contributors

David Trujillo

## 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)	
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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:**

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

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

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

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

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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:**
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