USDA Natural Resources Conservation Service

Ecological site R027XY094NV
DRY SODIC FLAT

Last updated: 6/03/2024
Accessed: 09/27/2024

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.

MLRA notes

Major Land Resource Area (MLRA): 027X–Fallon-Lovelock Area

Physiography
Found in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus this area is characterized by isolated uplifted fault block mountain ranges trending north to south that are separated by broad, hydrologically closed basins. The entire area occurs in the rain-shadow of the Sierra Nevada mountains and is influenced by Pleistocene Lake Lahontan which reached its most recent high stand about 12,000 years ago. There is substantial evidence suggesting the western Great Basin has been the site of pluvial-interpluvial cycles for at least the past two million years.
The mountains and valleys are dissected by the Humboldt, Truckee, Carson, and Walker Rivers and their tributaries, all of which terminate within MLRA 27. Extensive playas can be found throughout this area and are the result of drying of ancient Lake Lahontan. Elevation generally ranges from 3,300 to 5,900 feet (1,005 to 1,800 meters) in valleys, but on some mountain peaks it is more than 7,870 feet (2,400 meters).

Geology
Landforms and soils of this MLRA have been heavily influenced by fluctuating lake level over the last 40,000 years. There is a level line evident on the higher slopes marking the former extent of glacial Lake Lahontan. Almost half of this area has surface deposits of alluvial valley fill influenced by lacustrine sediment. The rest has andesite and basalt rocks of different ages. Mesozoic and Tertiary intrusives are concentrated along the western border of the area, and Lower Volcanic Rocks (17 to 43 million years old) are common on the eastern side of the area. Also, some scattered outcrops of Mesozoic sedimentary and volcanic rocks and tuffaceous sedimentary rocks are in the mountains within the interior of this MLRA.

Climate
The average annual precipitation is 5 to 10 inches (125 to 255 millimeters) in most of the area but is as much as 19 inches (485 millimeters) on high mountain slopes. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. The amount of precipitation is very low from summer to midautumn. The precipitation in winter occurs mainly as snow. The average annual temperature is 43 to 54 degrees F (6 to 12 degrees C). The freeze-free period averages 155 days and ranges from 110 to 195 days, decreasing in length with elevation.

Water
The amount of precipitation is very low, and water for irrigation is obtained principally from diversions on the four large rivers in the area and from water stored in the Lahontan, Rye Patch, and Weber Reservoirs. Pyramid Lake and Walker Lakes are terminal lakes for the Truckee and Walker Rivers, respectively. Much of the annual flow of both rivers is diverted for irrigation, causing lake levels to fall and levels of dissolved salts to increase causing problems for the native Lahontan cutthroat trout.

Soils
The dominant soil orders are Aridisols and Entisols. The soils in the area are predominantly a mesic temperature

regime, aridic moisture regime, and have a mixed mineralogy. They are generally well drained, loamy or sandy, commonly skeletal, and shallow to very deep. Accumulation of salts, tufa deposits, and eolian sediments with soluble salts over lacustrine deposits influence most of the soils in the basin landforms of this MLRA. Soils on bedrock-controlled landforms are typically comprised of volcanic or tuffaceous sedimentary colluvium over residuum.

Biological Resources
This area supports extensive areas of salt-desert shrub vegetation. Shadscale and Bailey's greasewood are widespread, occurring both individually and together. Grasses are generally sparse, although Indian ricegrass is prominent, especially on the sandy soils. Fourwing saltbush, winterfat, spiny hopsage, wolfberry, ephedra, dalea, and bud sagebrush are common shrubs. Basin wildrye, creeping wildrye, alkali sacaton, saltgrass, black greasewood, rubber rabbitbrush, and big saltbush are important plants on saline bottom lands and terraces. A few marsh areas support cattail, bulrushes, sedges, and rushes. Big sagebrush, along with scattered Utah juniper and singleleaf pinyon, is associated with Thurber needlegrass, desert needlegrass, Sandberg bluegrass, and squirreltail on the higher elevation piedmont slopes and mountains.

Ecological site concept

The Dry Sodic Flat site occurs on lake plains, basin floor remnants and lake terraces. Slope gradients are less than 2 percent. Elevations are 3800 to 5600 feet. The soils are very deep, somewhat poorly drained. A seasonal high water table (between March to September) is found between 4 and 6 feet below the soil surface. The site is saline and sodic and strongly or very strongly alkaline throughout the soil profile.

Associated sites

R027XY091NV	**LOAMY FAN 10-12 P.Z.** Found on slopes adjacent to the dry sodic flats.

Similar sites

R027XY010NV	**BEACH TERRACE** ATCO dominant plant
R027XY036NV	**DRY SODIC TERRACE** SAVE4 dominant plant

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Distichlis spicata var. stricta*

Physiographic features

The Dry Sodic Flat site occurs on lake plains, basin floor remnants and lake terraces. Slope gradients of 0 to 2 percent are typical. Elevations are 3800 to 5600 feet.

Table 2. Representative physiographic features

Landforms	(1) Lake plain (2) Basin-floor remnant
Runoff class	Very high
Flooding frequency	Rare
Elevation	1,158–1,707 m
Slope	0–2%
Water table depth	122 cm

Aspect	Aspect is not a significant factor

Climatic features

The climate is arid with cool, moist winters and hot, dry summers. Average annual precipitation is about 3 to about 5(6) inches. Mean annual air temperature is 49 to 53 degrees F. The average growing season is about 100 to 130 days.

Table 3. Representative climatic features

Frost-free period (average)	130 days
Freeze-free period (average)	
Precipitation total (average)	127 mm

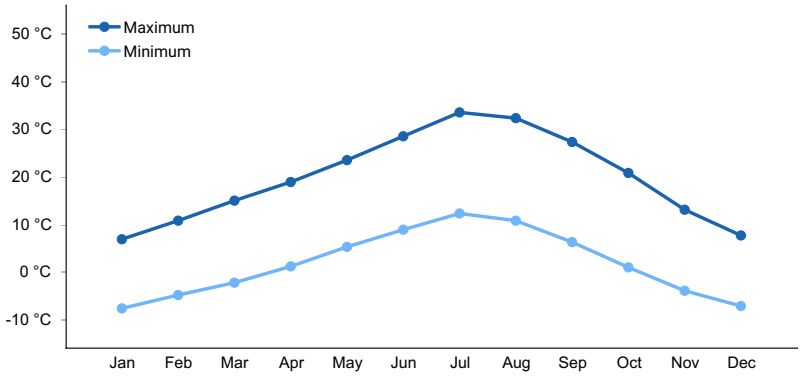


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

The Dry Sodic Flat may receive flooding from adjacent landforms.

Soil features

The soils of this site are very deep, somewhat poorly drained and formed lacustrine deposits derived from mixed rocks. Available water capacity is very low. A seasonal high water table (between March to September) is found between 4 and 6 feet below the soil surface. The soils are saline and sodic and strongly or very strongly alkaline throughout the profile. Soil series associated with this site include Parran.

Table 4. Representative soil features

Parent material	(1) Lacustrine deposits
Surface texture	(1) Silty clay (2) Clay (3) Silty clay loam
Family particle size	(1) Loamy
Drainage class	Somewhat poorly drained
Permeability class	Very slow
Soil depth	183 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	15.75–16 cm

Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	2–3 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	46–150
Soil reaction (1:1 water) (0-101.6cm)	8.5–9.6
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

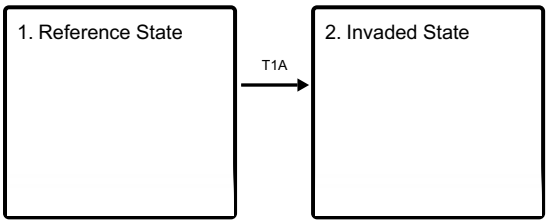
Ecological dynamics

This site is characterized by low productivity with little plant diversity. Species likely to invade this site are Russian thistle, annual mustards, cheatgrass, and annual wheatgrass.

Fire Ecology:
Black greasewood may be killed by severe fires, but it commonly sprouts soon after low to moderate-severity fires. Iodinebush probably does not easily burn due to salt succulent stems.

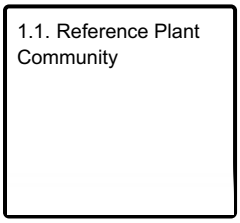
State and transition model

Ecosystem states

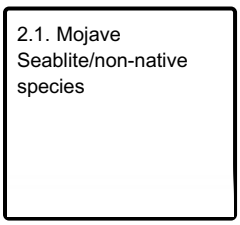


T1A - T1A - establishment of non-native plant species

State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Reference State

The plant community is sparse with low plant diversity from the combination of high salt in the soil and the fluctuating water table. Under natural conditions this site is very stable. Fire is not likely to be an important driver in

this community.

Community 1.1
Reference Plant Community

The reference plant community is dominated by Mojave seablite. Potential vegetative composition is about 5 percent grasses, 5 percent forbs and 90 percent shrubs. Approximate ground cover (basal and crown) ranges from 20 to 40 percent.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	75	151	303
Forb	4	8	17
Grass/Grasslike	4	9	17
Total	**83**	**168**	**337**

State 2
Invaded State

Similar to the Reference State except the plant community has established non-native plants.

Community 2.1
Mojave Seablite/non-native species

Similar to Community Phase 1.1, except community 2.1 has non-native species present.

Transition T1A
State 1 to 2

Transition T1A is caused by the introduction of non-native annual plants. Any amount of introduced non-native species causes and immediate decrease in the resilience of the site. Annual non-native plants cannot be easily removed from the system and have the potential to significantly alter disturbance regimes from their historic range of variation.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Secondary Perennial Grasses**			3–9	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	1–3	–
	saltgrass	DISP	*Distichlis spicata*	1–3	–
	foxtail barley	HOJU	*Hordeum jubatum*	1–3	–
Forb					
2	**Perennial Forbs**			0–9	
3	**Annual Forbs**			0–3	
Shrub/Vine					
4	**Primary Shrubs**			124–169	
	Mojave seablite	SUMO	*Suaeda moquinii*	118–143	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	3–17	–
	iodinebush	ALOC2	*Allenrolfea occidentalis*	3–9	–
5	**Secondary Shrubs**			0–9	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	1–3	–
	Torrey's saltbush	ATTO	*Atriplex torreyi*	1–3	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	1–3	–

Animal community

Livestock Interpretations:
This site has limited value for livestock grazing, due to the low forage production.
Black greasewood is an important winter browse plant for domestic sheep and cattle. It also receives light to moderate use by domestic sheep and cattle during spring and summer months. Black greasewood contains soluble sodium and potassium oxalates that may cause poisoning and death in domestic sheep and cattle if large amounts are consumed in a short time. Iodinebush has extremely salt-succulent stems, so few animals graze the plant directly, but many animals will eat the seeds of iodinebush.

Stocking rates vary over time depending upon season of use, climate variations, site, and previous and current management goals. A safe starting stocking rate is an estimated stocking rate that is fine tuned by the client by adaptive management through the year and from year to year.

Wildlife Interpretations:
Black greasewood is an important winter browse plant for big game animals and a food source for many other wildlife species. It also receives light to moderate use by mule deer and pronghorn during spring and summer months.

Hydrological functions

Runoff is very high and permeability is very slow.

Other products

The leaves, seeds and stems of black greasewood are edible.

Other information

Black greasewood is useful for stabilizing soil on wind-blown areas. It successfully revegetates eroded areas and sites too saline for most plant species.

Inventory data references

NASIS soil component data.

Type locality

Location 1: Churchill County, NV	
Township/Range/Section	T17N R30E S20
General legal description	Southwest of Fallon, west side of Carson Lake. Latitude 39.31586 north Longitude 118.64411 east NAD 83

Other references

Fire Effects Information System (Online; http://www.fs.fed.us/database/feis/plants/).

USDA-NRCS Plants Database (Online; http://www.plants.usda.gov).

Contributors

P. Novak-Echenique

Approval

Kendra Moseley, 6/03/2024

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	09/27/2024
Approved by	Kendra Moseley
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):**

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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):**

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:**