Ecological site R027XY090NV
DRY SALINE MEADOW

Last updated: 6/03/2024
Accessed: 07/17/2024

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.

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 Saline Meadow site occurs on stream terraces and axial-stream floodplains. Slopes are less than 2 percent. Elevations are 3700 to about 4300 feet. The soils are very deep and poorly to somewhat poorly drained. Soils are strongly salt and sodium affected. The water table is at or near the surface for short periods during the spring that usually stabilizes below 40 inches during the early summer.

Associated sites

R027XY089NV	**SODIC BOTTOM** Less productive site; less plant diversity

Similar sites

R027XY005NV	**SALINE MEADOW** SPAI dominant grass; more productive site
R027XY069NV	**WET MEADOW 4-8 P.Z.** POJU dominant grass

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Distichlis spicata* (2) *Puccinellia*

Physiographic features

The Dry Saline Meadow site occurs on stream terraces and axial-stream floodplains. Slopes are less than 2 percent. Elevations are 3700 to about 4300 feet.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Stream terrace
Runoff class	Medium to high
Flooding duration	Long (7 to 30 days)
Flooding frequency	Frequent
Ponding duration	Long (7 to 30 days)

Ponding frequency	None to frequent
Elevation	3,700–4,300 ft
Slope	0–2%
Water table depth	24–48 in
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 4 to 8 inches. Mean annual air temperature is 49 to 60 degrees F. The average growing season is about 100 to 190 days.

Table 3. Representative climatic features

Frost-free period (average)	190 days
Freeze-free period (average)	
Precipitation total (average)	8 in

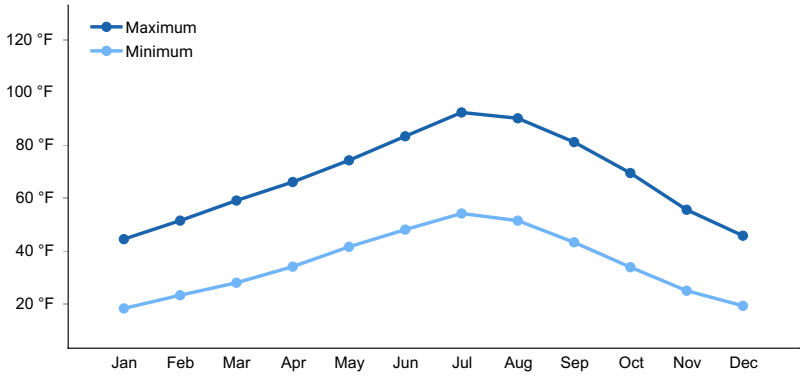


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

This site is associated with axial-stream floodplains.

Soil features

The soils associated with this site are very deep and poorly to somewhat poorly drained. Soils are strongly salt and sodium affected. Available water capacity is very low to moderate. The water table is at or near the surface for short periods during the spring that usually stabilizes below 40 inches during the early summer. Capillary rise of this ground water enhances soil moisture through the mid-summer portion of the growing season. The soil series associated with this site includes: Carcity, Pelic, Stillwater, and Turupah.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Gravelly sand (2) Silty clay loam (3) Sandy loam
Family particle size	(1) Loamy
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Very slow to rapid
Soil depth	72–84 in

Surface fragment cover <=3"	2–10%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	2.5–7.5 in
Calcium carbonate equivalent (0-40in)	0–10%
Electrical conductivity (0-40in)	0–32 mmhos/cm
Sodium adsorption ratio (0-40in)	0–45
Soil reaction (1:1 water) (0-40in)	7.4–9.6
Subsurface fragment volume <=3" (Depth not specified)	2–10%
Subsurface fragment volume >3" (Depth not specified)	0%

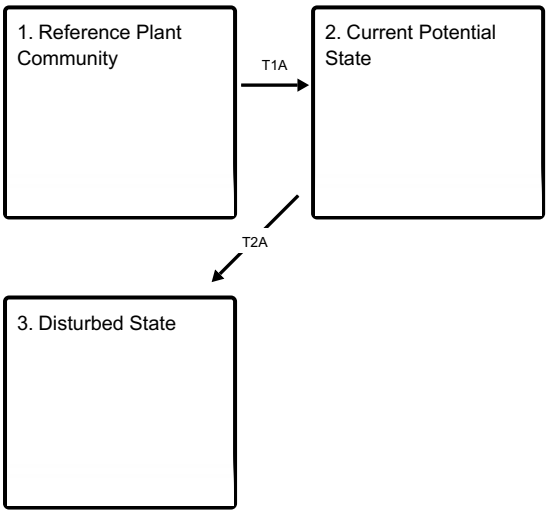
Ecological dynamics

As ecological condition declines, saltgrass cover initially increases as other perennial grasses and grass-like plants decrease and the amount of salt-crusted, bare ground increases. Tamarisk, and annual forbs such as Kochia spp. and Russian thistle are species most likely to invade this site. Locations that are ponded for prolonged periods may be dominated by foxtail barley (*Hordeum jubatum*).

Fire Ecology:
There is very little fire frequency information available for saline meadow communities prior to presettlement times. It is estimated that fire may have occurred every 7-10 years.
Saltgrass rhizomes occur deep in the soil where they are insulated from the heat of most fires. Saltgrass survives fire by sending up new growth from rhizomes.
Lemmon’s and Nuttall's alkaligrass have high fire tolerance due to their rhizomatous growth and infrequent fire.

State and transition model

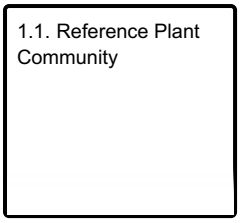
Ecosystem states



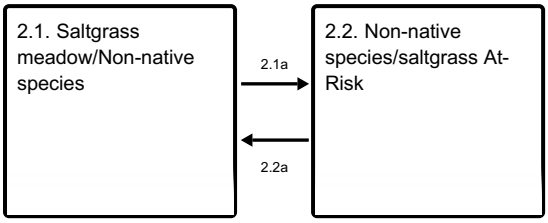
T1A - T1A - establishment of non-native species

T2A - T2A - increase dominance by non-native species, typically from a change in water table natural range of variability

State 1 submodel, plant communities



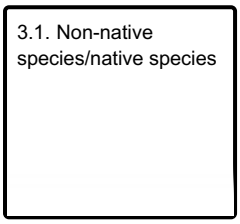
State 2 submodel, plant communities



2.1a - 2.1a - increased dominance of non-native plants and lowering of water table

2.2a - 2.2a - water table resumes normal fluctuations, allowing perennial species access to water longer in the growing season.

State 3 submodel, plant communities



State 1
Reference Plant Community

Community 1.1
Reference Plant Community

The reference plant community is dominated by inland saltgrass. Potential vegetative composition is about 95% grass and grass-like plants with 5% or less forbs and shrubs. Approximate ground cover (basal and crown) is 35 to 50 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	950	1615	2090
Shrub/Vine	25	42	55
Forb	25	43	55
Total	**1000**	**1700**	**2200**

State 2
Current Potential State

The current potential state is similar to the reference state, however invasive grasses and/ or forbs are now present in all community phases. This state still has the visual aspect of a saltgrass meadow and alkaligrass. Foxtail barley, arctic rush and alkali bluegrass are other primary perennial grass or grasslike species present. Fivehorn bassia, povertyweed and other less palatable species now make up a large portion of the herbaceous layer. Primary disturbance mechanisms include native herbivore and domestic livestock grazing. Timing of these disturbances dictates the ecological dynamics that occur. The current potential state is still self sustaining; but is losing resistance

to change due to lower resilience following disturbances. When disturbances occur, the rate of recovery is variable depending on severity. Current Potential State: Saltgrass meadow with various other native and non-native grasses and forbs present. Indicators: A community dominated by saltgrass where other native perennial grasses and forbs are also present. Invasive grasses and/or forbs are present. Feedbacks: Frequent disturbances that may allow annual invasive species such as fivehook bassia to dominate. At-risk Community Phase: As increased disturbance frequency allows for the increase and/or dominance of annual grasses and forbs, this community is at greater risk. Trigger: Reoccurring disturbance that results in a dominance of annual grasses and/or forbs in the herbaceous layer.

Community 2.1
Saltgrass meadow/Non-native species

This community is characterized by an open grassland aspect with saltgrass and alkaligrass dominating the herbaceous layer. Other commonly occurring grasses and grasslikes include native Kentucky bluegrass, alkali bluegrass, spikerush, and tufted hairgrass. Non-native species including fivehorn bassia, poverty weed, and/or salt cedar are also present. A stable water table is present, providing season long moisture for plant growth.

Community 2.2
Non-native species/saltgrass At-Risk

This community is characterized by an open grassland aspect with saltgrass, alkaligrass, and non-native plants dominating the herbaceous layer. Palatable grasses and grasslikes including native Kentucky bluegrass, alkali bluegrass, spikerush, and tufted hairgrass are much reduced. Nonnative species including fivehorn bassia, poverty weed,and/or salt cedar are also present and may dominate the site. Water table may be unstable and may allow annuals to out compete perennials.

Pathway 2.1a
Community 2.1 to 2.2

This pathway occurs when events favor a decrease in palatable perennial grasses and grasslikes and an increase in less palatable species such as saltgrass and baltic rush. Nonnative annuals including mustards and fivehorn smotherweed may eventually dominate the community. Events may include, improper livestock grazing, and a declining water table that may favor annuals and decrease desirable perennials.

Pathway 2.2a
Community 2.2 to 2.1

This pathway occurs when events favor a increase in palatable perennial grasses and grasslikes and a decrease in less palatable species such as saltgrass and baltic rush. Nonnative annuals including mustards and fivehorn smotherweed may eventually be reduced in the community. Events may include, carefully managed livestock grazing over long periods, and a stable water table. These conditions generally favor desirable perennials and decrease annual weeds.

State 3
Disturbed State

This state occurs when the site is burned or chemically treated to reduce saltgrass and other unwanted herbaceous species. The resulting plant communities can be highly variable ranging from the recovery of desired native species to the dominance of of invasive weeds such as salt cedar, fivehorn bassia, poverty weed and various mustard species. Disturbed State: Burned or chemically treated community phases influenced by livestock grazing practices and fluctuating water tables. Indicators: Perennial, annual, invasive grasses, grasslikes and forbs present in various amounts. Feedbacks: Livestock grazing practices and fluctuating water tables that maintain or degrade or desirable species and increase non-native, weedy species present in the community. Trigger: The further establishment of salt cedar, fivehorned bassia and/or other weedy species decrease perennial production and increase bare ground.

Community 3.1
Non-native species/native species

This community phase occurs when the site is chemically treated and/or burned to remove unwanted species. Results can be highly variable ranging from a mixture of native, non-native and invasive species being present. Non-palatable species such as arctic rush, salt cedar, fivehorn bassia & poverty weed may dominate. Native Kentucky bluegrass may occasionally be present. Water table may be unstable and when deeper that may allow annuals to out compete perennials.

Transition T1A
State 1 to 2

This transition is from the native perennial grass and grasslike community in the reference state to a state that contains non-native, invasive species. Events typically include the establishment of invasive grasses and forbs, and an increase in saltgrass,arctic rush and other less palatable species. Factors that drive such events may include any combination of improper livestock grazing, a fluctuating water table, and the presence of a seed source for invasive species. Invasive species such as fivehorn bassia however have been known to invade intact perennial plant communities with little to no disturbance. Once invasive species are found in the plant community a threshold has been crossed.

Transition T2A
State 2 to 3

This transition is from the current potential state to an altered state created by chemical treatment or fire. Results can vary widely from little site production to a healthy mixed perennial grass and grasslike community. Non-native, invasive species may also dominate the site. Factors that drive such events include, improper livestock grazing of palatable perennial grasses, fluctuating water tables and the availability of invasive weeds. Once site is converted, a threshold has been crossed.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses**			2113–2792	
	saltgrass	DISP	*Distichlis spicata*	1275–1530	–
	Lemmon's alkaligrass	PULE	*Puccinellia lemmonii*	385–495	–
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	385–495	–
	cosmopolitan bulrush	BOMA7	*Bolboschoenus maritimus*	34–136	–
2	**Secondary Perennial Grasses**			34–136	
	sedge	CAREX	*Carex*	9–51	–
	foxtail barley	HOJU	*Hordeum jubatum*	9–51	–
	basin wildrye	LECI4	*Leymus cinereus*	9–51	–
	western wheatgrass	PASM	*Pascopyrum smithii*	9–51	–
	common reed	PHAU7	*Phragmites australis*	9–51	–
	alkali sacaton	SPAI	*Sporobolus airoides*	9–51	–
	arrowgrass	TRIGL	*Triglochin*	9–51	–
Forb					
3	**Perennial Forbs**			0–85	
Shrub/Vine					
4	**Secondary Shrubs**			0–85	
	Torrey's saltbush	ATTO	*Atriplex torreyi*	9–17	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	9–17	–
	seepweed	SUAED	*Suaeda*	9–17	–

Animal community

Livestock Interpretations:
This site is suitable for livestock grazing. Grazing management should be keyed to inland saltgrass and alkaligrass. Saltgrass's value as forage depends primarily on the relative availability of other grasses of higher nutritional value and palatability. It can be an especially important late summer grass in arid environments after other forage grasses have deceased. Saltgrass is rated as a fair to good forage species only because it stays green after most other grasses dry. Livestock generally avoid saltgrass due to its coarse foliage. Saltgrass is described as an increaser under grazing pressure.
Baltic rush is described as a fair to good forage species for cattle. On average, Baltic rush’s palatability is considered medium to moderately low. Baltic rush is considered palatable early in the growing season when plants are young and tender, but as stems mature and toughen palatability declines.
Alkaligrass has low palatability for livestock.
Bulrush herbage production is high, but forage value is low. It is seldom grazed by livestock if other forage is available. If upland forage becomes limited and soil conditions dry, livestock may utilize bulrush.

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:
Saltgrass provides cover for a variety of bird species, small mammals, and arthropods and is on occasion used as forage for several big game wildlife species.
Baltic rush provides food for several wildlife species and waterfowl. Baltic rush is an important cover species for a variety of small birds, upland game birds, birds of prey, and waterfowl.
Alkaligrass has low palatability for wildlife.
The hard-coated seeds of bulrushes are one of the most important and most commonly used foods of ducks and of

certain marshbirds and shorebirds. The stems and underground parts are eaten by muskrats and geese. Bulrushes also furnish important nesting cover for waterfowl as well as for marsh wrens and blackbirds and give concealing protection to muskrats, otters, raccoons and other animals.

Hydrological functions

Runoff is negligible to high. Permeability is very slow to rapid.

Other products

The stems of Baltic rush were historically used by Native Americans as a foundation for coiled basketry.

Other information

Given its extensive system of rhizomes and roots which form a dense sod, saltgrass is considered a suitable species for controlling wind and water erosion.
Baltic rush's production of deep and fibrous roots originating from a mass of coarse and creeping rhizomes makes it a valuable species for stabilizing streambanks and protecting against soil erosion.
Bulrush erosion control and short-term and long-term revegetation potential are rated as medium. Bulrush buffers wind and wave action on lakes and ponds, which may enhance the establishment of vegetation along shorelines.

Inventory data references

NASIS soil component data.

Type locality

Location 1: Churchill County, NV	
General legal description	This site also occurs in Lyon, Mineral and Pershing Counties, Nevada.

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

TB/JG

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	07/17/2024

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):**

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:**
