

## Ecological site R026XF016CA Wet Sodic Meadow

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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.

### MLRA notes

Major Land Resource Area (MLRA): 026X–Carson Basin and Mountains

The area lies within western Nevada and eastern California, with about 69 percent being within Nevada, and 31 percent being within California. Almost all this area is in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. Isolated north-south trending mountain ranges are separated by aggraded desert plains. The mountains are uplifted fault blocks with steep side slopes. Most of the valleys are drained by three major rivers flowing east across this MLRA. A narrow strip along the western border of the area is in the Sierra Nevada Section of the Cascade-Sierra Mountains Province of the Pacific Mountain System. The Sierra Nevada Mountains are primarily a large fault block that has been uplifted with a dominant tilt to the west. This structure leaves an impressive wall of mountains directly west of this area. This helps create a rain shadow affect to MLRA 26. Parts of this eastern face, but mostly just the foothills, mark the western boundary of this area. Elevations range from about 3,806 feet (1,160 meters) on the west shore of Pyramid Lake to 11,653 feet (3,552 meters) on the summit of Mount Patterson in the Sweetwater Mountains.

Valley areas are dominantly composed of Quaternary alluvial deposits with Quaternary playa or alluvial flat deposits often occupying the lowest valley bottoms in the internally drained valleys, and river deposited alluvium being dominant in externally drained valleys. Hills and mountains are dominantly Tertiary andesitic flows, breccias, ash flow tuffs, rhyolite tuffs or granodioritic rocks. Quaternary basalt flows are present in lesser amounts, and Jurassic and Triassic limestone and shale, and Precambrian limestone and dolomite are also present in very limited amounts. Also of limited extent are glacial till deposits along the east flank of the Sierra Nevada Mountains, the result of alpine glaciation.

The average annual precipitation in this area is 5 to 36 inches (125 to 915 millimeters), increasing with elevation. Most of the rainfall occurs as high-intensity, convective storms in spring and autumn. Precipitation is mostly snow in winter. Summers are dry. The average annual temperature is 37 to 54 degrees F (3 to 12 degrees C). The freeze-free period averages 115 days and ranges from 40 to 195 days, decreasing in length with elevation.

The dominant soil orders in this MLRA are Aridisols and Mollisols. The soils in the area dominantly have a mesic soil temperature regime, an aridic or xeric soil moisture regime, and mixed or smectitic mineralogy. They generally are well drained, are clayey or loamy and commonly skeletal, and are very shallow to moderately deep.

This area supports shrub-grass vegetation characterized by big sagebrush. Low sagebrush and Lahontan sagebrush occur on some soils. Antelope bitterbrush, squirreltail, desert needlegrass, Thurber needlegrass, and Indian ricegrass are important associated plants. Green ephedra, Sandberg bluegrass, Anderson peachbrush, and several forb species also are common. Juniper-pinyon woodland is typical on mountain slopes. Jeffrey pine, lodgepole pine, white fir, and manzanita grow on the highest mountain slopes. Shadscale is the typical plant in the drier parts of the area. Sedges, rushes, and moisture-loving grasses grow on the wettest parts of the wet flood plains and terraces. Basin wildrye, alkali sacaton, saltgrass, buffaloberry, black greasewood, and rubber rabbitbrush grow on the drier sites that have a high concentration of salts.

Some of the major wildlife species in this area are mule deer, coyote, beaver, muskrat, jackrabbit, cottontail, raptors, pheasant, chukar, blue grouse, mountain quail, and mourning dove. The species of fish in the area include trout and catfish. The Lahontan cutthroat trout in the Truckee River is a threatened and endangered species.

## LRU notes

The Mono-Adobe-Long Valleys LRU is comprised of the basins surrounding Mono Lake, Adobe Valley, and Long Valley to the southeast. Pleistocene and Holocene age alluvium and lacustrine deposits predominate. Ash layers occur from eruptions of the numerous volcanic domes that are mostly in adjacent LRUs. Soil temperature regimes are mesic and soil moisture regimes are aridic. Elevations range from 1310 to 2680 meters and slopes are typically less than 10 percent, however there are some ecological sites within the Mono-Adobe-Long Valleys LRU that are greater than 10 percent. Frost free days (FFD) range from 97-125.

## Ecological site concept

The Wet Sodic Meadow site occurs on valley floors adjacent to thermal seeps and springs. Elevations are 4300 to 7000 feet. Slopes range from 0 to 2 percent. The soils that characterize this site are very deep and very poorly drained. Water tables are 0 to 24 inches in spring and summer. Hot springs are present in this site. These soils are saline/sodic. The plant community is dominated by spike rush (*Eleocharis* spp.), mountain (Baltic) rush (*Juncus arcticus* ssp. *littoralis*), and sedges (*Carex* spp.).

## Associated sites

R026XF007CA	<b>Sodic Meadow</b> The Sodic Meadow is found in areas where the water table is deeper.
R026XF002CA	<b>Dune 8-12" P.Z.</b> The Dune 8-12 P.Z. is found on sandy soils with no water table.
R026XF003CA	<b>Sandy 8-12" P.Z.</b> The Sandy 8-12 P.Z. is found on sandy soils adjacent to the Wet Sodic Meadow site.
R026XF006CA	<b>Dry Floodplain</b> The Dry Floodplain is found on stream terraces with a deeper than 60 inch water table.
R026XF010CA	<b>Wet Meadow</b> The Wet Meadow site is found on soils not influenced by salts.

## Similar sites

R026XF007CA	<b>Sodic Meadow</b> The Sodic Meadow site had a deeper water table (between 36 and 60 inches).
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**Table 1. Dominant plant species**

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Eleocharis</i> (2) <i>Juncus arcticus</i> ssp. <i>littoralis</i>

## Physiographic features

This site occurs on valley floors adjacent to thermal springs and seeps. Slopes range from 0 to 2 percent.

**Table 2. Representative physiographic features**

Landforms	(1) Valley floor
Runoff class	Low
Flooding duration	Long (7 to 30 days)

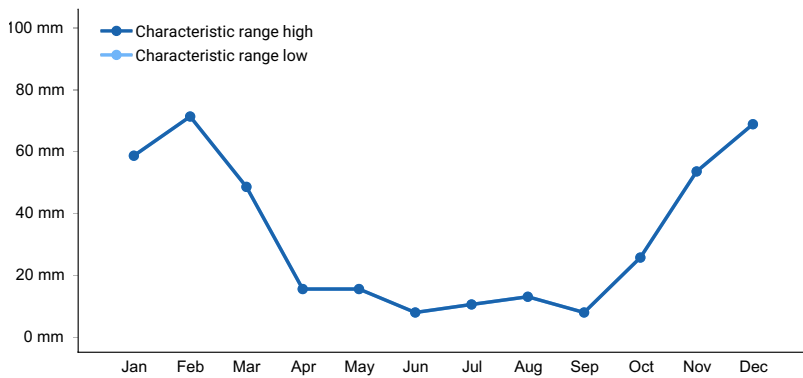
Flooding frequency	Frequent
Elevation	1,311–2,134 m
Slope	0–2%
Water table depth	0–61 cm
Aspect	Aspect is not a significant factor

## Climatic features

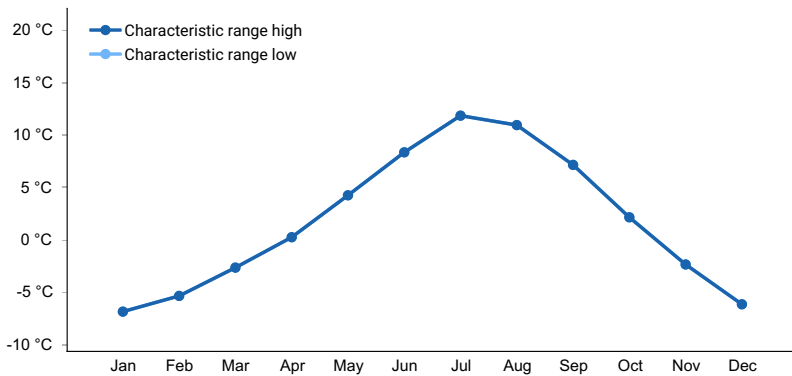
The climate on this site is characterized by cold winters (20 to 45 degrees F) and warm, mostly dry summers (40 to 85 degrees F). The average annual precipitation ranges from 6 to 12 inches, with most falling as snow from November to March.

**Table 3. Representative climatic features**

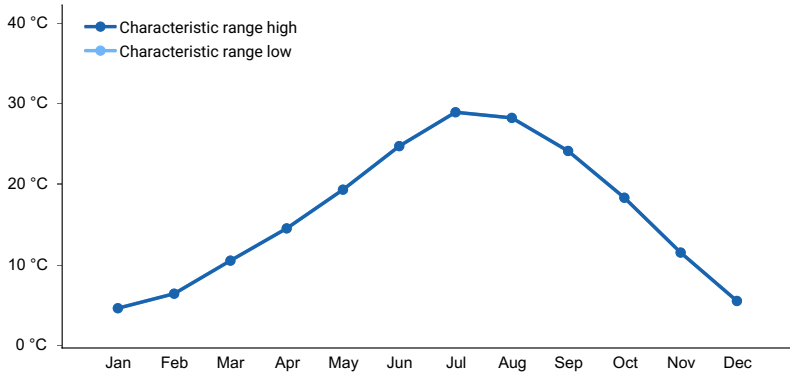
Frost-free period (characteristic range)	
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	152-305 mm
Frost-free period (average)	108 days
Freeze-free period (average)	135 days
Precipitation total (average)	254 mm



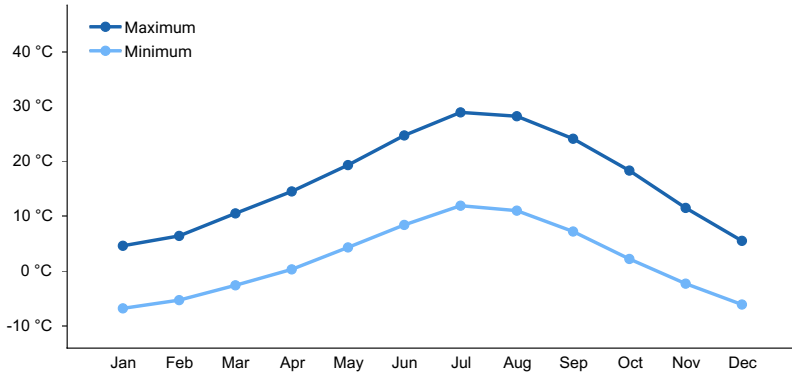
**Figure 1. Monthly precipitation range**



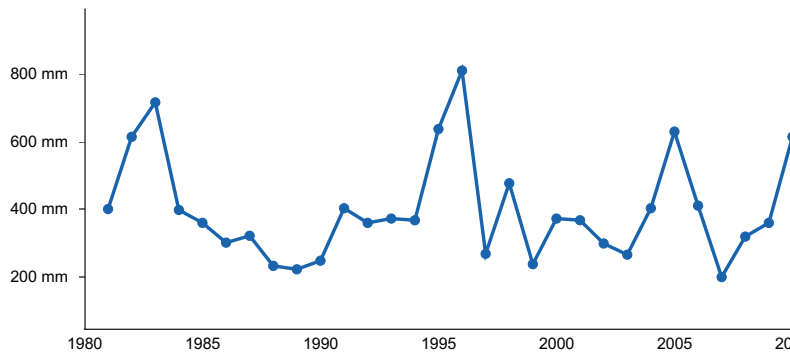
**Figure 2. Monthly minimum temperature range**



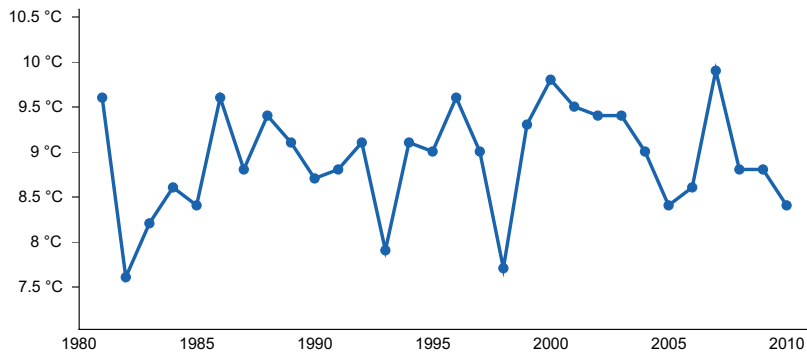
**Figure 3. Monthly maximum temperature range**



**Figure 4. Monthly average minimum and maximum temperature**



**Figure 5. Annual precipitation pattern**



**Figure 6. Annual average temperature pattern**

### Climate stations used

- (1) LEE VINING [USC00044881], Lee Vining, CA

### Influencing water features

The Wet Sodic Meadow site occurs on valley floors adjacent to thermal seeps and springs. It is flooded frequently for long duration. The water table is between the soil surface and 24 inches below the surface.

## Soil features

The soils that characterize this site are very deep and very poorly drained. They formed in alluvium from volcanic ash and mixed rock sources. Surface textures are white loams. Available water capacity is moderate to high and the hazard of water erosion is slight. Wind erosion hazard is moderate when dry. Effective rooting depth is 60 inches or more. Water tables are 0 to 24 inches in spring and summer. Hot springs are present in this site. These soils are saline/sodic.

The Wet Sodic Meadow has been correlated in the following surveys (survey: mapunit):

CA732: 111bo

CA763: 111bo; 113bo

CA802: 111; 112; 113

**Table 4. Representative soil features**

Parent material	(1) Volcanic ash (2) Alluvium
Surface texture	(1) Loam
Drainage class	Very poorly drained
Permeability class	Moderately slow
Soil depth	152 cm
Surface fragment cover <=3"	13%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	10.92–15.49 cm
Calcium carbonate equivalent (Depth not specified)	1–5%
Clay content (Depth not specified)	18–31%
Electrical conductivity (Depth not specified)	0–16 mmhos/cm
Sodium adsorption ratio (Depth not specified)	1–70
Soil reaction (1:1 water) (Depth not specified)	6.6–11
Subsurface fragment volume <=3" (Depth not specified)	13%
Subsurface fragment volume >3" (Depth not specified)	0%

## Ecological dynamics

The Wet Sodic Meadow site is dominated plants that are adapted to wet or saturated soil conditions. The plants are generally obligate and facultative wetland plants. The site is controlled by the natural hydrology, the fluctuation of water table depth through the season. Altering the natural hydrology to dry the site will cause a shift in plant community composition to drier species. Altering the hydrology may also cause soil chemistry to change.

## State and transition model

State and Transition Model

State: Nevada

Site Type: Rangeland

MLRA: 026- Carson Basin

Wet meadow/bottom sites influenced by salts

R026XY002NV, R026XF016CA, R026XF007CA, R026XF065CA

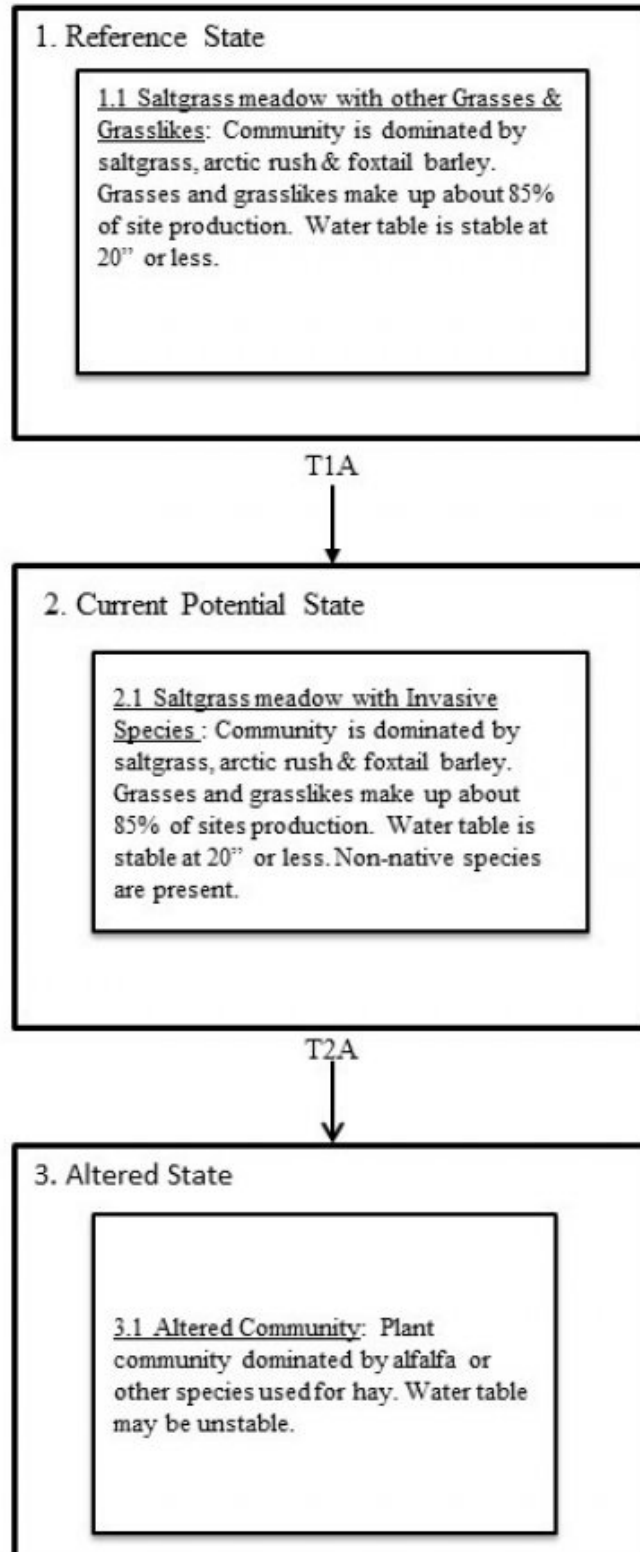


Figure 7. General STM for all wet sodic sites.

## Reference State

The Reference State represents the plant communities and ecological dynamics of sites that have a water table typically less than 24 inches to the soil surface. The Reference State is generally dominated by obligate and facultative wetland plants.

### Community 1.1 Grass-likes dominate

The plant community is dominated by spike rush, Baltic rush, and sedges. Potential vegetation composition is about 90% grasses and grass-like plants, and 10% forbs.

#### Dominant plant species

- fewflower spikerush (*Eleocharis quinqueflora*), grass
- mountain rush (*Juncus arcticus ssp. littoralis*), grass
- sedge (*Carex*), grass
- slender arrowgrass (*Triglochin concinna*), other herbaceous

## State 2 Current Potential State

The Current Potential State is similar to the Reference State, however invasive grasses and/ or forbs are now present. Primary disturbance mechanisms include native herbivore and domestic livestock grazing or disturbance to the hydrology. Timing of these disturbances dictates the ecological dynamics that occur. The Current Potential State is 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. Indicators: A community dominated by Arctic rush 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. Trigger: Reoccurring disturbance that results in a dominance of annual grasses and/or forbs in the herbaceous layer.

### Community 2.1 Grasslikes/Non-native species

Community Phase 2.1 is characterized by an open meadow of grasslike plant and non-native plants. Other commonly occurring grasses and grasslikes include Kentucky bluegrass, alkali bluegrass, spikerush, and tufted hairgrass. Non-native species may including fivehorn bassia, poverty weed, and salt cedar. A stable water table is present at 24 inches or less, providing season long moisture for plant growth.

## State 3 Altered State

The Altered State occurs when the natural hydrology has been altered. This can be from conversion to hayland or other uses.

### Community 3.1 Altered Community

Site is managed more intensely than under natural conditions if converted to hayland. The water table is altered.

## Transition T1A State 1 to 2

The transition from State 1 to State 2 occurs after the introduction of non-native plants.

## Transition T2A

## State 1 to 3

The transition occurs after site is converted for hayland use and non-native species are planted and the natural hydrology is altered.

## Additional community tables

### Inventory data references

NASIS data

### Type locality

Location 1: Mono County, CA

### Contributors

P.Novak

### Approval

Kendra Moseley, 4/10/2024

### 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	05/19/2024
Approved by	Kendra Moseley
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:**
- 
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:

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17. **Perennial plant reproductive capability:**

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