

## Ecological site R026XF065CA Ashy Sodic Basin

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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 Bodie Hills LRU straddles the California-Nevada state boundary, just north of Mono Lake. The area is underlain by late Miocene age volcanic fields with upper Miocene and Pliocene sedimentary deposits over top. The youngest faults in the area are north and north-east striking. Extensive zones of hydrothermally altered rocks and large mineral deposits, including gold and silver rich veins, formed during hydrothermally active periods of the Miocene (John et al. 2015). A primary distinguishing factor between the Bodie Hills and other hills in MLRA 26 is the dominance of volcanic parent material. Elevations range from 2170 to 2650 meters and slopes typically range from 5 to 35 percent. FFD range from 75-105.

## Ecological site concept

The Ashy Sodic Basin site occurs on lake basins. The soils are typically moderately deep to very deep and somewhat poorly drained formed in lacustrine sediments derived from volcanic rocks, with additions of volcanic ash. The dominant vegetation is Lemmon's alkaligrass (*Puccinellia lemmonii*) and Douglas' sedge (*Carex douglasii*).

## Associated sites

R026XF010CA	<b>Wet Meadow</b>
R026XY049NV	<b>MOUNTAIN BASIN</b>

## Similar sites

R026XF010CA	<b>Wet Meadow</b>
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**Table 1. Dominant plant species**

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Puccinellia lemmonii</i> (2) <i>Carex douglasii</i>

## Physiographic features

The Ashy Sodic Basin site occurs on lake basins. Slopes range from 0 to 2 percent. Elevations are 7300 to 7400 feet.

**Table 2. Representative physiographic features**

Landforms	(1) Lake plain
Ponding duration	Brief (2 to 7 days) to very long (more than 30 days)
Ponding frequency	Rare to frequent
Elevation	2,225–2,256 m
Slope	0–2%
Ponding depth	0–3 cm
Water table depth	51–102 cm

## Climatic features

The climate on this site is subhumid continental, characterized by cold, moist winters, and cool dry summers.

Average annual precipitation is 14 to 16 inches. Mean annual air temperature is 42 to 44 degrees F. The average growing season is about 40 to 70 days.

**Table 3. Representative climatic features**

Frost-free period (characteristic range)	
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	356-406 mm
Frost-free period (average)	70 days
Freeze-free period (average)	
Precipitation total (average)	406 mm

### Influencing water features

The Ashy Sodic Basin is a run-in site. Water from higher in the landscape drains into the site. Because of this, the site has ponded water on the soil surface, and a water table from 20 to 40 inches to the soil surface.

### Soil features

The soils in this site are typically moderately deep to very deep and somewhat poorly drained formed in lacustrine sediments derived from volcanic rocks, with additions of volcanic ash.

Soils correlated to this ecological site include Aquicambidic Haplodurids and Vitrandic Torriorthents.

**Table 4. Representative soil features**

Parent material	(1) Lacustrine deposits–volcanic rock (2) Volcanic ash (3) Eolian deposits
Surface texture	(1) Ashy loam (2) Ashy sandy loam
Family particle size	(1) Ashy
Drainage class	Somewhat poorly drained
Permeability class	Moderately rapid
Depth to restrictive layer	51–152 cm
Surface fragment cover <=3"	10%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	8.13–18.03 cm
Calcium carbonate equivalent (Depth not specified)	1–5%
Clay content (Depth not specified)	10–14%
Electrical conductivity (Depth not specified)	8–32 mmhos/cm
Sodium adsorption ratio (Depth not specified)	31–45
Soil reaction (1:1 water) (Depth not specified)	9.1–11
Subsurface fragment volume <=3" (Depth not specified)	10–20%

Subsurface fragment volume >3" (Depth not specified)	0%
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## Ecological dynamics

This is not a stable plant community. The site may be completely water covered during the growing season, or it can be a very productive site, dominated by annual forbs in drier years.

Determinations of range condition are not appropriate for this site.

### Fire Ecology:

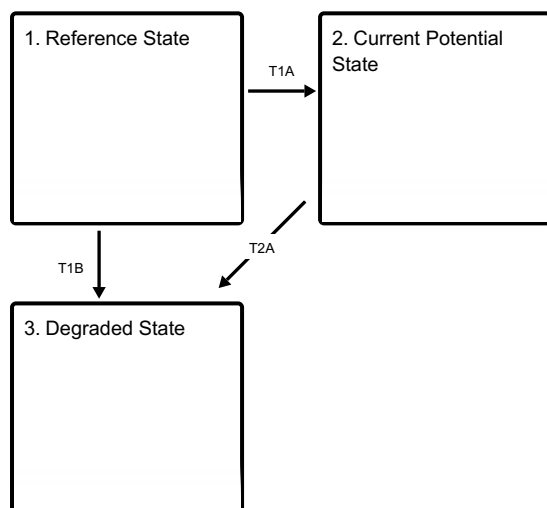
Sedge is top-killed by fire, with rhizomes protected by insulating soil. The rhizomes of sedge species may be killed by high-severity fires that remove most of the soil organic layer. Reestablishment after fire occurs by seed establishment and/or rhizomatous spread.

Due to the deep soils, fertility, inherent high productivity of the site and relatively flat slopes, it is fairly resistant to disturbances that can potentially degrade the site. Site degradation is usually the result of lowering of the water table. This can occur with down cutting of adjacent stream channels or significant run-off following prolonged drought. This can result from on-site improper grazing or off-site conditions in the upper watershed. Once adjacent streams down-cut, concentrated flows lower the water table.

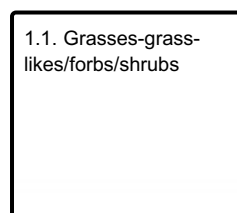
Season-long grazing can be very detrimental to this site. Excessive utilization is also detrimental. The grasses in the plant community will decline in the stand and sedges, rushes and forbs will increase. Continued improper grazing management will result in a stand of forbs and Kentucky bluegrass with sedges and rushes. This results in a reduced ability of the community to withstand seasonal flooding. Down cutting of adjacent streams can result. This down cutting will lower the water table and thus reduce the potential of the site.

## State and transition model

### Ecosystem states



### State 1 submodel, plant communities



**State 2 submodel, plant communities**

2.1. Grasses-grass-likes/shrubs/non-native plants

**State 3 submodel, plant communities**

3.1. Non-native grasses/Drought tolerant native grasses

**State 1  
Reference State**

The Reference state is dominated by Nevada bluegrass. In the last few thousand years, this site has evolved in an arid climate characterized by warm, dry summers and cold, wet winters. Flooding and high water table have also influenced the development of this site. Herbivory has historically occurred on this site at low levels of utilization. Herbivores include pronghorn antelope, mule deer, Rocky Mountain elk, sage grouse, lagomorphs and small rodents. Fire has historically occurred on the site and- normally burns in conjunction with an adjacent upland site.

**Community 1.1  
Grasses-grass-likes/forbs/shrubs**

The reference plant community is dominated by Lemmon's alkaligrass and Douglas sedge. Potential vegetative composition is approximately 75 percent grasses and grass-like plants and 25 percent forbs and shrubs. Approximate ground cover (basal and crown) is 30 to 50 percent.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	168	336	504
Shrub/Vine	28	56	84
Forb	28	56	84
<b>Total</b>	<b>224</b>	<b>448</b>	<b>672</b>

**State 2  
Current Potential State**

The Current Potential State is similar to the Reference State with the exception of non-native species.

**Community 2.1  
Grasses-grass-likes/shrubs/non-native plants**

The reference plant community is dominated by Lemmon's alkaligrass and Douglas sedge. Potential vegetative composition is approximately 75 percent grasses and grass-like plants and 25 percent forbs and shrubs. Approximate ground cover (basal and crown) is 30 to 50 percent.

**State 3  
Degraded State**

This plant community is dominated by Kentucky bluegrass and white sagebrush but the overall production potential of the site is much lower than State 1. There is an increase in forbs and grasses that require less soil moisture. Kentucky bluegrass, foxtail barley, bottlebrush squirreltail and Sandberg bluegrass may have invaded or increased in the community. This state developed due to continued improper grazing management and a permanent lowering of the water table. The site has crossed the threshold. This state cannot be returned to State 1 without raising the water table. This might be done using structures or bio-engineering over time, but the plant community may take many years to approach the plant community in State 1.

### **Community 3.1**

#### **Non-native grasses/Drought tolerant native grasses**

This plant community is dominated by non-native grass, like Kentucky bluegrass, but the overall production potential of the site is much lower than State 1. There is an increase in forbs and grasses that require less soil moisture. Kentucky bluegrass, foxtail barley, bottlebrush squirreltail and Sandberg bluegrass may have invaded or increased in the community.

### **Transition T1A**

#### **State 1 to 2**

Establishment of non-native plants.

### **Transition T1B**

#### **State 1 to 3**

Develops through permanently lowering the late growing season water table to more than 60 inches. This can occur with continued improper grazing management. It may also occur with proper grazing on the site, but channel erosion may continue if poor off-site conditions cause frequent and/or severe flooding.

### **Transition T2A**

#### **State 2 to 3**

Develops through permanently lowering the late growing season water table to more than 60 inches. This can occur with continued improper grazing management. It may also occur with proper grazing on the site, but channel erosion may continue if poor off-site conditions cause frequent and/or severe flooding.

## **Additional community tables**

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Primary Grasses/Grasslikes</b>			269–359	
	Lemmon's alkaligrass	PULE	<i>Puccinellia lemmonii</i>	179–247	–
	Douglas' sedge	CADO2	<i>Carex douglasii</i>	90–112	–
2	<b>Secondary Perennial Grasses/Grasslikes</b>			22–45	
	saltgrass	DISP	<i>Distichlis spicata</i>	2–9	–
	meadow barley	HOB2	<i>Hordeum brachyantherum</i>	2–9	–
	mat muhly	MURI	<i>Muhlenbergia richardsonis</i>	2–9	–
	seaside arrowgrass	TRMA20	<i>Triglochin maritima</i>	2–9	–
<b>Forb</b>					
3	<b>Perennial Forbs</b>			67–135	
	California rayless fleabane	ERIN2	<i>Erigeron inornatus</i>	45–67	–
	California hesperochiron	HECA7	<i>Hesperochiron californicus</i>	2–4	–
	Rocky Mountain iris	IRMI	<i>Iris missouriensis</i>	2–4	–
	sagebrush false dandelion	NOTR2	<i>Nothocalais troximoides</i>	2–4	–
	cutleaf cinquefoil	POMI4	<i>Potentilla millefolia</i>	2–4	–
<b>Shrub/Vine</b>					
4	<b>Secondary Shrubs</b>			0–22	
	silver sagebrush	ARCA13	<i>Artemisia cana</i>	2–9	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	2–9	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	2–9	–

## Animal community

Wildlife Interpretations:

Sedges have a high to moderate resource value for elk and a medium value for mule deer. Elk consume beaked sedge later in the growing season.

## Type locality

Location 1: Mono County, CA	
Latitude	38° 12' 37"
Longitude	119° 9' 26"
General legal description	Big Alkali, 8 miles west of Bodie, Ca

## Other references

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

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

## Contributors

A. Mushrush

## Approval

## 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:**

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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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