

## **Ecological site R027XY068NV GRANITIC CLAYPAN 8-10 P.Z.**

Last updated: 6/03/2024  
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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): 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 Granitic Claypan 8-10 P.Z. site occurs on mountains and hills on all aspects. Slope gradients of 4 to 50 percent are typical. Elevations are 4100 to 6600 feet. The soils are shallow to very shallow and well drained. The soil surface is moderately coarse textured and is usually gravelly. Subsurface layers are moderately fine textured. Lithic or paralithic material is usually present within 20 inches and restricts root penetration.

### Associated sites

R027XY020NV	<b>SHALLOW CLAYPAN 8-10 P.Z.</b> Less productive site; ACSP12 dominant grass
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### Similar sites

R027XY070NV	<b>DROUGHTY CLAYPAN 8-10 P.Z.</b> Less productive site; SAVEB major shrub
R027XY079NV	<b>GRAVELLY CLAYPAN 8-10 P.Z.</b> Less productive site; ACTH7 dominant grass
R027XY049NV	<b>COBBLY CLAYPAN 8-10 P.Z.</b> ARAR8 dominant shrub; less productive site
R027XY087NV	<b>CLAYPAN 14+ P.Z.</b> ARAR8 dominant shrub
R027XY046NV	<b>COBBLY CLAYPAN 12-14 P.Z.</b> ARAR8 dominant shrub; FEID dominant grass
R027XY083NV	<b>MOUNTAIN RIDGE</b> ARAR8 dominant shrub; less productive site

**Table 1. Dominant plant species**

Tree	Not specified
Shrub	(1) <i>Artemisia arbuscula ssp. longicaulis</i>
Herbaceous	(1) <i>Achnatherum speciosum</i>

### Physiographic features

The Granitic Claypan 8-10 P.Z. site occurs on mountains and hills on all aspects. Slope gradients of 4 to 50 percent are typical. Elevations are 4100 to 6600 feet.

**Table 2. Representative physiographic features**

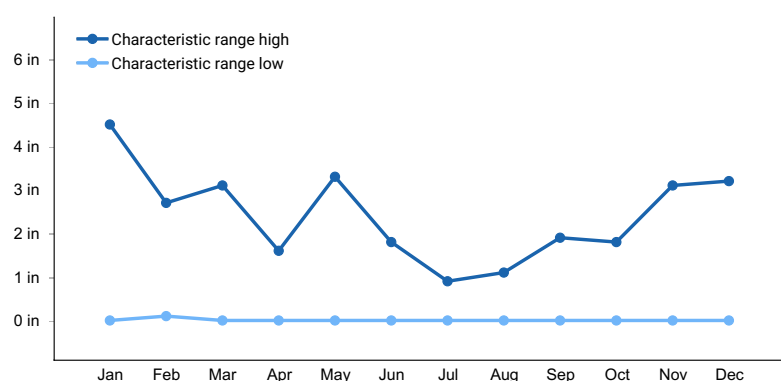
Landforms	(1) Hill (2) Mountain
Runoff class	High to very high
Elevation	4,100–6,600 ft
Slope	4–50%
Water table depth	72 in
Aspect	Aspect is not a significant factor

## Climatic features

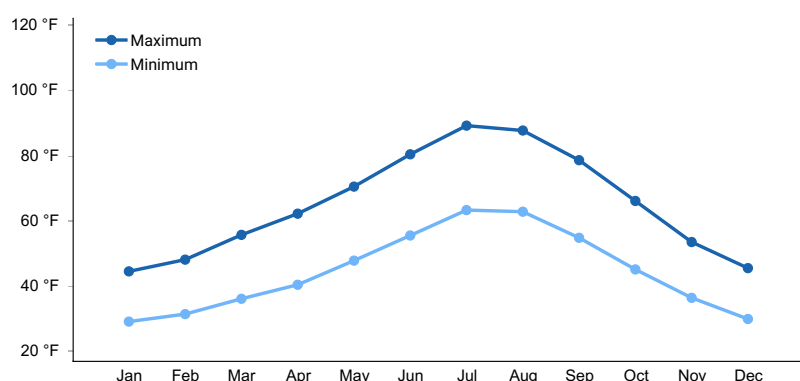
The climate is semiarid with cool, moist winters and warm, dry summers. Average annual precipitation is 8 to 10 inches. Mean annual air temperature is 48 to 55 degrees F. The average growing season is about 90 to 120 days.

**Table 3. Representative climatic features**

Frost-free period (average)	120 days
Freeze-free period (average)	
Precipitation total (average)	10 in



**Figure 1. Monthly precipitation range**



**Figure 2. Monthly average minimum and maximum temperature**

## Influencing water features

There are no influencing water features associated with this site.

## Soil features

The soils associated with this site are shallow to very shallow and well drained. These soils have formed in residuum from mixed rock sources. The soil surface is moderately coarse textured and is usually gravelly. Subsurface layers are moderately fine textured. Lithic or paralithic material is usually present within 20 inches and

restricts root penetration. Available water capacity is very low. Infiltration is rapid and permeability is moderately slow. Surface runoff is high to very high and the potential for sheet and rill erosion is moderate. The soil series associated with this site includes: Soar.

**Table 4. Representative soil features**

Parent material	(1) Alluvium
Surface texture	(1) Very gravelly coarse sandy loam (2) Very gravelly sandy clay loam (3) Very gravelly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow
Soil depth	6–14 in
Surface fragment cover ≤3"	40–50%
Surface fragment cover >3"	5–25%
Available water capacity (0–40in)	0.4–0.7 in
Calcium carbonate equivalent (0–40in)	0%
Electrical conductivity (0–40in)	0 mmhos/cm
Sodium adsorption ratio (0–40in)	0
Soil reaction (1:1 water) (0–40in)	6.6–7.4
Subsurface fragment volume ≤3" (Depth not specified)	35–50%
Subsurface fragment volume >3" (Depth not specified)	0–2%

## Ecological dynamics

As ecological condition deteriorates, Lahontan sagebrush, Douglas' rabbitbrush, bottlebrush squirreltail, and Sandberg's bluegrass increase while desert needlegrass decreases. Following major disturbances such as wildfire, winterfat, spiny hopsage and Nevada ephedra increase. Species likely to invade this site are cheatgrass, halogeton, and annual mustards.

### Fire Ecology:

The mean fire return intervals for Lahontan sagebrush communities have been estimated to be from 35 to over 100 years. Fire most often occurs during wet years with high forage production. Lahontan sagebrush is very susceptible to fire damage. Lahontan sagebrush is usually killed by fire and does not re-sprout. The recovery in burned areas is usually via small, light, wind-dispersed seed for all low sagebrush subspecies. Partially injured Lahontan sagebrush may re-grow from living branches, but sprouting does not occur.

Spiny hopsage is considered to be somewhat fire tolerant and often survives fires that kill sagebrush. Mature spiny hopsage generally sprout after being burned. Spiny hopsage is reported to be least susceptible to fire during summer dormancy.

Winterfat is either killed or top-killed by fire, depending on fire severity. Severe fire can kill the perennating buds located several inches above the ground surface and thus kills the plant. In addition, severe fire usually destroys seed on the plant. Low-severity fire scorches or only partially consumes the aboveground portions of winterfat and thus does not cause high mortality.

Desert needlegrass has persistent dead leaf bases, which make it susceptible to burning. Fire removes the accumulation; a rapid, cool fire will not burn deep into the root crown. Most perennial grasses have root crowns that

can survive wildfire.

## **State and transition model**

## 1: Reference State

### Community Phase 1.1

Lahontan sagebrush & desert needlegrass dominant  
Other species include; Spiny hopsage, winterfat, Indian ricegrass, Bailey's greasewood and forbs

### Community Phase 1.2

Lahontan sagebrush decreases  
Perennial bunchgrasses and native forbs increase

### Community Phase 1.3

Lahontan sagebrush and other shrubs increase  
Perennial herbaceous understory is reduced

T1A

## State 2

### Community Phase 2.1

Lahontan sagebrush & desert needlegrass dominant  
Other species include; Spiny hopsage, winterfat, Indian ricegrass, Bailey's greasewood and forbs  
Annual non-native species present

### Community Phase 2.2

Lahontan sagebrush decreases  
Perennial bunchgrasses increasing, sprouting shrubs stable to increasing  
Annual non-native species stable to increasing

### Community Phase 2.3 (At Risk)

Lahontan sagebrush & shallow-rooted perennial (bluegrass & squirreltail) bunchgrass increases  
Deep-rooted perennial bunchgrass (desert needlegrass) decrease  
Annual non-native species stable to increasing

T2A

R3A

T2B

## State 3

### Community Phase 3.1

Decadent Lahontan sagebrush and rabbitbrush dominate overstory  
Deep-rooted perennial bunchgrass (desert needlegrass) decreases  
Shallow-rooted bunchgrasses (bluegrass) may or may not be present or dominant  
Annual non-native species increase  
Bare ground increases

### Community Phase 3.2

Shallow rooted bunchgrass dominates site  
Annual non-native species may be present to increasing, but are not dominant  
Trace amounts of sagebrush, rabbitbrush, spiny hopsage may be present

## State 4

### Community Phase 4.1

Annual non-natives, cheatgrass tansy mustard, etc., dominate site

### Community Phase 4.2

Spiny hopsage, rabbitbrush, Bailey's greasewood, and/or Lahontan sagebrush dominate overstory  
Annual non-natives dominate understory  
Bare ground increasing

T3A

3.1A

3.2A

4.1A

4.2A



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**Reference State 1.0:** This state is a representative of the natural range of variability under pristine conditions. State dynamics are maintained by interactions between climatic patterns and disturbance regimes, including fires set by Native peoples. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. Plant community phase changes are primarily driven by fire, periodic drought and/or insect or disease attack.

**Community Phase 1.1:**

Lahontan sagebrush and desert needlegrass dominate the site. Spiny hopsage is common. Shadscale, bud sagebrush and Bailey's greasewood are associated species. Forbs are present but not abundant. This site is tolerant of dry conditions, but prolonged drought will result in an overall decline, with possible mortality, in the plant community.

**Community Phase Pathway 1.1a:** Fire would decrease or eliminate the overstory of sagebrush and allow the perennial bunchgrasses to dominate the site. Fires would typically be small and patchy due to low fuel loads. A fire following an unusually wet spring may be more severe and reduce sagebrush cover to trace amounts. A severe infestation of Aroga moth could also reduce large areas of sagebrush canopy cover, giving a competitive advantage to the perennial grasses and forbs.

**Community Phase Pathway 1.1b:** Time and lack of disturbance such as fire allows for sagebrush to increase and become decadent. Long-term drought, herbivory, or combinations of these would cause a decline in perennial bunchgrasses and fine fuels and lead to a reduced fire frequency allowing big sagebrush to dominate the site.

**Community Phase 1.2:** This community phase is characteristic of a post-disturbance, early seral community phase. Desert needlegrass and other perennial grasses dominate. Depending on fire severity or intensity of Aroga moth infestation, patches of intact sagebrush may remain.

**Community Phase Pathway 1.2a:** Absence of disturbance over time coupled with natural regeneration allows sagebrush to increase. Patches of mature sagebrush required for a seed source are important for recovery to community phase 1.1.

**Community Phase 1.3:**

Lahontan sagebrush increases in the absence of disturbance. Decadent sagebrush dominates the overstory and the deep-rooted perennial bunchgrasses in the understory are reduced either from competition with shrubs and/or from herbivory.

**Community Phase 1.3a:** Fire would decrease or eliminate the overstory of sagebrush and allows perennial bunchgrasses to dominate the site. Under natural conditions fires are typically low severity resulting in a mosaic pattern due to low fine fuel loads. A fire following an unusually wet spring favoring an increase in fine fuels, may be more severe and reduce sagebrush cover to trace amounts. A severe infestation of Aroga moth could also cause a large decrease in sagebrush within the community, giving a competitive advantage to the perennial grasses and forbs.

**Community Phase Pathway 1.3b:** A low severity patchy fire, Aroga moth or combination would reduce the sagebrush overstory and create a sagebrush/grass mosaic with sagebrush and perennial bunchgrasses co-dominant.

**T1A: Transition from Reference State 1.0 to Current Potential State 2.0**

**Trigger:** This transition is caused by the introduction of non-native annual weeds, such as cheatgrass, mustards, bur buttercup and halogeton.

**Slow variables:** Over time the annual non-native plants will increase within the community.

**Threshold:** Any amount of introduced non-native species causes an immediate decrease in the resilience of the site. Annual non-native species cannot be easily removed from the system and have the potential to significantly alter disturbance regimes from their historic range of variation.

**Current Potential State 2.0:**

This state is similar to the Reference State 1.0. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of non-natives. Non-natives may increase in abundance but will not become dominant within this State. These non-natives can be highly flammable and can promote fire where historically fire had been infrequent. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These feedbacks include the presence of all structural and functional groups, low fine fuel loads and retention of organic matter and nutrients. Positive feedbacks decrease ecosystem resilience and stability of the state. These include the non-natives' high seed output, persistent seed bank, rapid growth rate, ability to cross pollinate and adaptations for seed dispersal.



Community Phase 2.1: Lahontan sagebrush and desert needlegrass dominate the site. Spiny hopsage is common. Shadscale, bud sagebrush and Bailey's greasewood are associated species. Forbs are present but not abundant. Non-native annual species are present.

Community Phase Pathway 2.1a: Fire reduces shrub overstory and allows for perennial bunchgrasses to dominate the site. Fires are typically low severity resulting in a mosaic pattern due to low fuel loads. A fire following an unusually wet spring or a change in management favoring an increase in fine fuels, may be more severe and reduce sagebrush cover to trace amounts. A severe infestation of Aroga moth could also cause a large decrease in sagebrush cover, reducing competition with perennial grasses and forbs. Annual non-native species are likely to increase after fire.

Community Phase Pathway 2.1b: Natural regeneration over time and lack of disturbance such as fire allows for sagebrush to increase and become decadent. Chronic drought reduces fine fuels and leads to a reduced fire frequency allowing sagebrush to dominate the site. Inappropriate growing season grazing reduces the deep-rooted perennial bunchgrass understory; conversely Sandberg bluegrass may increase in the understory depending on grazing management. Excessive sheep grazing favors Sandberg bluegrass; however, where cattle and/or horses are the dominant grazers, cheatgrass often increases.

Community Phase 2.2: This community phase is characteristic of a post-disturbance, early seral community phase. Desert needlegrass and other perennial grasses dominate. Lahontan sagebrush is present in trace amounts. Depending on fire severity or intensity of Aroga moth infestations, patches of intact sagebrush may remain. Rabbitbrush may be sprouting. Forbs may increase post-fire but will likely return to pre-burn levels within a few years. Annual non-native species generally respond well after fire and may be stable or increasing within the community.

Community Phase Pathway 2.2a: Natural regeneration over time and lack of disturbance and/or grazing management that favors the establishment and growth of sagebrush allows the shrub component to recover. The establishment of Lahontan sagebrush can take many years and is dependent on multiple years of favorable weather conditions.

Community Phase 2.3 (at risk): This community is at risk of crossing a threshold to another state. Sagebrush dominates the overstory and deep-rooted perennial bunchgrasses in the understory are reduced, either from competition with shrubs or from inappropriate grazing management, or from both. Rabbitbrush may be a significant component. Sandberg bluegrass may increase and become co-dominate with deep rooted bunchgrasses. Annual non-natives species may be stable or increasing due to lack of competition with perennial bunchgrasses. This site is susceptible to further degradation from excessive grazing, prolonged drought, and/or fire.

Community Phase Pathway 2.3a: A change in grazing management that decreases shrubs would allow the perennial bunchgrasses in the understory to increase. Heavy late-fall/winter grazing may cause mechanical damage and subsequent death to sagebrush, facilitating an increase in the herbaceous understory. An infestation of Aroga moth or a low severity fire would reduce some sagebrush overstory and allow perennial grasses to increase in the community. Brush management with minimal soil disturbance would also decrease sagebrush and release the herbaceous perennial understory. Annual non-native species are present and may increase in the community.

Community Phase Pathway 2.3b: Fire would decrease or eliminate the overstory of sagebrush and allow perennial bunchgrasses to dominate the site. Fires would typically be small and patchy due to low fuel loads. A fire following an unusually wet spring or a change in management may be more severe and reduce sagebrush cover to trace amounts. A severe infestation of Aroga moth could also cause a large decrease in sagebrush within the community, giving a competitive advantage to the perennial grasses and forbs.

T2A: Transition from Current Potential State 2.0 to Shrub State 3.0

Trigger: Inappropriate, long-term grazing of perennial bunchgrasses during the growing season favors an increase in sagebrush.

Slow variables: Long term decrease in deep-rooted perennial grass density.

Threshold: Loss of deep-rooted perennial bunchgrasses changes spatial and temporal nutrient cycling and nutrient redistribution, and reduces soil organic matter.

T2B: Transition from Current Potential State 2.0 to Annual State 4.0

Trigger: To Community Phase 4.1: Severe fire and/or soil disturbing treatments that cause Lahontan sagebrush mortality. To Community Phase 4.2: Inappropriate grazing management that favors shrubs in the presence of non-native species.

Slow variables: Increased production and cover of non-native annual species.

Threshold: Loss of deep-rooted perennial bunchgrasses and shrubs truncates, spatially and temporally, nutrient capture and cycles within the community. Increased, continuous fine fuels



temporary, nutrient capture and cycling within the community, increased, continuous fine fuels from annual non-native plants modify the fire regime by changing intensity, size and spatial variability of fires.

#### Shrub State 3.0:

This state is a product of many years of heavy grazing during time periods harmful to perennial bunchgrasses. Sandberg bluegrass may increase with a reduction in deep rooted perennial bunchgrass competition and may become the dominate grass or the herbaceous understory may be completely eliminated. Sagebrush dominates the overstory and spiny hopsage, Nevada ephedra, Bailey's greasewood and/or rabbitbrush may be a significant component. Sagebrush cover exceeds site concept and may be decadent, reflecting stand maturity and lack of seedling establishment due to competition with mature plants. The shrub overstory dominates site resources such that soil water, nutrient capture, nutrient cycling and soil organic matter are temporally and spatially redistributed. Bare ground may be significant with soil redistribution occurring between interspace and canopy locations.

#### Community Phase 3.1:

Lahontan sagebrush dominates overstory and spiny hopsage, Bailey's greasewood and/or rabbitbrush may be a significant component. Deep-rooted perennial bunchgrasses may be present in trace amounts or absent from the community. Sandberg bluegrass may dominate the understory. Annual nonnative species are present and may be co-dominant. Bare ground is significant.

Community Phase Pathway 3.1a: Fire, heavy fall grazing causing mechanical damage to shrubs, and/or brush treatments with minimal soil disturbance, will greatly reduce the overstory shrubs to trace amounts and allow Sandberg bluegrass to dominate the site.

#### Community Phase 3.2

Bluegrass dominates the site; annual non-native species may be present but are not dominant.

Trace amounts of sagebrush may be present. Sprouting shrubs such as spiny hopsage, Nevada ephedra, horsebrush or rabbitbrush may be dominant. Shadscale may be increasing

Community Phase Pathway 3.2a: Time and lack of disturbance and/or grazing management that favors the establishment and growth of sagebrush allows the shrub component to recover. The re-establishment of Lahontan sagebrush can take many years.

#### T3A: Transition from Shrub State 3.0 to Annual State 4.0

Trigger: Severe/repeated fire and/or soil disturbing treatments. Possible soil disturbing treatments include attempted restoration with drought tolerant perennials, such as crested wheatgrass. Restoration attempts causing soil disturbance will likely initiate a transition to an annual state. Probability of success very low. Inappropriate grazing management in the presence of annual non-native species.

Slow variables: Increased production and cover of non-native annual species.

Threshold: Increased, continuous fine fuels modify the fire regime by changing intensity, size and spatial variability of fires. Changes in plant community composition and spatial variability of vegetation due to the loss of perennial bunchgrasses and sagebrush truncate energy capture spatially and temporally thus impacting nutrient cycling and distribution.

#### R3A: Restoration from Shrub State 3.0 to Current Potential State 2.0

Brush management with minimal soil disturbance, coupled with seeding of deep rooted perennial native bunchgrasses. Probability of success very low. Mechanical brush management, mowing, etc., should be considered carefully. There are multiple reports of Lahontan sagebrush sprouting from the root-crown following mowing, perpetuating the shrub state.

#### Annual State 4.0:

This community is characterized by the dominance of annual non-native species such as cheatgrass and tansy mustard in the understory. Sprouting shrubs such as rabbitbrush, spiny hopsage and Bailey's greasewood may dominate the overstory.

#### Community Phase 4.1

Annual non-native plants such as cheatgrass or tansy mustard dominate the site. Rabbitbrush may or may not be present.

Community Phase Pathway 4.1a: Time and lack of fire allows for the sagebrush to establish.

Probability of sagebrush establishment is extremely low.

Community Phase 4.2: Sprouting shrubs such as spiny hopsage and rabbitbrush, along with shadscale dominate overstory. Lahontan sagebrush may be a minor component. Annual non-native species dominate understory. Trace amounts of desirable bunchgrasses may be present. Bare ground is significant.

Community Phase Pathway 4.2a: Fire removes sagebrush and allows for annual non-native species to dominate the site.

## State 1 Reference Plant Community

### Community 1.1 Reference Plant Community

The reference plant community is dominated by Lahontan sagebrush and desert needlegrass. Potential vegetative composition is about 60% grasses, 5% forbs and 35% shrubs. Approximate ground cover (basal and crown) is 20 to 30 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	210	360	540
Shrub/Vine	123	210	315
Forb	17	30	45
<b>Total</b>	<b>350</b>	<b>600</b>	<b>900</b>

### Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Primary Perennial Grasses</b>			300–360	
	desert needlegrass	ACSP12	<i>Achnatherum speciosum</i>	300–360	–
2	<b>Secondary Perennial Grasses</b>			12–48	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	3–18	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	3–18	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	3–18	–
<b>Forb</b>					
3	<b>Perennial Forbs</b>			12–48	
	buckwheat	ERIOG	<i>Eriogonum</i>	3–18	–
	desertparsley	LOMAT	<i>Lomatium</i>	3–18	–
	phlox	PHLOX	<i>Phlox</i>	3–18	–
	globemallow	SPHAE	<i>Sphaeralcea</i>	3–18	–
<b>Shrub/Vine</b>					
4	<b>Primary Shrubs</b>			174–276	
	little sagebrush	ARARL3	<i>Artemisia arbuscula ssp. longicaulis</i>	150–180	–
	spiny hopsage	GRSP	<i>Grayia spinosa</i>	12–48	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	12–48	–
5	<b>Secondary Shrubs</b>			30–60	
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	3–18	–
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	3–18	–
	bud sagebrush	PIDE4	<i>Picrothamnus desertorum</i>	3–18	–

### Animal community

#### Livestock Interpretations:

This site is suitable for livestock grazing. Grazing management should be keyed to desert needlegrass. Young desert needlegrass is palatable to all classes of livestock. Mature herbage is moderately grazed by horses and cattle, but rarely grazed by sheep.

Lahontan sagebrush is considered a valuable browse plant during the spring, fall and winter months. In some areas it is of little value in winter due to heavy snow.

Spiny hopsage provides a palatable and nutritious food source for livestock, particularly during late winter through spring. Domestic sheep browse the succulent new growth of spiny hopsage in late winter and early spring. Winterfat is an important forage plant for livestock, especially during winter when forage is scarce. Abusive grazing practices have reduced or eliminated winterfat on some areas even though it is fairly resistant to browsing. Effects depend on severity and season of grazing.

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:

Young desert needlegrass is palatable to many species of wildlife. Desert needlegrass produces considerable basal foliage and is good forage while young. Lahontan sagebrush is considered a valuable browse plant during the spring, fall and winter months. In some areas it is of little value in winter due to heavy snow. Mule deer utilize and sometimes prefer Lahontan sagebrush, particularly in winter and early spring. Spiny hopsage provides a palatable and nutritious food source for big game animals. Spiny hopsage is used as forage to at least some extent by domestic goats, deer, pronghorn, and rabbits.

Winterfat is an important forage plant for wildlife, especially during winter when forage is scarce. Winterfat seeds are eaten by rodents and are a staple food for black-tailed jackrabbits. Mule deer and pronghorn antelope browse winterfat. Winterfat is used for cover by rodents. It is potential nesting cover for upland game birds, especially when grasses grow up through its crown.

### Hydrological functions

Runoff is high to very high. Permeability is moderately slow.

### Recreational uses

Aesthetic value is derived from the diverse floral and faunal composition and the colorful flowering of wild flowers and shrubs during the spring and early summer. This site offers rewarding opportunities to photographers and for nature study. This site is used for camping and hiking and has potential for upland and big game hunting.

### Other products

Some Native American peoples traditionally ground parched seeds of spiny hopsage to make pinole flour.

### Other information

Spiny hopsage has moderate potential for erosion control and low to high potential for long-term revegetation projects. It can improve forage, control wind erosion, and increase soil stability on gentle to moderate slopes. Spiny hopsage is suitable for highway plantings on dry sites in Nevada.

Winterfat adapts well to most site conditions, and its extensive root system stabilizes soil. However, winterfat is intolerant of flooding, excess water, and acidic soils.

### Type locality

Location 1: Pershing County, NV	
Township/Range/Section	T25N R26E S8
General legal description	Sahwave Mountains, Pershing County, Nevada.
Location 2: Pershing County, NV	



Township/Range/Section	T24N R21E S32
General legal description	Pyramid Lake Paiute Tribe, Virginia Mountains, Pershing County, Nevada. This site also occurs in Churchill, Lyon, Storey and Washoe 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

DK/GD

## 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.

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Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

- Number and extent of rills:** Rills are none to rare. A few can be expected on steeper slopes in areas subjected to summer convection storms or rapid spring snowmelt.

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- Presence of water flow patterns:** Water flow patterns are none to rare but can be expected in areas subjected to summer convection storms or rapid snowmelt.

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- Number and height of erosional pedestals or terracettes:** Pedestals are rare with occurrence typically limited to area within water flow patterns. Frost heaving of shallow rooted plants should not be considered as normal condition.

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- Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground up to 30% depending on amount of surface rock fragments

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5. **Number of gullies and erosion associated with gullies:** None
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6. **Extent of wind scoured, blowouts and/or depositional areas:** None
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7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage from grasses and annual & perennial forbs) expected to move distance of slope length during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during large rainfall events.
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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):** Soil stability values should be 3 to 6 on most soil textures found on this site. (To be field tested.)
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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically prismatic to columnar or subangular blocky. Soil surface colors are brownish grays and soils are typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is typically 1 to 1.5 percent dropping off quickly below. Organic matter content can be more or less depending on micro-topography.
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Perennial herbaceous plants slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact and provide opportunity for snow catch and accumulation on site.
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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):** Compacted layers are none. Subsoil argillic horizons are not to be interpreted as compacted.
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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: deep-rooted, cool season perennial bunchgrasses
- Sub-dominant: evergreen shrub (Lahontan sagebrush) >associated shrubs>deep-rooted, cool season, perennial forbs> fibrous, shallow-rooted, cool season, annual and perennial forbs= deep-rooted, cool season, perennial grasses
- Other:
- Additional: After wildfires, deep-rooted, cool season perennial bunchgrasses, perennial forbs and sprouting shrubs (spiny hopsage, ephedra, rabbitbrush) dominate. Lahontan sagebrush is removed for 5 to 10 years.
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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead branches within individual shrubs common and standing dead shrub canopy material may be as much as 25% of total woody canopy; some of the mature bunchgrasses (<20%) have dead centers.

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14. **Average percent litter cover (%) and depth ( in):** Between plant interspaces 20-30% and depth <¼-in.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season, ±600 lbs/ac; Favorable years ±900 lbs/ac and unfavorable years ±350 lbs/ac.

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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:** Potential invaders include cheatgrass, medusa head, halogeton, Russian thistle and annual mustards.

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17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season year. Reduced growth and reproduction occur during extended or extreme drought conditions.

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