USDA Natural Resources
Conservation Service

Ecological site R027XY006NV
SALINE BOTTOM

Last updated: 6/03/2024
Accessed: 06/30/2024

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 Saline Bottom site occurs on alluvial flats, lake plains, and lake terraces. Slopes are less than 4 percent, but slope gradients of 0 to 2 percent are most typical. Elevations are 3400 to 5500 feet. The soils are very deep and surface soils are medium to moderately-fine textured. These soils are calcareous and they are strongly salt and sodium affected in their upper profile with soil reaction and salt and sodium concentrations usually decreasing with depth. The soils are poorly to somewhat-poorly drained and have a seasonally high water table at depths of 24 to 30 inches.

Associated sites

R027XY005NV	**SALINE MEADOW**
R027XY025NV	**SODIC FLAT**

Similar sites

R027XY025NV	**SODIC FLAT** Much less productive site; DISP dominant grass
R027XY091NV	**LOAMY FAN 10-12 P.Z.** SAVE4 & DISP absent; soils not saline-alkali affected
R027XY041NV	**DEEP SODIC FAN** ATTO dominant shrub; ARTRT is a common shrub
R027XY044NV	**SALINE FLAT** Less productive site; ATTO dominant shrub
R027XY003NV	**LOAMY BOTTOM** More productive site; SAVE4 and DISP absent; soils not saline-alkali affected
R027XY024NV	**SODIC TERRACE** Much less productive site; ATCO and SAVE4 codominant shrubs

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Sarcobatus vermiculatus*
Herbaceous	(1) *Leymus cinereus*

Physiographic features

The Saline Bottom site occurs on alluvial flats, lake plains, and Lake terraces. Slopes range from 0 to 4 percent, but slope gradients of 0 to 2 percent are most typical. Elevations are 3400 to 5500 feet.

Table 2. Representative physiographic features

Landforms	(1) Lake plain (2) Alluvial flat (3) Lake terrace
Runoff class	Negligible to very high
Flooding duration	Very brief (4 to 48 hours) to long (7 to 30 days)
Flooding frequency	Rare to frequent
Ponding frequency	None
Elevation	3,400–5,500 ft
Slope	0–4%
Water table depth	24–30 in
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is arid, characterized by 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 120 to 220 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	104-109 days
Freeze-free period (characteristic range)	143-144 days
Precipitation total (characteristic range)	5-6 in
Frost-free period (actual range)	103-110 days
Freeze-free period (actual range)	143-144 days
Precipitation total (actual range)	5-6 in
Frost-free period (average)	107 days
Freeze-free period (average)	144 days
Precipitation total (average)	6 in

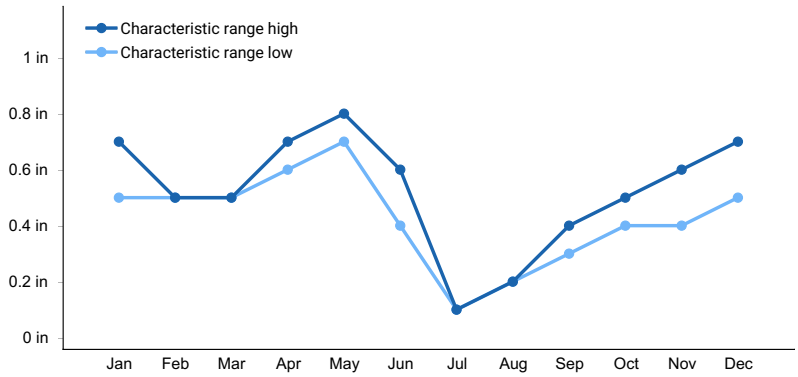


Figure 1. Monthly precipitation range

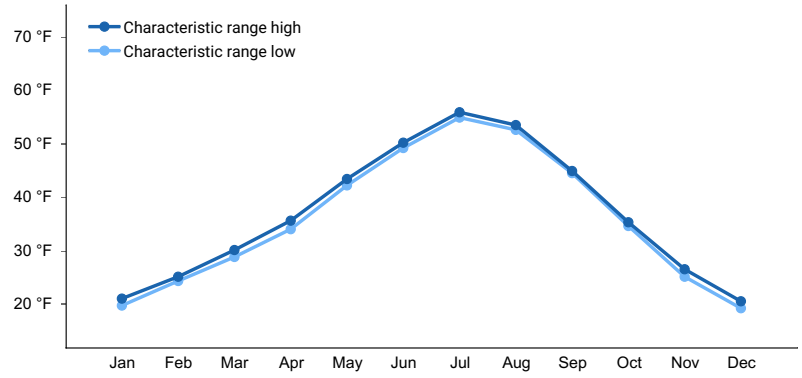


Figure 2. Monthly minimum temperature range

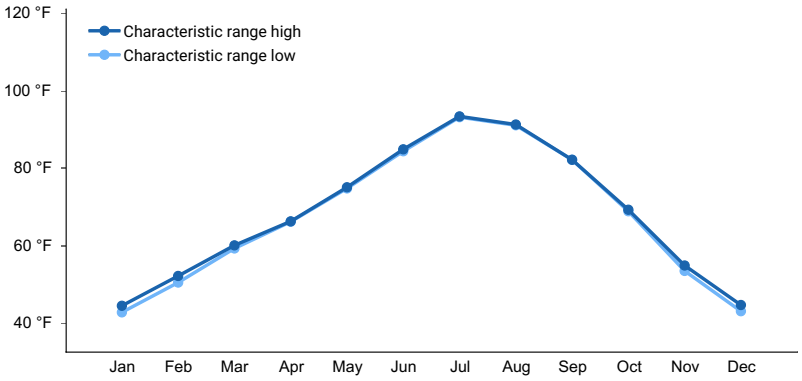


Figure 3. Monthly maximum temperature range

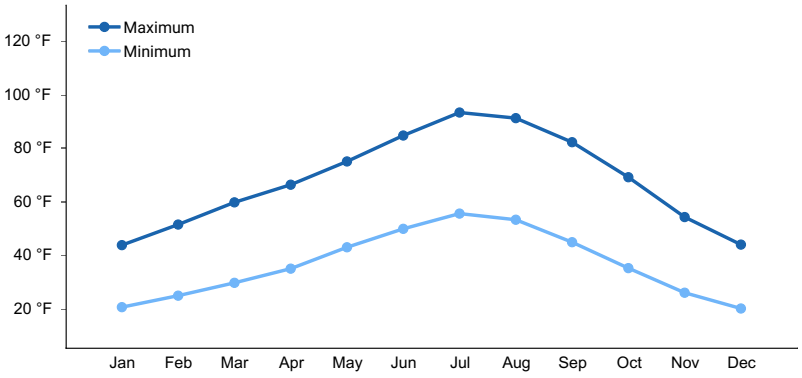


Figure 4. Monthly average minimum and maximum temperature

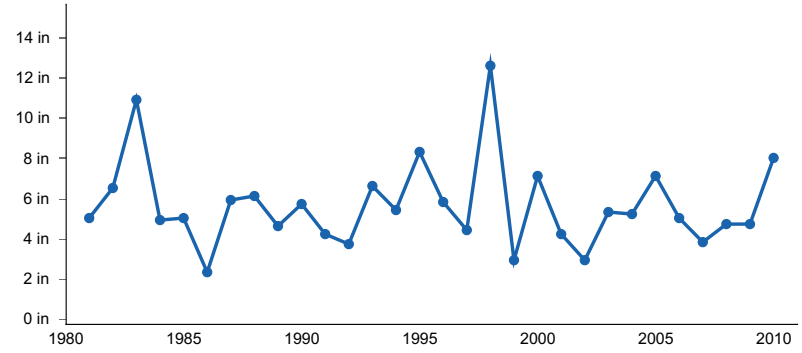


Figure 5. Annual precipitation pattern

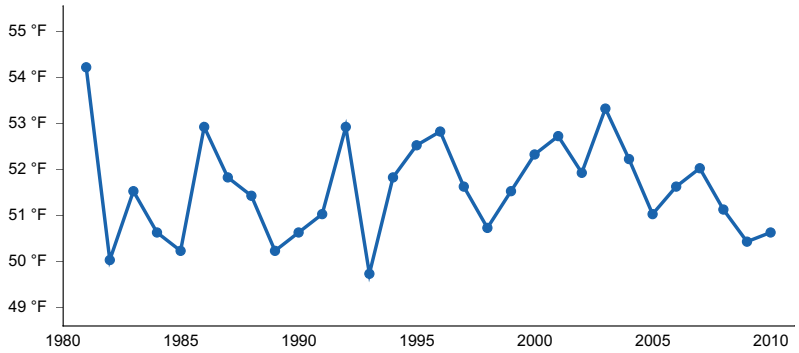


Figure 6. Annual average temperature pattern

Climate stations used

- (1) FALLON EXP STN [USC00262780], Fallon, NV
- (2) LOVELOCK [USC00264698], Lovelock, NV

Influencing water features

This site is associated with adjacent streams.

Soil features

The soils associated with this site are very deep. Surface soils are less than 10 inches thick and are medium to moderately-fine textured. These soils are calcareous and they are strongly salt and sodium affected in their upper profile with soil reaction and salt and sodium concentrations usually decreasing with depth. The soils are poorly to somewhat-poorly drained and have a seasonally high water table at depths of 24 to 30 inches. Additional moisture is received on this site during the winter and spring months as run-in from higher landscapes or occasional brief overflow from adjacent streams. Wetting of these soils dilutes their salt and sodium concentrations and the degree of salinity and alkalinity fluctuates widely through the year. Permeability is very slow to moderate and available water capacity is low to high. The surface layer of these soils will crust and bake upon drying, inhibiting water infiltration and seedling emergence. Runoff is high to very high and ponding occurs in some areas. Potential for sheet and rill erosion is slight. The soil series associated with this site include Armydrain, Bigmeadow, Brinker, Fernley, Nuyobe, Ocala, Ryepatch, Settlement, and Wabuska.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Loam (2) Silty clay loam (3) Silt loam
Family particle size	(1) Loamy
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Very slow to moderate
Soil depth	72–84 in
Surface fragment cover <=3"	2–7%
Surface fragment cover >3"	1–2%
Available water capacity (0-40in)	4.3–7.9 in
Calcium carbonate equivalent (0-40in)	0–30%
Electrical conductivity (0-40in)	2–32 mmhos/cm

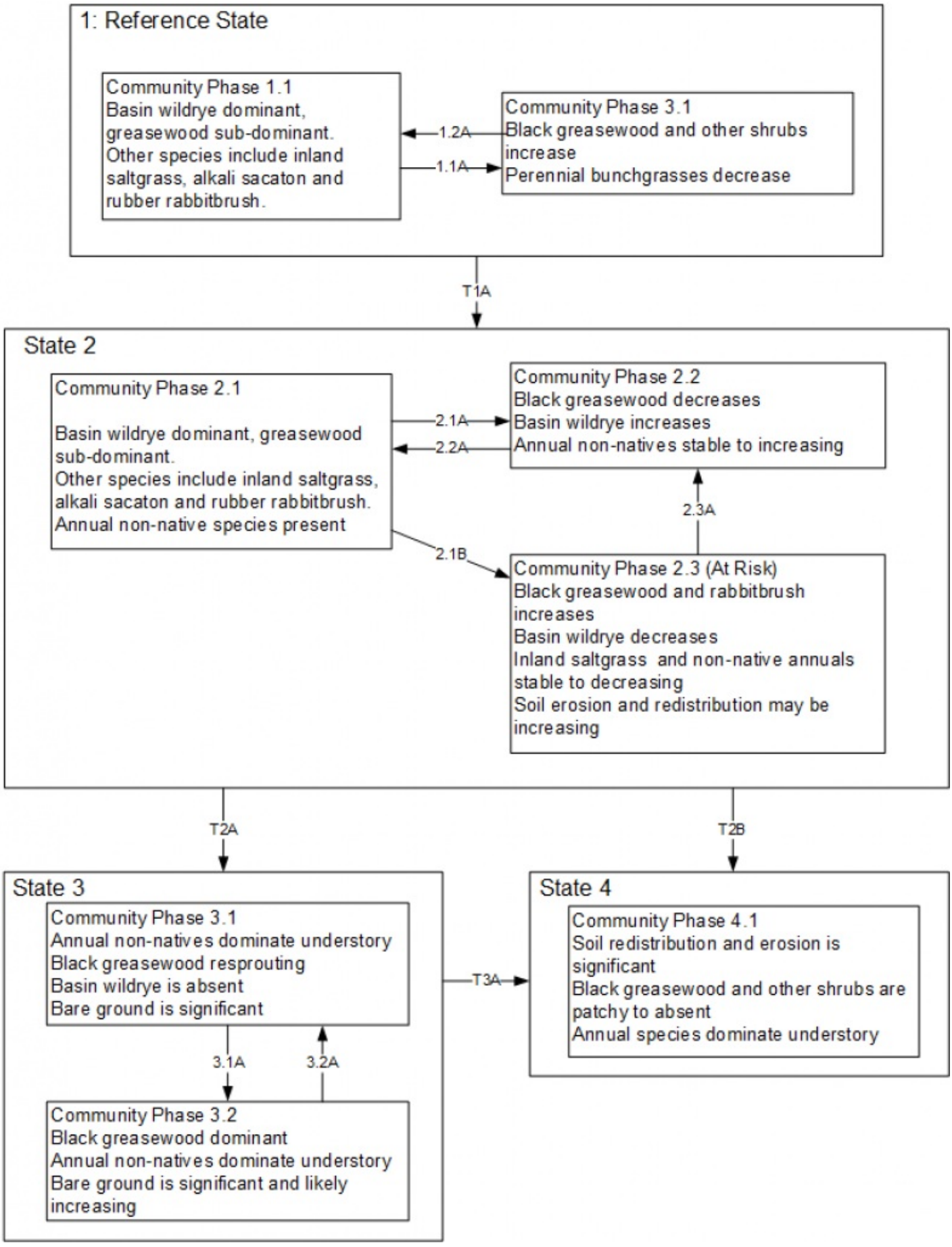
Sodium adsorption ratio (0-40in)	1–90
Soil reaction (1:1 water) (0-40in)	7.9–9.6
Subsurface fragment volume <=3" (Depth not specified)	2–7%
Subsurface fragment volume >3" (Depth not specified)	1–2%

Ecological dynamics

Where management results in abusive grazing use by livestock, rabbitbrush and black greasewood increase as basin wildrye and other desirable forage grasses decrease. With further site degradation, rubber rabbitbrush typically becomes the dominant overstory species. Inland saltgrass increases as condition declines and often dominates the understory when this site is in low ecological condition. Fivehook bassia and annual mustards are species likely to invade this site.

Fire Ecology:
Black greasewood is historically subject to stand-replacing fire regimes with intervals of <100 years. Black greasewood may be killed by severe fires, but it commonly sprouts soon after low to moderate-severity fire. Rubber rabbitbrush is often top-killed by fire. Rubber rabbitbrush is a fire-adapted species that is typically unharmed or enhanced by fire. Recovery time is often rapid to very rapid. Rubber rabbitbrush is often one of the first species to colonize burned areas by sprouting or from off-site seed. Basin wildrye is top-killed by fire. Older basin wildrye plants with large proportions of dead material within the perennial crown can be expected to show higher mortality due to fire than younger plants having little debris. Basin wildrye is generally tolerant of fire but may be damaged by early season fire combined with dry soil conditions. 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. Alkali sacaton is classified as tolerant of, but not resistant to, fire. Top-killing by fire is probably frequent, and the plants can be killed by severe fire.

State and transition model



Reference State 1.0

The Reference State 1.0 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 burning by native people. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These include the presence

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: This community is dominated by basin wildrye, black greasewood is common throughout the plant community. Inland saltgrass, alkiali sacaton and rubber rabbitbrush are also present. This community phase is stable and long-lived, it is tolerant of prolong drought conditions. Drought favors shrubs over grasses, due to their well developed root systems. However, prolonged drought will result in an overall decline in the plant community. This site may experience patchy fire under natural conditions. Basin wildrye will readily recover and return to dominance

1.1a: Time and lack of disturbance such as fire, drought, herbivory, or combinations of these.

Community phase 1.3: Black greasewood, rabbitbrush and other shrubs increase in the absence of disturbance. Decadent shrubs dominate the overstory and deep-rooted perennial bunchgrasses, such as basin wildry, are reduced. Rhizomatous and shallow-rooted grasses, like inland saltgrass and squirreltail, are stable or increasing.

1.3a: Fire significantly reduces shrub cover.

Transition T1A: Introduction of non-native plants.

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 invasive weeds. 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:
This community phase is compositionally similar to the Reference State Community Phase 1.1 with the presence of non-native species in trace amounts. This community is dominated by black greasewood. Inland saltgrass, shadscale, seepweed and other shrubs comprise the minor components. Non-native annual species such as halogeton and cheatgrass are present.

2.1a: Fire or brush treatments (i.e. mowing) with minimal soil disturbance.
2.1b: Time and lack of disturbance such as fire allow greasewood to increase. Drought, inappropriate grazing management, or combinations of these would decrease the perennial herbaceous community.

Community Phase 2.2:
This community phase is characteristic of a post-disturbance plant community with annual non-native species present. Basin wildrye is increasing. Perennial bunchgrasses such as alkali sacaton, inland saltgrass and western wheatgrass also increase. Depending on fire severity patches of intact shrubs may remain. Black greasewood and rabbitbrush may be sprouting. Annual non-native species are stable to increasing in the community.

sprouting. Annual non-native species are stable to increasing in the community.
2.2a: Time, natural regeneration and lack of disturbance such as fire.

Community Phase 2.3 (at-risk):
Black greasewood dominates the overstory and perennial bunchgrasses in the understory are reduced, either from competition with shrubs or from inappropriate grazing, or from both. Rabbitbrush and shadscale may be a significant component. Inland saltgrass is more grazing tolerant and may increase within the community. Annual non-native species are stable or increasing. This community is at risk of crossing a threshold to State 3.0 (grazing or fire).
2.3a: Low severity/patchy fire or heavy late fall/winter grazing causing mechanical damage to shrubs and/or brush treatment with minimal soil disturbance.

Transition T2A: Time and lack of disturbance often coupled with excessive grazing pressure would reduce the perennial understory(3.1). Severe fire, lowering of water table from groundwater pumping and/or soil disturbing brush treatments (3.2)
Transition T2B: Severe fire, lowering of water table from groundwater pumping and/or soil disturbing brush treatments (4.1),
Inappropriate grazing management (4.2)
Transition T2C: Severe fire, soil disturbing treatments and/or inappropriate grazing management or combinations.

Transition T2A: Time and lack of disturbance often coupled with excessive grazing pressure would reduce the perennial understory(3.1). Severe fire, lowering of water table from groundwater pumping and/or soil disturbing brush treatments (3.2)
Transition T2B: Severe fire, lowering of water table from groundwater pumping and/or soil disturbing brush treatments (4.1)

Shrub State 3.0:
This state is characterized by a dominance of black greasewood and rabbitbrush in the overstory. This site has crossed a biotic and abiotic threshold and site processes are being controlled by shrubs. Bare ground has increased and pedestalling of grasses may be excessive. Non-natives are present and likely increasing.

Community Phase 3.1:
Rabbitbrush and black greasewood increasing. Perennial grasses are present but a minor component. Annual non-native species are present and may be increasing in the understory.
3.1a: Drought and/or lowering of the water table due to groundwater pumping and/or severe fire.

Community Phase 3.2:
Black greasewood dominates the overstory. Rabbitbrush and shadscale may be a significant component. Deep-rooted perennial bunchgrasses have significantly declined. Annual nonnative species increase. Bare ground is significant.
3.2a: Release of drought and/or grazing pressure may allow for black greasewood and perennial bunchgrasses to increase
Transition T3A: Severe fire, lowering of water table by groundwater pumping and/or soil disturbing treatments (4.1)

Annual State 4.0
In this state, a biotic threshold has been crossed and state dynamics are driven by the dominance and persistence of the non-native annual plant community which is perpetuated by a shortened fire return interval. The herbaceous understory is dominated by annual non-native species such as cheatgrass and halogeton. Bare ground may be abundant. The fire

native species such as cheatgrass and halogeton. Bare ground may be abundant. The fire return interval has shortened due to the dominance of cheatgrass in the understory and is a driver in site dynamics.

Community Phase Pathways
Community Phase 4.1:
This community is dominated by annual non-native species. Halogeton is common, cheatgrass and mustards may also be present. Trace amounts of greasewood, shadscale and other shrubs may be present, but are not contributing to site function. Bare ground may be abundant, especially during low precipitation years. Soil erosion from wind and soil temperature are driving factors in site function.

State 1
Reference Plant Community

Community 1.1
Reference Plant Community

The reference plant community is dominated by basin wildrye. Black greasewood is the dominant shrub. Potential vegetative composition is about 75% grasses, 5% forbs and 20% shrubs. Approximate ground cover (basal and crown) is 25 to 40 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	600	1125	1500
Shrub/Vine	160	300	400
Forb	40	75	100
Total	**800**	**1500**	**2000**

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**			900–1350	
	basin wildrye	LECI4	*Leymus cinereus*	750–900	–
	alkali sacaton	SPAI	*Sporobolus airoides*	75–225	–
	saltgrass	DISP	*Distichlis spicata*	75–225	–
2	**Secondary Perennial Grasses**			30–120	
	squirreltail	ELEL5	*Elymus elymoides*	8–45	–
	beardless wildrye	LETR5	*Leymus triticoides*	8–45	–
	western wheatgrass	PASM	*Pascopyrum smithii*	8–45	–
	bluegrass	POA	*Poa*	8–45	–
	alkaligrass	PUCCI	*Puccinellia*	8–45	–
Forb					
3	**Perennial**			30–120	
	alkali sacaton	SPAI	*Sporobolus airoides*	75–225	–
	milkvetch	ASTRA	*Astragalus*	8–30	–
	povertyweed	IVAX	*Iva axillaris*	8–30	–
	niterwort	NITRO	*Nitrophila*	8–30	–
	thelypody	THELY	*Thelypodium*	8–30	–
Shrub/Vine					
4	**Primary Perennial Shrubs**			105–300	
	greasewood	SAVE4	*Sarcobatus vermiculatus*	75–225	–
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	30–75	–
	beardless wildrye	LETR5	*Leymus triticoides*	8–45	–
	western wheatgrass	PASM	*Pascopyrum smithii*	8–45	–
	alkaligrass	PUCCI	*Puccinellia*	8–45	–
5	**Secondary Perennial Shrubs**			30–120	
	squirreltail	ELEL5	*Elymus elymoides*	8–45	–
	bluegrass	POA	*Poa*	8–45	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	8–45	–
	Torrey's saltbush	ATTO	*Atriplex torreyi*	8–45	–
	silver buffaloberry	SHAR	*Shepherdia argentea*	8–45	–
	seepweed	SUAED	*Suaeda*	8–45	–

Animal community

Livestock Interpretations:
This site is suited to livestock grazing. Grazing management should be keyed to basin wildrye production and all other perennial grasses. The early growth and abundant production of basin wildrye make it a valuable source of forage for livestock. It is important forage for cattle and is readily grazed by cattle and horses in early spring and fall. Though coarse-textured during the winter, basin wildrye may be utilized more frequently by livestock and wildlife when snow has covered low shrubs and other grasses. 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. Alkali sacaton is a valuable forage species in arid and semiarid regions. Plants are tolerant to moderate grazing and can produce abundant herbage utilized by livestock. Black greasewood is an important winter browse plant for domestic sheep and cattle. It also receives light to moderate use by domestic sheep and cattle during spring and summer months. In general, livestock forage only lightly on this species during the summer, but winter use can be heavy in some locations. Fall use is variable, but flowers are often used by livestock. A few leaves and the more tender stems may also be used.

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:
Basin wildrye provides winter forage for mule deer, though use is often low compared to other native grasses. Basin wildrye provides summer forage for black-tailed jackrabbits. Because basin wildrye remains green throughout early summer, it remains available for small mammal forage for longer time than other grasses. 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. The western salt desert shrub and grassland communities where alkali sacaton is common support an abundance of mule deer, pronghorn, carnivores, small mammals, birds, amphibians, and reptiles. Black greasewood is an important winter browse plant for big game animals. It also receives light to moderate use by mule deer and pronghorn during spring and summer months. Black greasewood is an important source of food for jackrabbits. Wildlife forage only lightly on rubber rabbitbrush during the summer, but winter use can be heavy in some locations. Fall use is variable, but flowers are often used by wildlife. A few leaves and the more tender stems may also be used. The forage value of rubber rabbitbrush varies greatly among subspecies and ecotypes.

Hydrological functions

There are no rills, pedestals and/or terracettes. Water flow patterns are rare to common depending on proximity of site to a well-defined in-flow channel. Moderately fine to fine surface textures result in limited infiltration rates and ponding is of run-in water is common for short period in the late winter or early spring. Concentrations of surface salts and sodium result in chemical crusts which also impedes precipitation infiltration. Water flow patterns are typically short, ending in depressional areas.
Gullies are none to common depending on landform. Where this site occurs on landforms not associated with ephemeral or perennial drainageways, gullies do not occur. Where this site occurs associated with relatively confined drainageways, gullies may be present. Gullies and associated head cuts should be healing and stable. Deep-rooted perennial grasses (basin wildrye and alkali sacaton] slow runoff and increase infiltration. Tall stature and relatively coarse foliage of basin wildrye and associated litter break raindrop impact and provide opportunity for snow catch and moisture accumulation on site.

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 is used for camping and hiking and has potential for upland and big game hunting.

Other products

Basin wildrye was used as bedding for various Native American ceremonies, providing a cool place for dancers to stand. The leaves, seeds and stems of black greasewood are edible.

Other information

Basin wildrye is useful in mine reclamation, fire rehabilitation and stabilizing disturbed areas. Its usefulness in range seeding, however, may be limited by initially weak stand establishment. 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. Alkali sacaton is one of the most commonly used species for seeding and stabilizing disturbed lands. Due to alkali sacaton’s salt tolerance, is recommended for native grass seeding on subirrigated saline sites. Black greasewood is

useful for stabilizing soil on wind-blown areas. It successfully revegetates processed oil shale and is commonly found on eroded areas and sites too saline for most plant species.

Inventory data references

NASIS soils data was used to update abiotic site ranges.

Type locality

Location 1: Lyon County, NV	
Township/Range/Section	T13N R25E S12
General legal description	Approximately 1300 feet east and 50 feet south of the center of section 12, T13N, R25E., Lyon County, Nevada. This site also occurs in Churchill, 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

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.

Author(s)/participant(s)	GK BRACKLEY
Contact for lead author	State Rangeland Management Specialist
Date	06/20/2006
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None

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2. **Presence of water flow patterns:** Water flow patterns are rare to common depending on proximity of site to a well-defined in-flow channel. Moderately fine to fine surface textures result in limited infiltration rates and ponding is of run-in water is common for short period in the late winter or early spring. Concentrations of surface salts and sodium result in chemical crusts which also impedes precipitation infiltration. Water flow patterns are typically short, ending in

depressional areas.

3. **Number and height of erosional pedestals or terracettes:** None

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground ± 65%; surface rock fragments less than 5%; shrub canopy ±10%; basal area for perennial herbaceous plants ± 20%.

5. **Number of gullies and erosion associated with gullies:** Gullies are none to common depending on landform. Where this site occurs on landforms not associated with ephemeral or perennial drainageways, gullies do not occur. Where this site occurs associated with relatively confined drainageways, gullies may be present. Gullies and associated head cuts should be healing and stable.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None

7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage of grasses and annual & perennial forbs) is only expected to move during periods of flooding by adjacent streams. Persistent litter (large woody material) will remain in place except during major flooding events.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil stability values will range from 1 to 4. (To be field tested.)

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Structure of soil surface will be platy or massive. Soil surface colors are light and soils are typified by an ochric epipedon. Organic carbon can range from 1.5 to over 3 percent and will vary with micro-topography.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Deep-rooted perennial grasses (basin wildrye and alkali sacaton] slow runoff and increase infiltration. Tall stature and relatively coarse foliage of basin wildrye and associated litter break raindrop impact and provide opportunity for snow catch and moisture accumulation on site.

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 not typical. Platy or massive subsurface layers are normal for this site and are not to be interpreted as compaction.

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: Reference Plant Community: Tall-statured, deep-rooted, cool season, perennial bunchgrasses

Sub-dominant: Short-statured rhizomatous grasses > tall shrubs >associated perennial grasses and grass-like plants = deep-rooted, cool season, perennial forbs = fibrous, shallow-rooted, cool season, perennial and annual forbs.

Other:

Additional:

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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 are common and standing dead shrub canopy material may be as much as 25% of total woody canopy.

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14. **Average percent litter cover (%) and depth (in):** Within plant interspaces (± 35%) and depth of litter ± ½ inch.

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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 (through end of May) ± 1500 lbs/ac; Winter moisture significantly affects total 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:** Rubber rabbitbrush, black greasewood, poverty weed, and Torrey""s quailbush are increasers on this site. Annual mustards, annual kochia, pigweed, tall whitetop (perennial pepperweed), and saltcedar are invaders on this site.

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17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season years.
