USDA Natural Resources
Conservation Service

Ecological site R027XY032NV
SHALLOW CALCAREOUS LOAM 10-12 P.Z.

Last updated: 6/03/2024
Accessed: 05/11/2025

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 Shallow Calcareous Loam 10-12 P.Z. site occurs on summits and sideslopes of hills and mountains on all aspects. Slopes range from 4 to over 75 percent, but slope gradients of 15 to 50 percent are typical. Elevations are 4400 to 7200 feet. The soils are shallow and very shallow and well drained. Surface soils typically have high amounts of gravels and cobbles. Subsoils typically are skeletal and have an argillic horizon.

Associated sites

R027XY031NV	**SHALLOW CALCAREOUS LOAM 8-10 P.Z.** ACHY dominant grass; less productive site

Similar sites

R027XY061NV	**SHALLOW CALCAREOUS SLOPE 8-10 P.Z.** ACSP12-ACHY codominant grasses
R027XY083NV	**MOUNTAIN RIDGE** ARAR8 dominant shrub
R027XY079NV	**GRAVELLY CLAYPAN 8-10 P.Z.** ARARL3 dominant shrub; ACTH7 dominant grass
R027XY020NV	**SHALLOW CLAYPAN 8-10 P.Z.** ARARL3 dominant shrub; ACSP12 dominant grass

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia nova*
Herbaceous	(1) *Achnatherum thurberianum*

Physiographic features

The Shallow Calcareous Loam 10-12 P.Z. site occurs on summits and sideslopes of hills and mountains on all aspects. Slopes range from 4 to over 75 percent, but slope gradients of 15 to 50 percent are typical. Elevations are 4400 to 7200 feet.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mountain slope
Runoff class	Very high

Elevation	4,400–7,200 ft
Slope	4–75%
Water table depth	72 in
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is semiarid, characterized by cool, moist winters and warm, dry summers. Average annual precipitation is 10 to 12 (14) inches. Mean annual air temperature is 43 to 50 degrees F. The average growing season is about 90 to 110 days.

Table 3. Representative climatic features

Frost-free period (average)	110 days
Freeze-free period (average)	
Precipitation total (average)	12 in

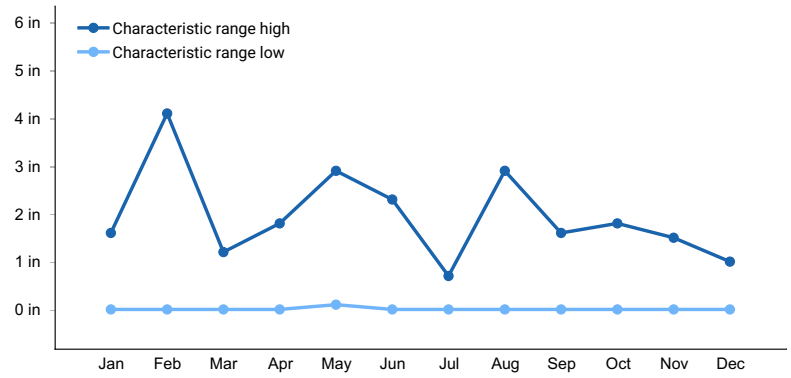


Figure 1. Monthly precipitation range

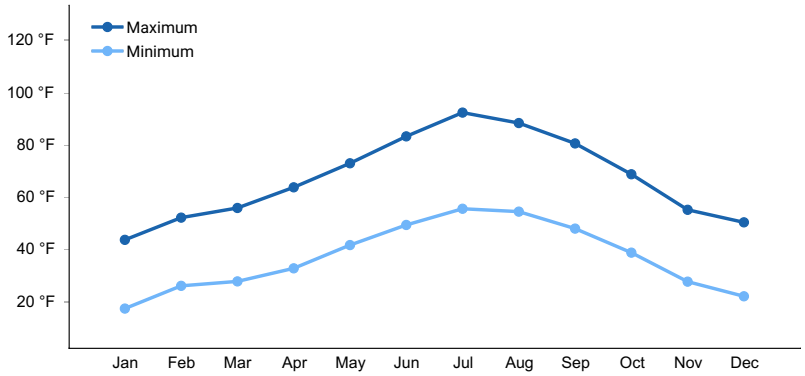


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are shallow and very shallow and well drained. Surface soils typically have high amounts of gravels and cobbles. Subsoils typically are skeletal and have an argillic horizon. Rock fragments in the profile occupy plant growing space and reduce the potential soil moisture holding capacity. The available water capacity is very low to low, soil permeability is slow to moderate, and surface runoff is medium to high. The soil moisture regime is aridic bordering on xeric and the soil temperature regime is mesic. The soil series associated with this site include: Atlow, Hooplite, Jung, and Puffer.

The representative soil series is Hooplite, a loamy-skeletal, mixed, superactive, mesic Lithic Xeric Haplargids. An ochric epipedon occurs from the soil surface to 10 cm or an argillic horizon occurs from 10 to 20 cm.

Table 4. Representative soil features

Parent material	(1) Residuum–rhyolite (2) Colluvium–rhyolite
Surface texture	(1) Very gravelly loam (2) Very cobbly loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Slow to moderate
Soil depth	8–19 in
Surface fragment cover <=3"	20–40%
Surface fragment cover >3"	2–25%
Available water capacity (0-40in)	0.7–4.1 in
Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–12
Soil reaction (1:1 water) (0-40in)	7–8.4
Subsurface fragment volume <=3" (Depth not specified)	15–45%
Subsurface fragment volume >3" (Depth not specified)	5–20%

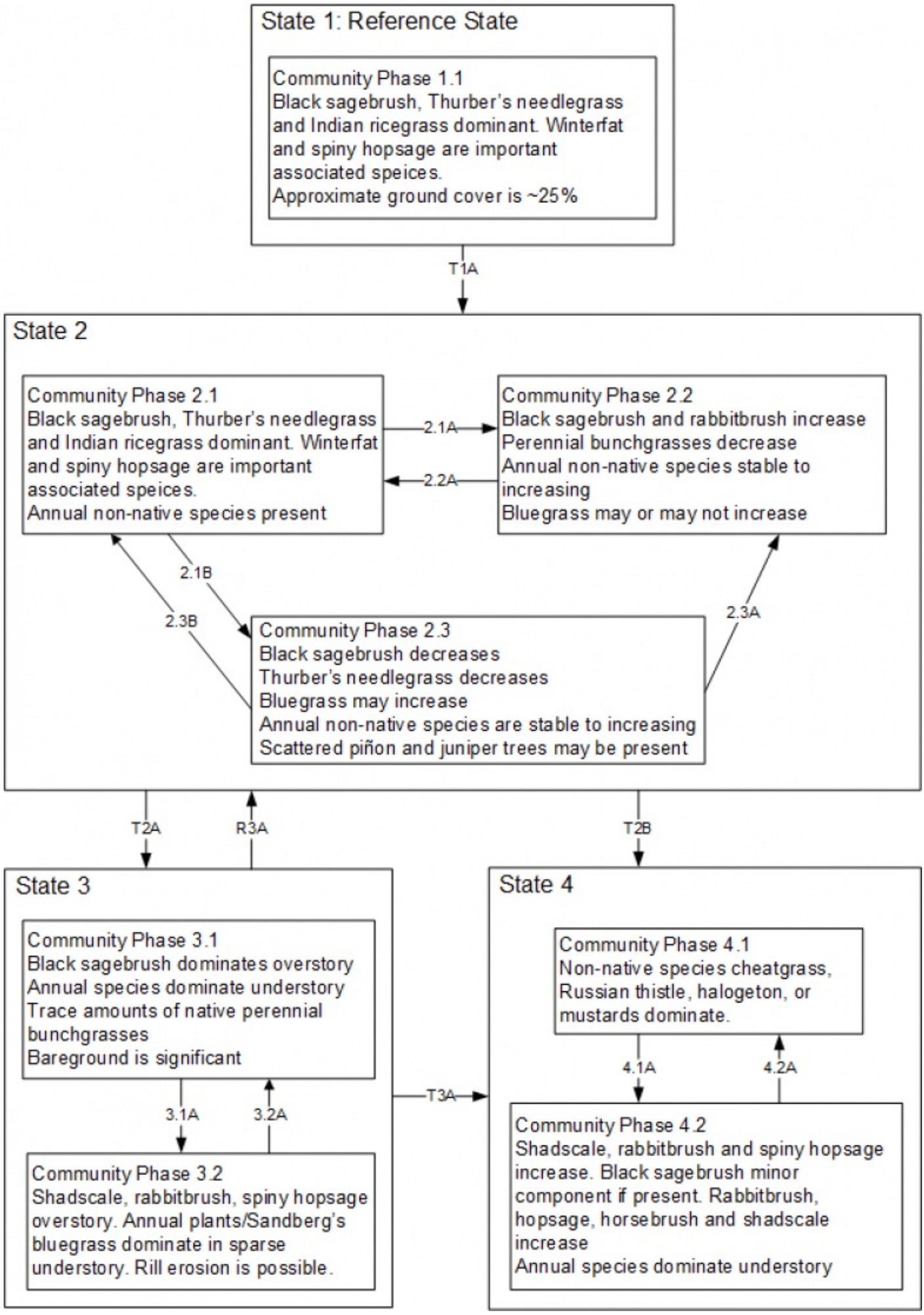
Ecological dynamics

Where management results in abusive grazing use by cattle or feral horses, Sandberg's bluegrass and bottlebrush squirreltail increase in the understory as black sagebrush and rabbitbrush increase and become the dominant vegetation. Grazing by sheep will reduce black sagebrush, Thurber's needlegrass, and Sandberg's bluegrass in the plant community. Cheatgrass, Russian thistle, and halogeton are species most likely to invade this site. Following wildfire, shadscale and spiny hopsage (with rabbitbush, horsebrush, and snakeweed) often replace black sagebrush.

Fire Ecology:
Black sagebrush communities generally lack enough fine fuels to carry a fire. In addition to low fine fuel loading, wide shrub spacing makes fire infrequent or difficult to prescribe in black sagebrush types. Black sagebrush is highly susceptible to fire-caused mortality; plants are readily killed by all fire intensities. Following burning, reestablishment occurs through off-site sources. 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. Fires in spiny hopsage sites generally occur in late summer when plants are dormant, and sprouting generally does not occur until the following spring. 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. Thurber’s needlegrass is classified as moderately resistant, but depending on season of burn, phenology, and fire severity, this perennial bunchgrass is moderately to severely damaged by fire. Burning has been

found to decrease the vegetation and reproductive vigor. Early season burning is more damaging to this needlegrass than late season burning. Indian ricegrass can be killed by fire, depending on severity and season of burn. Indian ricegrass reestablishes on burned sites through seed dispersed from adjacent unburned areas. Sandberg bluegrass is generally unharmed by fire. It produces little litter, and its small bunch size and sparse litter reduces the amount of heat transferred to perennating buds in the soil. Its rapid maturation in the spring also reduces fire damage, since it is dormant when most fires occur.

State and transition model



Reference State 1.0: The Reference 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. 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:
This community is dominated by black sagebrush in the overstory with Thurber's needlegrass and Indian ricegrass dominant in the understory.

T1A: Transition from Reference State 1.0 to Current Potential State 2.0
Trigger: Introduction of non-native annual plants.
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 in this state, but the resiliency of the state has been reduced by the presence of invasive weeds. These non-native species can be highly flammable, and promote fire where historically fire had been infrequent. 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. 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 sagebrush in the overstory with Thurber's needlegrass, Indian ricegrass dominant in the understory.
CPP 2.1a: A low severity fire would decrease the overstory of sagebrush and allow the understory perennial grasses to increase. Fires are typically low severity resulting in a mosaic pattern due to low fuel loads. Annual non-native species are likely to increase after fire. Brush treatments with minimal soil disturbance may also reduce the sagebrush overstory and allow an increase in perennial grasses.
CPP 2.1b: Time, absence of disturbance, chronic drought, inappropriate grazing management or combinations of these would allow the sagebrush overstory to increase and dominate the site. Inappropriate grazing management reduces the perennial bunchgrass understory; conversely Sandberg bluegrass may increase in the understory.
Community Phase 2.2: This community phase is characteristic of a post-disturbance, early seral community where annual non-native species are present. Sagebrush is present in trace amounts; perennial bunchgrasses dominate the site. Depending on fire severity patches of intact sagebrush may remain. Rabbitbrush or other sprouting shrubs may be increasing. Annual non-native species are stable or increasing within the community. Annual non-native species generally respond well after fire and may be stable or increasing within the community.
CPP 2.2a: Absence of disturbance over time and/or grazing management that favors the establishment and growth of sagebrush allows the shrub component to recover. The establishment of black sagebrush can take many years.
Community Phase 2.3 (At Risk):
Black sagebrush dominates the overstory and perennial bunchgrasses in the understory are reduced, either from competition with shrubs or from inappropriate grazing, or from both. Rabbitbrush may be a significant component. Sandberg bluegrass may increase and become codominant with deep rooted bunchgrasses. Annual non-native species may be stable or increasing due to lack of competition with perennial bunchgrasses. This site is susceptible to further degradation from grazing, drought, and fire. This community is at risk of crossing a threshold to either Shrub State 3.0 (grazing or fire) or Annual State 4.0 (fire).
CPP 2.3a: Fire will decrease or eliminate the overstory of sagebrush and allow the perennial bunchgrasses to dominate the site. Fires may be high intensity due to the dominance of sagebrush in this phase, resulting in removal of the overstory shrub community. Annual non-native species respond well to fire and may increase post-burn.
CPP 2.3b: Brush treatments with minimal soil disturbance decrease sagebrush and release the perennial understory. Annual non-native species are present and may increase. A low severity fire would decrease the

overstory of sagebrush and allow the understory perennial grasses to increase. Due to low fuel loads in this State, fires will likely be small creating a mosaic pattern. Heavy late-fall/winter grazing may cause mechanical damage to sagebrush promoting the perennial bunchgrass understory.

T2A: Transition from Current Potential State 2.0 to Shrub State 3.0
Trigger: Inappropriate grazing will decrease or eliminate deep rooted perennial bunchgrasses, increase Sandberg bluegrass and favor shrub growth and establishment. Soil disturbing brush treatments and/or inappropriate sheep grazing will reduce sagebrush and potentially increase sprouting shrubs and Sandberg bluegrass.
Slow variables: Long term decrease in deep-rooted perennial grass density and/or black sagebrush.

T2B: Transition from Current Potential State 2.0 to Annual State 4.0
Trigger: Catastrophic or repeated fire or soil surface disturbance.
Slow variables: Increased production and cover of non-native annual species.
Threshold: Loss of deep-rooted perennial bunchgrasses and shrubs changes energy and nutrient capture and cycling both spatially and temporally within the community. Increased, continuous fine fuels modify the fire regime by changing intensity, size and spatial variability of fires.

Shrub State 3.0: This state is characterized by an overstory of black sagebrush and/or other shrubs (shadscale or rabbitbrush) with a Sandberg bluegrass understory. The site has crossed a biotic threshold and site processes are being controlled by shrubs. Bare ground has increased and pedestalling of grasses may be excessive.
Community Phase 3.1:
Black sagebrush dominates overstory while Sandberg bluegrass dominates the understory. Deep-rooted perennial bunchgrasses have significantly declined. Annual non-native species may be present. Bare ground and soil redistribution may be increasing. The community phase may be at risk of transitioning into an Annual State.
CPP 3.1a: Fire reduces black sagebrush to trace amounts and allows for sprouting shrubs such as rabbitbrush or spiny hopsage to dominate. Shadscale may also establish/become dominate post-fire. Inappropriate or excessive sheep grazing could also reduce cover of sagebrush and allow shadscale or sprouting shrubs to dominate the community. Brush treatments with minimal soil disturbance would facilitate sprouting shrubs and Sandberg bluegrass.
Community Phase 3.2 (At Risk):
Shadscale and/or rabbitbrush dominate the overstory. Broom snakeweed may be present to increasing. Annual non-native species may be increasing and bare ground is significant. This site is at risk for an increase in invasive annual weeds.

T3B: Transition from Shrub State 3.0 to Annual State 4.0
Trigger: Fire or treatments that disturb the soil and existing plant community (ex: failed restoration attempts).
Slow variables: Increased seed production and cover of annual non-native 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 and impact the nutrient cycling and distribution.

Annual State 4.0: This state is characterized by the dominance of annual nonnative species such as cheatgrass and tansy mustard in the understory. Sagebrush and/or rabbitbrush may dominate the overstory. Annual non-native species are dominate in the understory.
Community Phase 4.1:
Annual non-native plants such as cheatgrass or tansy mustard dominate the site. This phase may have seeded species present if resulting from a failed seeding attempt.
Community Phase Pathway 4.1a: Time, natural regeneration and lack of disturbance. Occurrence of this pathway is unlikely.
Community Phase 4.2: Rabbitbrush, spiny hopsage and/or shadscale. Trace amounts of black sagebrush in the overstory with annual non-native species, likely cheatgrass, dominating the understory. Trace amounts of desirable bunchgrasses may be present.
Community Phase Pathway 4.2a: Fire allows for annual non-native species to dominate site

State 1
Reference State

Community 1.1
Reference Plant Community

The reference plant community is dominated by black sagebrush and Indian ricegrass. Potential vegetative composition is about 50% grasses, 5% forbs and 45% 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	100	175	250
Shrub/Vine	90	157	225
Forb	10	18	25
Total	**200**	**350**	**500**

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**			147–245	
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	105–140	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	35–70	–
	Sandberg bluegrass	POSE	*Poa secunda*	7–35	–
2	**Secondary Perennial Grasses**			18–53	
	squirreltail	ELEL5	*Elymus elymoides*	2–18	–
	needle and thread	HECO26	*Hesperostipa comata*	2–18	–
	James' galleta	PLJA	*Pleuraphis jamesii*	2–18	–
Forb					
3	**Perennial**			7–35	
	milkvetch	ASTRA	*Astragalus*	2–18	–
	buckwheat	ERIOG	*Eriogonum*	2–18	–
	phlox	PHLOX	*Phlox*	2–18	–
	globemallow	SPHAE	*Sphaeralcea*	2–18	–
Shrub/Vine					
4	**Primary Perennial Shrubs**			89–193	
	black sagebrush	ARNO4	*Artemisia nova*	75–123	–
	spiny hopsage	GRSP	*Grayia spinosa*	7–35	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	7–35	–
5	**Secondary Perennial Shrubs**			18–53	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	2–18	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	2–18	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	2–18	–
	bud sagebrush	PIDE4	*Picrothamnus desertorum*	2–18	–
	littleleaf horsebrush	TEGL	*Tetradymia glabrata*	2–18	–

Animal community

Livestock Interpretations:
This site is suited to livestock grazing. Grazing management should be keyed perennial grass and palatable shrub production. Thurber’s needlegrass species begin growth early in the year and remain green throughout a relatively long growing season. This pattern of development enables animals to use Thurber’s needlegrass when many other grasses are unavailable. Cattle prefer Thurber’s needlegrass in early spring before fruits have developed as it becomes less palatable when mature. Thurber’s needlegrasses are grazed in the fall only if the fruits are softened by rain. Indian ricegrass is highly palatable to all classes of livestock in both green and cured condition. It supplies a source of green feed before most other native grasses have produced much new growth. Bluegrass is a widespread forage grass. It is one of the earliest grasses in the spring and is sought by domestic livestock and several wildlife species. Sandberg bluegrass is a palatable species, but its production is closely tied to weather conditions. It produces little forage in drought years, making it a less dependable food source than other perennial bunchgrasses.
In winter, at lower elevations, black sagebrush is heavily utilized by domestic sheep. 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. 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.

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:
Black sagebrush is a significant browse species within the Intermountain region. It is especially important on low elevation winter ranges in the southern Great Basin, where extended snow free periods allow animal's access to plants throughout most of the winter. In these areas it is heavily utilized by pronghorn and mule deer. Sagebrush-grassland communities provide critical sage-grouse breeding and nesting habitats. Sagebrush is a crucial component of their diet year-round, and sage-grouse select sagebrush almost exclusively for cover. Sage-grouse prefer mountain big sagebrush and Wyoming big sagebrush communities to basin big sagebrush communities. Winterfat is an important forage plant for Wildlife, especially during winter when forage is scarce. Winterfat seeds are eaten by rodents. Winterfat is a staple food for black-tailed jackrabbit. 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. 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. Thurber needlegrass is valuable forage for wildlife. Indian ricegrass is eaten by pronghorn in moderate amounts whenever available. In Nevada, it is consumed by desert bighorns. A number of heteromyid rodents inhabiting desert rangelands show preference for seed of Indian ricegrass. Indian ricegrass is an important component of jackrabbit diets in spring and summer. In Nevada, Indian ricegrass may even dominate jackrabbit diets during the spring through early summer months. Indian ricegrass seed provides food for many species of birds. Doves, for example, eat large amounts of shattered Indian ricegrass seed lying on the ground.

Hydrological functions

Runoff is high to very high. Permeability is slow to moderate. Hydrologic soil groups include C and D. Rills are none to rare. Water flow patterns are few and can be expected in areas subjected to summer convection storms or rapid snowmelt. Pedestals are rare. Occurrence is usually limited to areas of water flow patterns. Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., Thurber's needlegrass] slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact.

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

Some Native American peoples traditionally ground parched seeds of spiny hopsage to make pinole flour. Indian ricegrass was traditionally eaten by some Native Americans. The Paiutes used seed as a reserve food source.

Other information

Black sagebrush is an excellent species to establish on sites where management objectives include restoration or improvement of domestic sheep, pronghorn, or mule deer winter range. 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. 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.

Inventory data references

NASIS soil component data.

Type locality

Location 1: Churchill County, NV	
Township/Range/Section	T19N R37E S27
UTM zone	N
UTM northing	4370649
UTM easting	431017
Latitude	39° 28′ 57″
Longitude	117° 48′ 7″
General legal description	About 6 miles north of Cold Creek HMS just east of USHwy 50, Edwards Creek Valley area, Churchill County, Nevada. This site also occurs in Lyon, Mineral, Pershing, and Storey Counties, Nevada.
Location 2: Mineral County, NV	
Township/Range/Section	T13N R33E S5
General legal description	About 2 miles east of Nevada Scheelite Mine, Monte Cristo Mountains, Mineral County, Nevada. This site also occurs in Lyon, Pershing, and Storey 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
TK Stringham

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)	Patti Novak-Echenique
Contact for lead author	State Rangeland Management Specialist
Date	09/21/2009
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are none to rare.

2. **Presence of water flow patterns:** Water flow patterns are few and can be expected in areas subjected to summer convection storms or rapid snowmelt.

---

3. **Number and height of erosional pedestals or terracettes:** Pedestals are rare. Occurrence is usually limited to areas of water flow patterns. Frost heaving of shallow rooted plants should not be considered a "normal" condition.

---

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground ± 40% depending on amount of surface rock fragments.

---

5. **Number of gullies and erosion associated with gullies:** None

---

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 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.

---

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.)

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically thin to thick platy. Soil surface colors are light brownish grays and soils are typified by an ochric epipedon. Organic carbon 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.

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., Thurber needlegrass] slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact.

---

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. Subangular blocky, platy, or massive sub-surface horizons, subsoil argillic horizons or duripans are not to be interpreted as compacted layers.

---

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: Deep-rooted, cool season, perennial bunchgrasses > low shrubs (black sagebrush)

Sub-dominant: associated shrubs = shallow-rooted, cool season, grasses > deep-rooted, cool season, perennial forbs = fibrous, shallow-rooted, cool season, perennial and annual forbs

Other:

Additional:

---

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.

---

14. **Average percent litter cover (%) and depth (in):** Under canopy and between plant interspaces (20-30%) and depth of litter is <½ inch.

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (end of May) ± 350 lbs/ac; Spring moisture significantly affects total production. Favorable years ± 500 lbs/ac and unfavorable years ± 200 lbs/ac.

---

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 singleleaf pinyon, Utah juniper, halogeton, Russian thistle, annual mustards, and cheatgrass.

---

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