

Ecological site R027XY065NV GRANITIC SLOPE 8-10 P.Z.

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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 Slope 8-10 P.Z. site occurs on mountain slopes and hills on all aspects. Slope gradients of 30 to 50 percent are most typical. Elevations are 4300 to 7600 feet. The soils are shallow and well drained. The soils typically have a coarse to moderately coarse upper surface over weathered granitic parent material.

Associated sites

R027XY047NV	ERODED GRANITIC SLOPE Found on eroded slopes.
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Similar sites

R027XY088NV	GRANITIC LOAM 10-12 P.Z. ACTH7 dominant grass
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Table 1. Dominant plant species

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

Physiographic features

The Granitic Slope 8-10 P.Z. site occurs on mountain slopes and hills on all aspects. Slope gradients of 30 to 75 percent are typical on this site. Elevations are 4300 to 7600 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope (2) Hill
Runoff class	Low to very high
Flooding frequency	None
Ponding frequency	None
Elevation	4,300–7,600 ft
Slope	30–75%
Water table depth	72 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 8 to 10 inches. Mean annual temperatures are 49 to 57 degrees F. The average growing season is about 100 to 130 days. No climate station is available.

Table 3. Representative climatic features

Frost-free period (average)	130 days
Freeze-free period (average)	
Precipitation total (average)	10 in

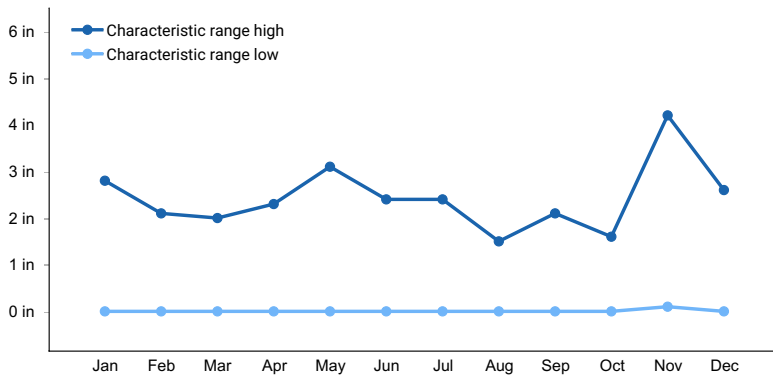


Figure 1. Monthly precipitation range

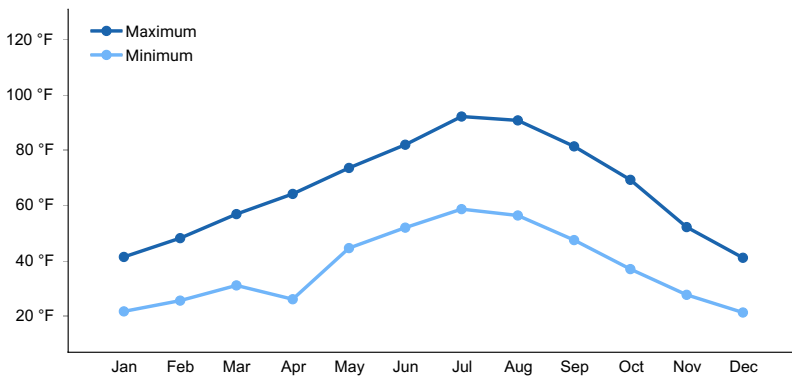


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

There is no influencing water features associated with this site.

Soil features

The soils are shallow and well drained. These soils have formed in residuum and colluvium from granitic or metamorphic rock sources. The soils typically have a coarse to moderately coarse upper surface over weathered granitic parent material. Available water capacity is very low. Surface runoff is low to very high. The potential for sheet and rill erosion is high. Soil series associated with the site are Bijorja, Breko, Gabbvally, Petspring, and Wiskiflat.

Table 4. Representative soil features

Parent material	(1) Colluvium–granite (2) Residuum–granite (3) Colluvium–volcanic rock (4) Residuum–volcanic rock
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Surface texture	(1) Very bouldery loamy sand (2) Very gravelly coarse sandy loam (3) Very stony loamy coarse sand
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderately rapid
Soil depth	3–14 in
Surface fragment cover ≤3"	23–74%
Surface fragment cover >3"	6–17%
Available water capacity (0–40in)	0.2–3.6 in
Calcium carbonate equivalent (0–40in)	0–30%
Electrical conductivity (0–40in)	0–2 mmhos/cm
Sodium adsorption ratio (0–40in)	0–2
Soil reaction (1:1 water) (0–40in)	6.1–9
Subsurface fragment volume ≤3" (Depth not specified)	12–44%
Subsurface fragment volume >3" (Depth not specified)	5–16%

Ecological dynamics

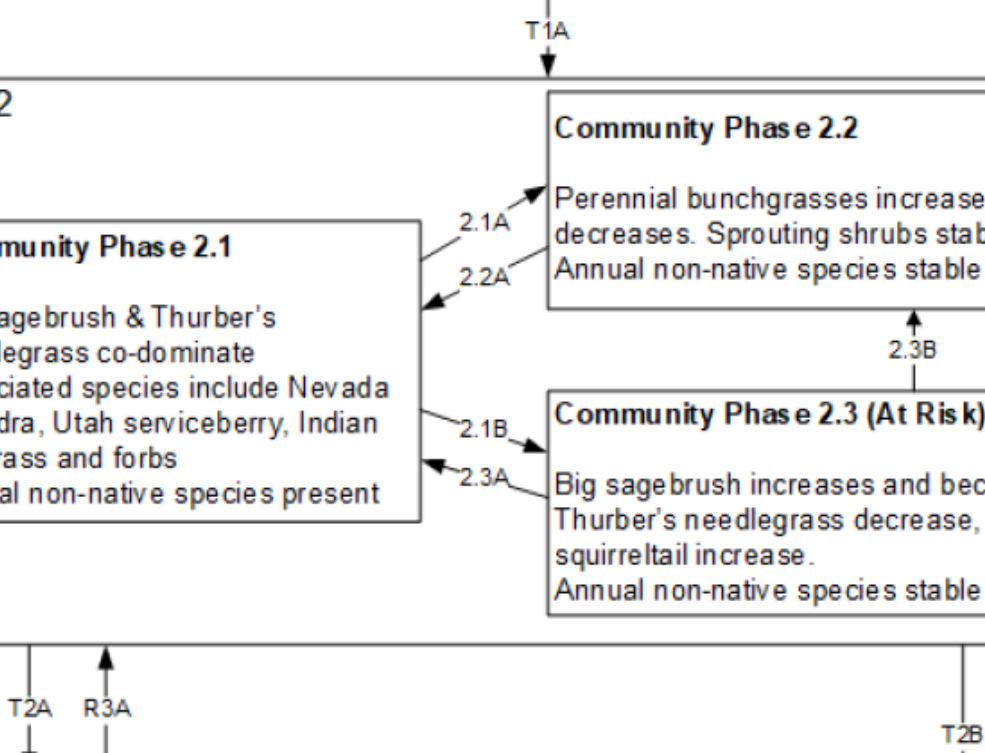
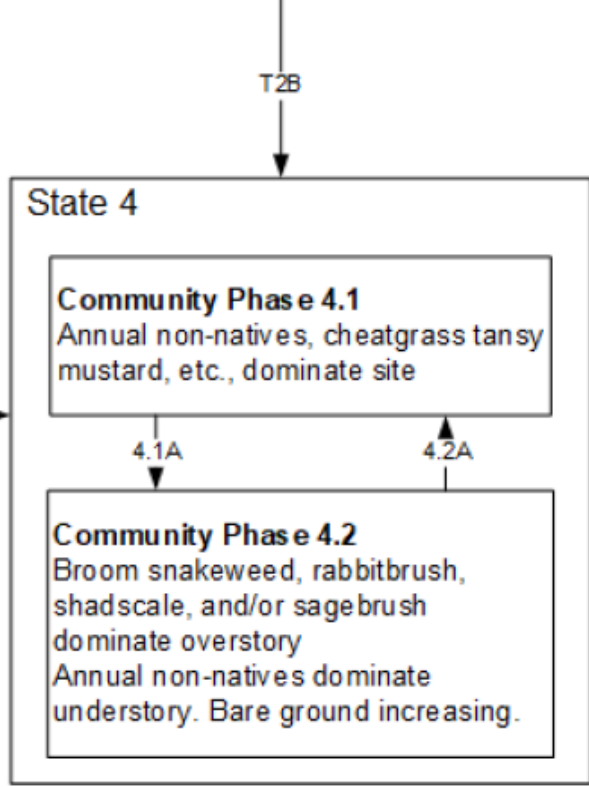
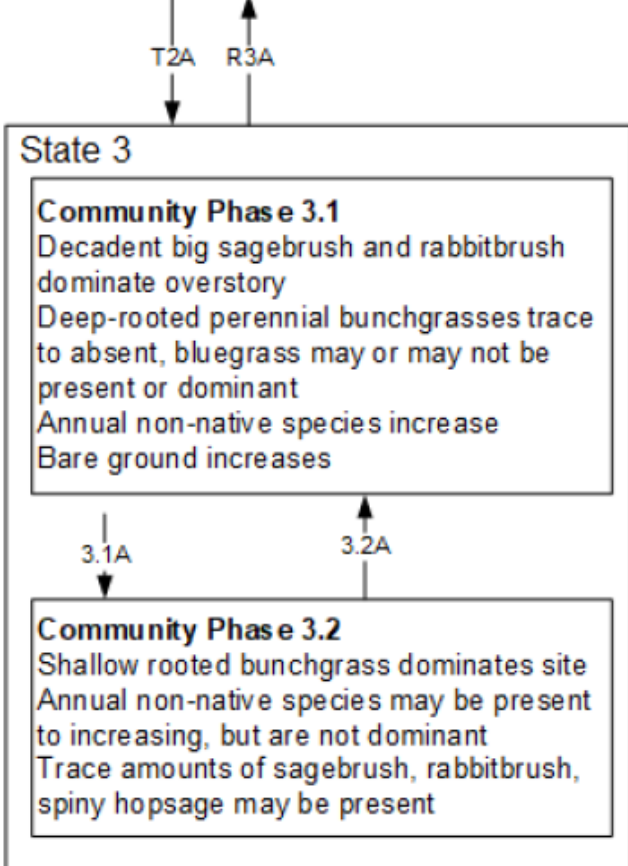
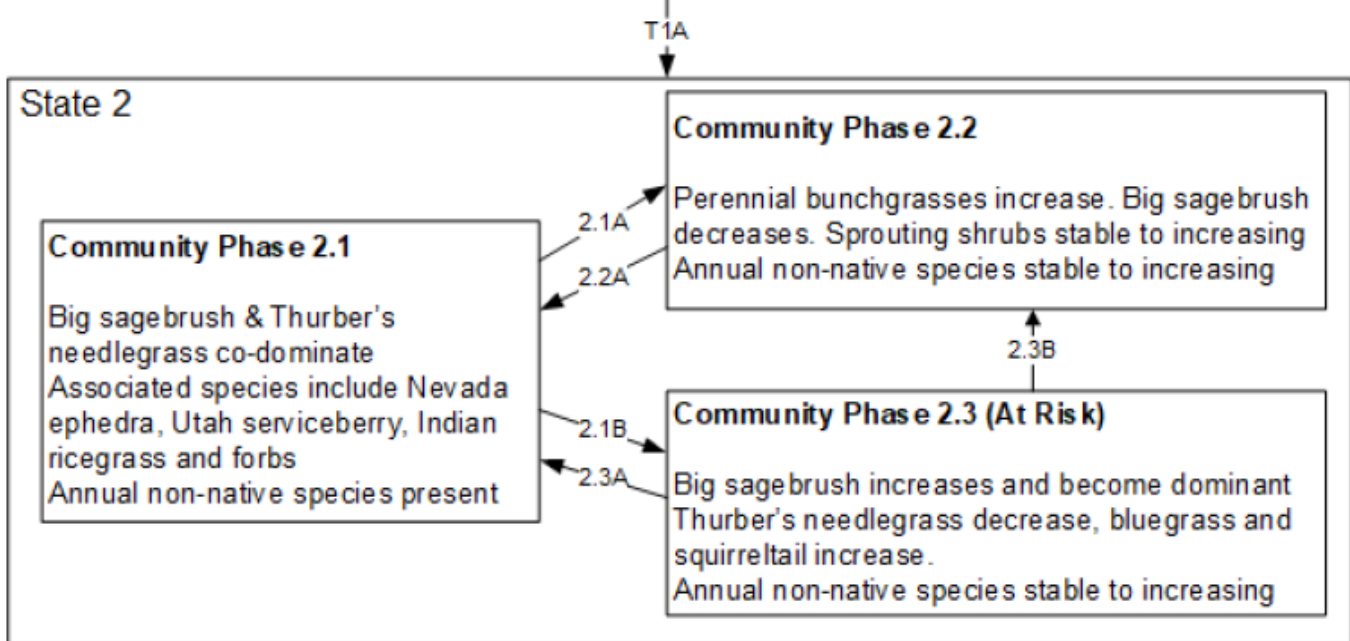
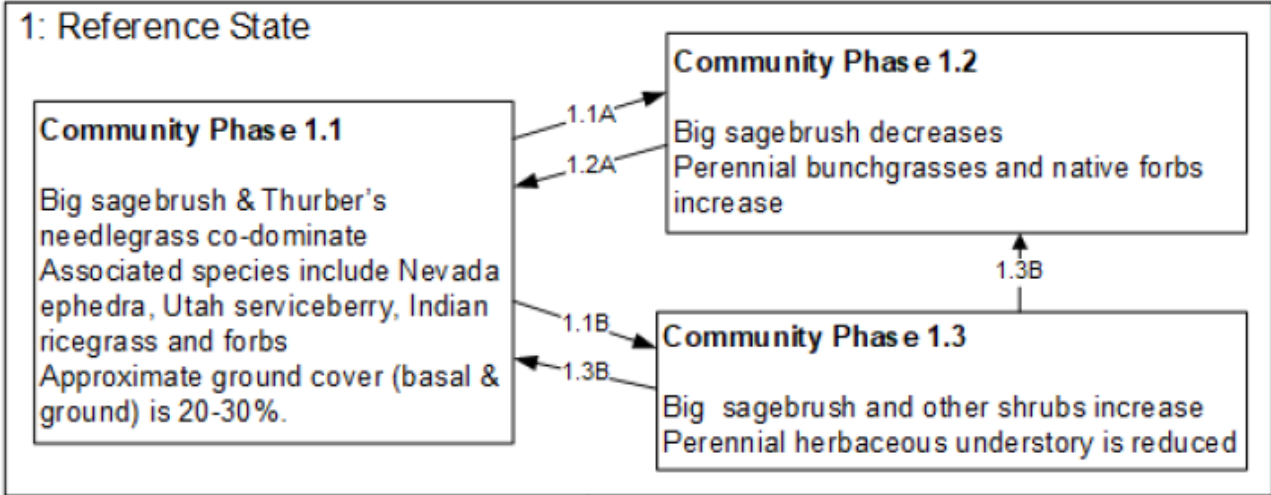
As ecological condition declines, overstory shrubs such as Wyoming big sagebrush, littleleaf horsebrush, and Douglas' rabbitbrush increase as Sandberg's bluegrass and galleta increase in the understory. With further site degradation galleta and bluegrass also decline. After wildfire, Douglas' rabbitbrush, littleleaf horsebrush, wolfberry, spiny hopsage and Nevada ephedra often dominate the aspect. Should excessive soil erosion occur after disturbance and soils become unstable, the potential plant community may be permanently altered to that characterized by the Eroded Granitic Slope (027XY047NV) ecological site. Species likely to invade this site are annuals such as cheatgrass and filaree.

Fire Ecology:

The fire return interval for Wyoming big sagebrush communities ranges from 10 to 70 years. Fire is the principal means of renewal for decadent stands of Wyoming big sagebrush.

Wyoming big sagebrush is killed by fire and establishes after fire from a seedbank; from seed produced by remnant plants that escaped fire; and from plants adjacent to the burn that seed in. 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. Nevada ephedra generally sprouts after fire damages aboveground vegetation. Underground regenerative structures commonly survive when aboveground vegetation is consumed by fire. However, severe fires may kill shallowly buried regenerative structures. 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. 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 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. 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:

Wyoming/mountain big sagebrush and Thurber's needlegrass dominate the site. Indian ricegrass, Sandberg bluegrass, Nevada ephedra and Utah serviceberry are important 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 fine fuel loads.

Community Phase Pathway 1.1b: Natural regeneration over 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. Thurber's needlegrass and other perennial grasses dominate. Depending on fire severity 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:

Big 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 decreases or eliminates overstory of sagebrush and allow the perennial bunchgrasses to dominate. Fires would typically be low severity resulting in a mosaic pattern due to low fine 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 within the community, giving a competitive advantage to the perennial grasses and forbs.

Community Phase Pathway 1.3b: A low severity/patchy fire reduces 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: Big sagebrush and Thurber's needlegrass dominate the site. Indian ricegrass and squirreltail may be significant components while Sandberg bluegrass and forbs are less common. Non-native annual species present.

Community Phase Pathway 2.1a: Fire reduces the 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. 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 big sagebrush to dominate the site. Inappropriate grazing management reduces the perennial bunchgrass understory, conversely Sandberg bluegrass may increase in the understory depending on grazing management.

Community Phase 2.2: This community phase is characteristic of a post-disturbance, early seral community phase. Thurber's needlegrass and other perennial grasses dominate. Big 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. 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 big 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 perennial bunchgrasses in the understory are reduced, either from competition with shrubs or from inappropriate grazing management, or both. Rabbitbrush may be a significant component. Sandberg bluegrass may increase and become co-dominant 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. Brush management with minimal soil disturbance would also decrease sagebrush and release the perennial understory. Low intensity/patchy fire may create a sagebrush-grass mosaic. 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 the perennial bunchgrasses to dominate the site. 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. 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 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 dominant grass or the herbaceous understory may be completely eliminated. 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:

Big sagebrush dominates overstory and rabbitbrush may be a significant component. Deep-rooted perennial bunchgrasses may be present in trace amounts or absent. 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 Nevada ephedra, Utah serviceberry, Anderson's peachbrush or rabbitbrush may be dominant.

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 big 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.

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, ephedra, etc. 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 broom snakeweed dominate overstory. Big 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 eliminates shrubs and allows for annual non-native species to dominate the site.

State 1

Reference Plant Community

Community 1.1

Reference Plant Community



Figure 3. Granitic slope

The reference plant community is dominated by desert needlegrass and Wyoming big sagebrush. 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	200	300	400
Shrub/Vine	180	270	360
Forb	20	30	40
Total	400	600	800

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			264–378	
	desert needlegrass	ACSP12	<i>Achnatherum speciosum</i>	240–300	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	12–48	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	12–30	–
2	Secondary Perennial Grasses			12–48	
	squirreltail	ELEL5	<i>Elymus elymoides</i>	3–18	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	3–18	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	3–18	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	3–18	–
Forb					
3	Perennial			12–48	
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	3–18	–
	buckwheat	ERIOG	<i>Eriogonum</i>	3–12	–
	phlox	PHLOX	<i>Phlox</i>	3–12	–
	globemallow	SPHAE	<i>Sphaeralcea</i>	3–12	–
Shrub/Vine					
4	Primary Shrubs			174–278	
	spiny hopsage	GRSP	<i>Grayia spinosa</i>	12–48	–
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	12–30	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	3–12	–
	buckwheat	ERIOG	<i>Eriogonum</i>	3–12	–
	phlox	PHLOX	<i>Phlox</i>	3–12	–
	globemallow	SPHAE	<i>Sphaeralcea</i>	3–12	–
5	Secondary Shrubs			12–60	
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	3–18	–
	water jacket	LYAN	<i>Lycium andersonii</i>	3–18	–
	desert peach	PRAN2	<i>Prunus andersonii</i>	3–18	–
	desert bitterbrush	PUGL2	<i>Purshia glandulosa</i>	3–18	–
	Stansbury cliffrose	PUST	<i>Purshia stansburiana</i>	3–18	–
	desert snowberry	SYLO	<i>Symphoricarpos longiflorus</i>	3–18	–
Tree					
6	Evergreen			6–36	
	spiny hopsage	GRSP	<i>Grayia spinosa</i>	12–48	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	6–18	–
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	3–18	–
	singleleaf pinyon	PIMO	<i>Pinus monophylla</i>	3–18	–

Animal community

Livestock Interpretations:

This site is suited for livestock grazing. Grazing management should be keyed to desert needlegrass, indian ricegrass, and bluegrass production. Desert needlegrass produces considerable basal foliage and is good forage while young. Young desert needlegrass is palatable to all classes of livestock. Mature herbage is moderately

grazed by horses and cattle but rarely grazed by sheep. 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. Livestock browse Wyoming big sagebrush, but may use it only lightly when palatable herbaceous species are available. 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.

Nevada ephedra is important winter range browse for domestic cattle, sheep and goats.

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:

Wyoming big sagebrush is preferred browse for wild ungulates, and Wyoming big sagebrush communities are important winter ranges for big game. Pronghorn usually browse Wyoming big sagebrush heavily. Wyoming big sagebrush communities are critical habitat for the birds.

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. Mule deer, bighorn sheep, and pronghorn browse Nevada ephedra, especially in spring and late summer when new growth is available. Desert needlegrass is an important forage species for several wildlife species in the spring. 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 low.

Other products

Native Americans made tea from big sagebrush leaves. They used the tea as a tonic, an antiseptic, for treating colds, diarrhea, and sore eyes and as a rinse to ward off ticks. Big sagebrush seeds were eaten raw or made into meal. Some Native American peoples traditionally ground parched seeds of spiny hopsage to make pinole flour. Native Americans used Nevada ephedra as a tea to treat stomach and kidney ailments. Indian ricegrass was traditionally eaten by some Native Americans. The Paiutes used seed as a reserve food source.

Other information

Wyoming big sagebrush is used for stabilizing slopes and gullies and for restoring degraded wildlife habitat, rangelands, mine spoils and other disturbed sites. It is particularly recommended on dry upland sites where other shrubs are difficult to establish. 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. Nevada ephedra is useful for erosion control, and seedlings have been successfully planted onto reclaimed strip mines, with survival ranging from 12 to 94%. Atrazine may be effective in controlling Nevada ephedra, though some plants can survive through crown sprouting. Irrigation may increase control by atrazine.

Desert needlegrass seeds are easily germinated and have potential for commercial use. Desert needlegrass may be used for groundcover in areas of light disturbance, but it is susceptible to excessive trampling.

Inventory data references

NASIS soil component data.

Type locality

Location 1: Mineral County, NV	
Township/Range/Section	T7N R34E S29
General legal description	About 6 miles northwest of Mina, Black Dyke Mountain area, Garfield Hills, Mineral County Nevada. This site also occurs in Churchill, Esmeralda, Lyon, Nye and Pershing Counties, Nevada.
Location 2: Pershing County, NV	
Township/Range/Section	T26N R26E S9
General legal description	Sahwave Mountains, Pershing County, Nevada. This site also occurs in Churchill, Esmeralda, Lyon, Mineral, and Nye 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

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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

1. **Number and extent of rills:** Rills may occur on steeper slopes and most frequently occur in areas subjected to summer convection storms or rapid spring melt.
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2. **Presence of water flow patterns:** Water flow patterns are rare to slight.
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3. **Number and height of erosional pedestals or terracettes:** Pedestals are rare to slight and most frequently occur in areas subjected to summer convection storms or rapid spring snowmelt.
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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 50 to 60 percent
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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, forbs and shrubs) expected to move distance of slope length during intense summer storms. Persistent litter (large woody material) will remain in place except during catastrophic 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 4 to 6 on most surface soil textures found on this site.
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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is single grain, weak subangular blocky or massive. Soil surface colors are light and soils are typified by an ochric epipedon. Organic carbon of the surface 2 to 3 inches is typically less than 1 percent dropping off quickly below.
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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, especially deep-rooted bunchgrasses [Desert needlegrass and Indian ricegrass] 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):** None. Subsoil argillic horizons are not to be mistaken for compaction on this site.
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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**
- Dominant: Reference Plant Community: Deep-rooted, cool season, perennial bunchgrasses >> evergreen and deciduous shrubs
- Sub-dominant: shallow-rooted, cool season perennial grasses = deep-rooted cool season perennial forbs = fibrous, shallow-rooted cool season, annual and perennial forbs > shallow-rooted, warm season grasses.
- 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 30% of total woody canopy. Some of the mature bunchgrasses (<25%) have dead centers.
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14. **Average percent litter cover (%) and depth (in):** Mostly under the canopy
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**
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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Cheatgrass, annual mustards, halogeton, and Russian thistle are invaders on this site. Douglas rabbitbrush, Utah juniper and singleleaf pinyon are increasers on this site.
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17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (normal) and above average growing seasons.
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