USDA Natural Resources Conservation Service

Ecological site R026XY094NV
ERODED SLOPE 8-10

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 026X–Carson Basin and Mountains

The area lies within western Nevada and eastern California, with about 69 percent being within Nevada, and 31 percent being within California. Almost all this area is in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. Isolated north-south trending mountain ranges are separated by aggraded desert plains. The mountains are uplifted fault blocks with steep side slopes. Most of the valleys are drained by three major rivers flowing east across this MLRA. A narrow strip along the western border of the area is in the Sierra Nevada Section of the Cascade-Sierra Mountains Province of the Pacific Mountain System. The Sierra Nevada Mountains are primarily a large fault block that has been uplifted with a dominant tilt to the west. This structure leaves an impressive wall of mountains directly west of this area. This helps create a rain shadow affect to MLRA 26. Parts of this eastern face, but mostly just the foothills, mark the western boundary of this area. Elevations range from about 3,806 feet (1,160 meters) on the west shore of Pyramid Lake to 11,653 feet (3,552 meters) on the summit of Mount Patterson in the Sweetwater Mountains.

Valley areas are dominantly composed of Quaternary alluvial deposits with Quaternary playa or alluvial flat deposits often occupying the lowest valley bottoms in the internally drained valleys, and river deposited alluvium being dominant in externally drained valleys. Hills and mountains are dominantly Tertiary andesitic flows, breccias, ash flow tuffs, rhyolite tuffs or granodioritic rocks. Quaternary basalt flows are present in lesser amounts, and Jurassic and Triassic limestone and shale, and Precambrian limestone and dolomite are also present in very limited amounts. Also of limited extent are glacial till deposits along the east flank of the Sierra Nevada Mountains, the result of alpine glaciation.

The average annual precipitation in this area is 5 to 36 inches (125 to 915 millimeters), increasing with elevation. Most of the rainfall occurs as high-intensity, convective storms in spring and autumn. Precipitation is mostly snow in winter. Summers are dry. The average annual temperature is 37 to 54 degrees F (3 to 12 degrees C). The freeze-free period averages 115 days and ranges from 40 to 195 days, decreasing in length with elevation.

The dominant soil orders in this MLRA are Aridisols and Mollisols. The soils in the area dominantly have a mesic soil temperature regime, an aridic or xeric soil moisture regime, and mixed or smectitic mineralogy. They generally are well drained, are clayey or loamy and commonly skeletal, and are very shallow to moderately deep.

This area supports shrub-grass vegetation characterized by big sagebrush. Low sagebrush and Lahontan sagebrush occur on some soils. Antelope bitterbrush, squirreltail, desert needlegrass, Thurber needlegrass, and Indian ricegrass are important associated plants. Green ephedra, Sandberg bluegrass, Anderson peachbrush, and several forb species also are common. Juniper-pinyon woodland is typical on mountain slopes. Jeffrey pine, lodgepole pine, white fir, and manzanita grow on the highest mountain slopes. Shadscale is the typical plant in the drier parts of the area. Sedges, rushes, and moisture-loving grasses grow on the wettest parts of the wet flood plains and terraces. Basin wildrye, alkali sacaton, saltgrass, buffaloberry, black greasewood, and rubber rabbitbrush grow on the drier sites that have a high concentration of salts.

Some of the major wildlife species in this area are mule deer, coyote, beaver, muskrat, jackrabbit, cottontail, raptors, pheasant, chukar, blue grouse, mountain quail, and mourning dove. The species of fish in the area include trout and catfish. The Lahontan cutthroat trout in the Truckee River is a threatened and endangered species.

LRU notes

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

Ecological site concept

The Eroded Slope site is found on slopes between 8 and 50 percent on rock pediments and hills. The elevations are 4,400 and 5,800 feet. The soil is very shallow to bedrock and the soil surface texture is very gravelly coarse sandy loam. The dominant vegetation is Lahontan sagebrush (Artemisia arbuscula ssp. longicaulis) and desert sagebrush (Achnatherum speciosum).

Associated sites

R026XY011NV	**SOUTH SLOPE 8-12 P.Z.**
R026XY016NV	**LOAMY 8-10 P.Z.**

Similar sites

R026XY015NV	**SHALLOW LOAM 10-12 P.Z.** ACTH7 dominant grass; more productive site
R026XY022NV	**STONY SLOPE 8-10 P.Z.** ACSP12 dominant grass; more productive site
R026XY017NV	**LOAMY HILL 10-12 P.Z.** ACTH7 dominant grass; more productive site
R026XY011NV	**SOUTH SLOPE 8-12 P.Z.** ACSP12 dominant grass; more productive site
R026XY029NV	**ERODED SLOPE 10-12 P.Z.** ARTRW8 is major shrub

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia arbuscula ssp. longicaulis*
Herbaceous	(1) *Achnatherum speciosum*

Physiographic features

This site occurs on sideslopes of pediments and low hills. Slopes range from 8 to 50 percent. Elevations are 4400 to 5800 feet.

Table 2. Representative physiographic features

Landforms	(1) Pediment (2) Hill
Elevation	4,400–5,800 ft

Slope	8–50%
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is semiarid, charaterized by cool, moist winters and warm, dry summers. Average annual precipitation is 8 to 10 inches. Mean annual air temperature is 49 to 51 degrees F. The average growing season is about 90 to 120 days.

Nevada's climate is predominantly arid, with large daily ranges of temperature, infrequent severe storms, heavy snowfall in the higher mountains, and great location variations with elevation. Three basic geographical factors largely influence Nevada's climate: continentality, latitude, and elevation. Continentality is the most important factor. The strong continental effect is expressed in the form of both dryness and large temperature variations. Nevada lies on the eastern, lee side of the Sierra Nevada Range, a massive mountain barrier that markedly influences the climate of the State. The prevailing winds are from the west, and as the warm moist air from the Pacific Ocean ascend the western slopes of the Sierra Range, the air cools, condensation occurs and most of the moisture falls as precipitation. As the air descends the eastern slope, it is warmed by compression, and very little precipitation occurs. The effects of this mountain barrier are felt not only in the West but throughout the state, with the result that the lowlands of Nevada are largely desert or steppes. The temperature regime is also affected by the blocking of the inland-moving maritime air. Nevada sheltered from maritime winds, has a continental climate with well-developed seasons and the terrain responds quickly to changes in solar heating.

Nevada lies within the mid-latitude belt of prevailing westerly winds which occur most of the year. These winds bring frequent changes in weather during the late fall, winter and spring months, when most of the precipitation occurs. To the south of the mid-latitude westerlies, lies a zone of high pressure in subtropical latitudes, with a center over the Pacific Ocean. In the summer, this high-pressure belt shifts northward over the latitudes of Nevada, blocking storms from the ocean. The resulting weather is mostly clear and dry during the summer and early fall, with scattered thundershowers. The eastern portion of the state receives significant summer thunderstorms generated from monsoonal moisture pushed up from the Gulf of California, known as the North American monsoon. The monsoon system peaks in August and by October the monsoon high over the Western U.S. begins to weaken and the precipitation retreats southward towards the tropics (NOAA 2004).

Table 3. Representative climatic features

Frost-free period (characteristic range)	
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	8-10 in
Frost-free period (average)	105 days
Freeze-free period (average)	
Precipitation total (average)	9 in

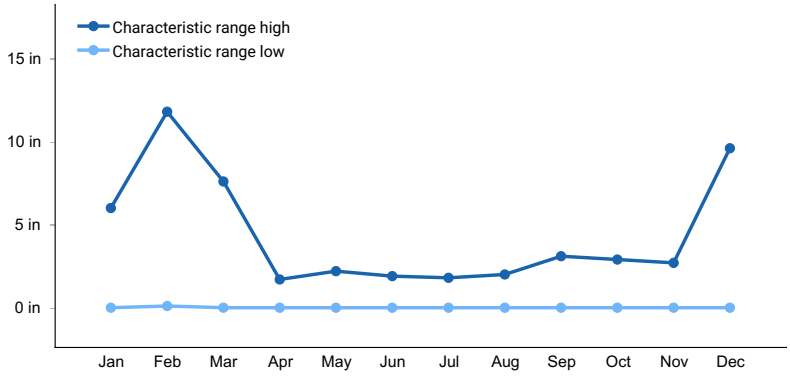


Figure 1. Monthly precipitation range

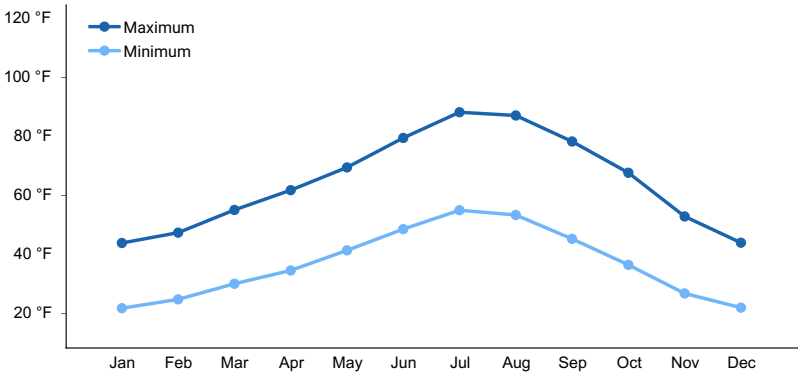


Figure 2. Monthly average minimum and maximum temperature

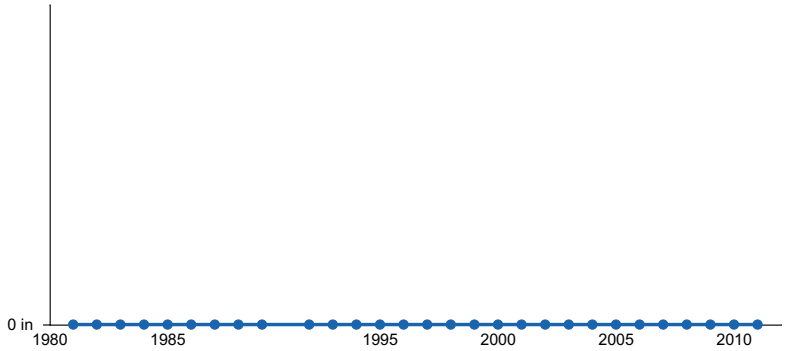


Figure 3. Annual precipitation pattern

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils in this site are very shallow, well drained soils that formed in residuum derived from tuff or rhyolite rocks. The available water capacity is very low. The soils are moist in the winter and early spring, and dry in summer and fall. The soil moisture regime is torric that borders on xeric. The soils have an ochric epipedon. Loss of the soil surface layer through erosion is a severely limiting factor to plant development. A thin surface layer or exposed subsoil restricts infiltration of moisture. Because of the low infiltration rate and steepness of slope, runoff is very high. Soil series associated with this site include Boondock and Mizel.

Table 4. Representative soil features

Parent material	(1) Residuum–tuff (2) Residuum–rhyolite
Surface texture	(1) Very gravelly coarse sandy loam (2) Gravelly fine sandy loam
Family particle size	(1) Loamy (2) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderately slow
Soil depth	3–10 in
Surface fragment cover <=3"	23–34%
Surface fragment cover >3"	3–5%
Available water capacity (0-40in)	0.3–1 in

Calcium carbonate equivalent (Depth not specified)	0%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	5.6–6.5
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0–1%

Ecological dynamics

As ecological condition declines, perennial grasses decline while Douglas' rabbitbrush, littleleaf horsebrush, and Lahontan sagebrush become more dominant Species most likely to invade this site are non-native annual forbs and grasses.

Fire Ecology:
The mean fire return interval for Lahontan sagebrush communities have been estimated to be from 35 to over 100 years. Fire most often occurs during wet years with high forage production. Lahontan sagebrush is very susceptible to fire damage. Lahontan sagebrush is usually killed by fire and does not re-sprout. The recovery in burned areas is usually via small, light, wind-dispersed seed for all low sagebrush subspecies. Partially injured Lahontan sagebrush may re-grow from living branches, but sprouting does not occur.
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.
Bottlebrush squirreltail's small size, coarse stems, and sparse leafy material aid in its tolerance of fire. Postfire regeneration occurs from surviving root crowns and from on- and off-site seed sources. Frequency of disturbance greatly influences postfire response of bottlebrush squirreltail. Undisturbed plants within a 6 to 9 year age class generally contain large amounts of dead material, increasing bottlebrush squirreltail's susceptibility to fire.
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 Narrative Group 8

This is a text description of the states, phases, transitions, and community pathways possible in the State and Transition model for the MLRA 26 Disturbance Response Group 8.
Reference State 1.0:

The Reference State 1.0 is a representative of the natural range of variability under pristine conditions. The reference state has three general community phases; a shrub-grass dominant phase, a perennial grass dominant phase and a shrub dominant phase. 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 big sagebrush, Thurber’s needlegrass, desert needlegrass, bottlebrush squirreltail and Indian ricegrass dominate the site. Douglas rabbitbrush, purple sage and antelope bitterbrush are also common on this site. Utah juniper and singleleaf pinyon are described in the site concept and may be present in minor amounts.

Community Phase Pathway 1.1a, from Phase 1.1 to 1.2:
Fire would decrease or eliminate the overstory of sagebrush and allow for the perennial bunchgrasses to dominate

the site. Fires would typically be small and patchy due to low fuel loads. A fire following an unusually wet spring 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.

Community Phase Pathway 1.1b, Phase 1.1 to 1.3:
Long-term drought, time and/or herbivory favor an increase in Wyoming big sagebrush over deep-rooted perennial bunchgrasses. Combinations of these would allow the sagebrush overstory to increase and dominate the site, causing a reduction in the perennial bunchgrasses.

Community Phase 1.2:
This community phase is characteristic of a post-disturbance, early to mid-seral community phase. Thurber's needlegrass, desert needlegrass, bottlebrush squirreltail, Indian ricegrass and other perennial grasses are common. Sprouting shrubs are present. Wyoming big sagebrush is killed by fire, therefore decreasing within the burned community. Sagebrush could still be present in unburned patches. Needlegrasses can experience high mortality from fire and may be reduced in the community for several years.

Community Phase Pathway 1.2a, Phase 1.2 to 1.1:
Time and lack of disturbance allows for sagebrush to reestablish.

Community Phase 1.3:
Wyoming 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 or from herbivory. Squirreltail will likely increase in the understory and may be the dominant grass on the site.

Community Phase Pathway 1.3a, from Phase 1.3 to 1.2:
Fire would decrease or eliminate the overstory of sagebrush and allow for the perennial bunchgrasses to dominate the site. Fires would typically be small and patchy due to low fuel loads. A fire following an unusually wet spring 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.

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 and mustards.
Slow variables: Over time the annual non-native plants will increase within the community decreasing organic matter inputs from deep-rooted perennial bunchgrasses resulting in reductions in soil water availability for perennial bunchgrasses.
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 invasive weeds. This state has the same three general community phases. 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. Additionally, the presence of highly flammable, non-native species reduces state resilience because these species can promote fire where historically fire has been infrequent leading to positive feedbacks that further the degradation of the system.

Community Phase 2.1:
Wyoming big sagebrush, desert needlegrass and Thurber's needlegrass dominate the site. Bottlebrush squirreltail, Indian ricegrass, Douglas rabbitbrush, purple sage and antelope bitterbrush are also common on this site. Utah juniper and singleleaf pinyon may be present. Non-native annual species are present in minor amounts.

Community Phase Pathway 2.1a, from Phase 2.1 to 2.2:

Fire would decrease or eliminate the overstory of sagebrush and allow perennial bunchgrasses to dominate the site. Fires would typically be small and patchy due to low fuel loads. A fire following an unusually wet spring or a change in management may be more severe and reduce sagebrush cover to trace amounts. A severe infestation of Aroga moth could also cause a large decrease in sagebrush within the community, giving a competitive advantage to the perennial grasses and forbs. Annual non-native species generally respond well after fire and may be stable or increasing within the community.

Community Phase Pathway 2.1b, from Phase 2.1 to 2.3:
Time, long-term drought, grazing management that favors shrubs or combinations of these would allow the sagebrush overstory to increase and dominate the site, causing a reduction in the perennial bunchgrasses. However, squirreltail may increase in the understory depending on the grazing management. Heavy spring grazing will favor an increase in sagebrush. Annual non-native species may be stable or increasing within the understory.

Community Phase 2.2:
This community phase is characteristic of a post-disturbance, early seral community phase. Thurber's needlegrass, desert needlegrass, bottlebrush squirreltail, Indian ricegrass and other perennial grasses are common. Sprouting shrubs are present. Wyoming big sagebrush is killed by fire, therefore decreasing within the burned community. Sagebrush could still be present in unburned patches. Perennial forbs may increase or dominate after fire for several years. Thurber's needlegrass can experience high mortality from fire and may be reduced in the community for several years. Annual non-native species generally respond well after fire and may be stable or increasing within the community. Rabbitbrush may dominate the aspect for a number of years following wildfire.

Community Phase Pathway 2.2a, from Phase 2.2 to 2.1:
Absence of disturbance over time allows for the sagebrush to recover. This transition may be combined with grazing management that favors shrubs.

Community Phase 2.3 (At-Risk):
Wyoming big sagebrush increases and the perennial understory is reduced. Decadent sagebrush dominates the overstory and the deep-rooted perennial bunchgrasses in the understory are reduced either from competition with shrubs or from inappropriate grazing management. Squirreltail will likely increase in the understory and may be the dominant grass on the site. Utah juniper and singleleaf pinyon may be present. Annual non-native species present.

Community Phase Pathway 2.3a, from Phase 2.3 to 2.2:
Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Other disturbances/practices include brush management with minimal soil disturbance; late-fall/winter grazing causing mechanical damage to sagebrush.

T2A: Transition from Current Potential State 2.0 to Shrub State 3.0:
Trigger: Inappropriate, long-term grazing of perennial bunchgrasses during growing season would favor shrubs and initiate transition to Community Phase 3.1. Fire would cause a transition to Community Phase 3.2.
Slow variables: Long term decrease in deep-rooted perennial grass density resulting in a decrease in organic matter inputs and subsequent soil water decline.
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: Fire leads to Community Phase 4.1. Inappropriate grazing management that favors shrubs in the presence of non-native annual species leads to Community Phase 4.2.
Slow variables: Increased production and cover of non-native annual species.
Threshold: Cheatgrass or other non-native annuals dominate understory.

Shrub State 3.0:
This state has two community phases; a Wyoming big sagebrush dominated phase and a sprouting shrub dominated phase. This state is a product of many years of heavy grazing during time periods harmful to perennial bunchgrasses. Squirreltail will increase with a reduction in deep-rooted perennial bunchgrass competition and become the dominant grass. Sagebrush dominates the overstory and rabbitbrush may be a significant component. Sagebrush canopy cover is high and sagebrush may be decadent, reflecting stand maturity and lack of seedling establishment due to competition with mature plants. The shrub overstory and squirreltail understory dominate site resources such that soil water, nutrient capture, nutrient cycling and soil organic matter are temporally and spatially

redistributed.

Community Phase 3.1:
Wyoming big sagebrush dominates overstory and sprouting shrubs may be a significant component. Squirreltail dominates the understory and may also be a significant component of the plant community. Utah juniper and singleleaf pinyon may be present or increasing. Annual non-native species are present to increasing. Understory may be sparse, with bare ground increasing.

Community Phase Pathway 3.1a, from Phase 3.1 to 3.2:
Fire would decrease or eliminate the overstory of sagebrush. A severe infestation of Aroga moth could also cause a large decrease in sagebrush within the community, giving a competitive advantage to sprouting shrubs. Heavy fall grazing causing mechanical damage to shrubs, and/or brush treatments with minimal soil disturbance, would greatly reduce the overstory shrubs and allow for squirreltail to dominate the site.

Community Phase 3.2:
Sprouting shrubs such as Douglas rabbitbrush, littleleaf horsebrush, desert peach and antelope bitterbrush dominate the understory; annual non-natives are present but are not dominant. Trace amounts of sagebrush may be present.

Community Phase Pathway 3.2a, from Phase 3.2 to 3.1:
Absence of disturbance over time would allow for sagebrush and other shrubs to recover.

T3A: Transition from Shrub State 3.0 to Annual State 4.0:
Trigger: Fire or inappropriate grazing management can eliminate the squirreltail understory and transition to community Phase 4.1 or 4.2.
Slow variable: 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.

T3B: Transition from Shrub State 3.0 to Tree State 5.0:
Trigger: Lack of fire allows for trees to dominate site; may be coupled with inappropriate grazing management that reduces fine fuels.
Slow variables: Increased establishment and cover of juniper/pinyon trees, reduction in organic matter inputs.
Threshold: Trees overtop Wyoming big sagebrush and out-compete shrubs for water and sunlight. Shrub skeletons exceed live shrubs with minimal recruitment of new cohorts.

Annual State 4.0:
This state has two community phases; one dominated by annual non-native species and the other is a shrub dominated state. This state is characterized by the dominance of annual non-native species such as cheatgrass in the understory. Sagebrush and/or rabbitbrush may dominate the overstory. Annual non-native species dominate the understory.

Community Phase 4.1:
Annual non-native plants dominate the site. Sagebrush and sprouting shrubs may be present.

Community Phase Pathway 4.1a, from Phase 4.1 to 4.2:
Time and lack of disturbance allows for shrubs to reestablish. Sprouting shrubs such as rabbitbrush will be the first to reappear after fire. Probability of sagebrush establishment is extremely low.

Community Phase 4.2:
Sprouting shrubs and/or sagebrush remains 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, from Phase 4.2 to 4.1:
Fire allows for annual, non-native species to dominate site.

Tree State 5.0:

This state has two community phases that are characterized by the dominance of Utah juniper and singleleaf pinyon in the overstory. Wyoming big sagebrush and perennial bunchgrasses may still be present, but they are no longer controlling site resources. Soil moisture, soil nutrients, soil organic matter distribution and nutrient cycling have been spatially and temporally altered.

Community Phase 5.1:
Juniper trees dominate overstory, sagebrush is decadent and dying, deep rooted perennial bunchgrasses are decreasing. Recruitment of sagebrush cohorts is minimal. Annual non-natives may be present or increasing.

Community Phase Pathway 5.1a, from Phase 5.1 to 5.2:
Absence of disturbance over time allows for tree cover and density to further increase and out-compete the herbaceous understory species for sunlight and water.

Community Phase 5.2:
Utah juniper dominates the site and tree leader growth is minimal; annual non-native species may be the dominant understory species and will typically be found under the tree canopies. Trace amounts of sagebrush may be present however dead skeletons will be more numerous than living sagebrush. Bunchgrasses may or may not be present. Squirreltail or mat forming forbs may be present in trace amounts. Bare ground interspaces are large and connected. Soil redistribution is evident.

Community Phase Pathway 5.2a, from Phase 5.2 to 5.1:
Manual or mechanical thinning of trees allows understory regrowth due to less competition for resources.

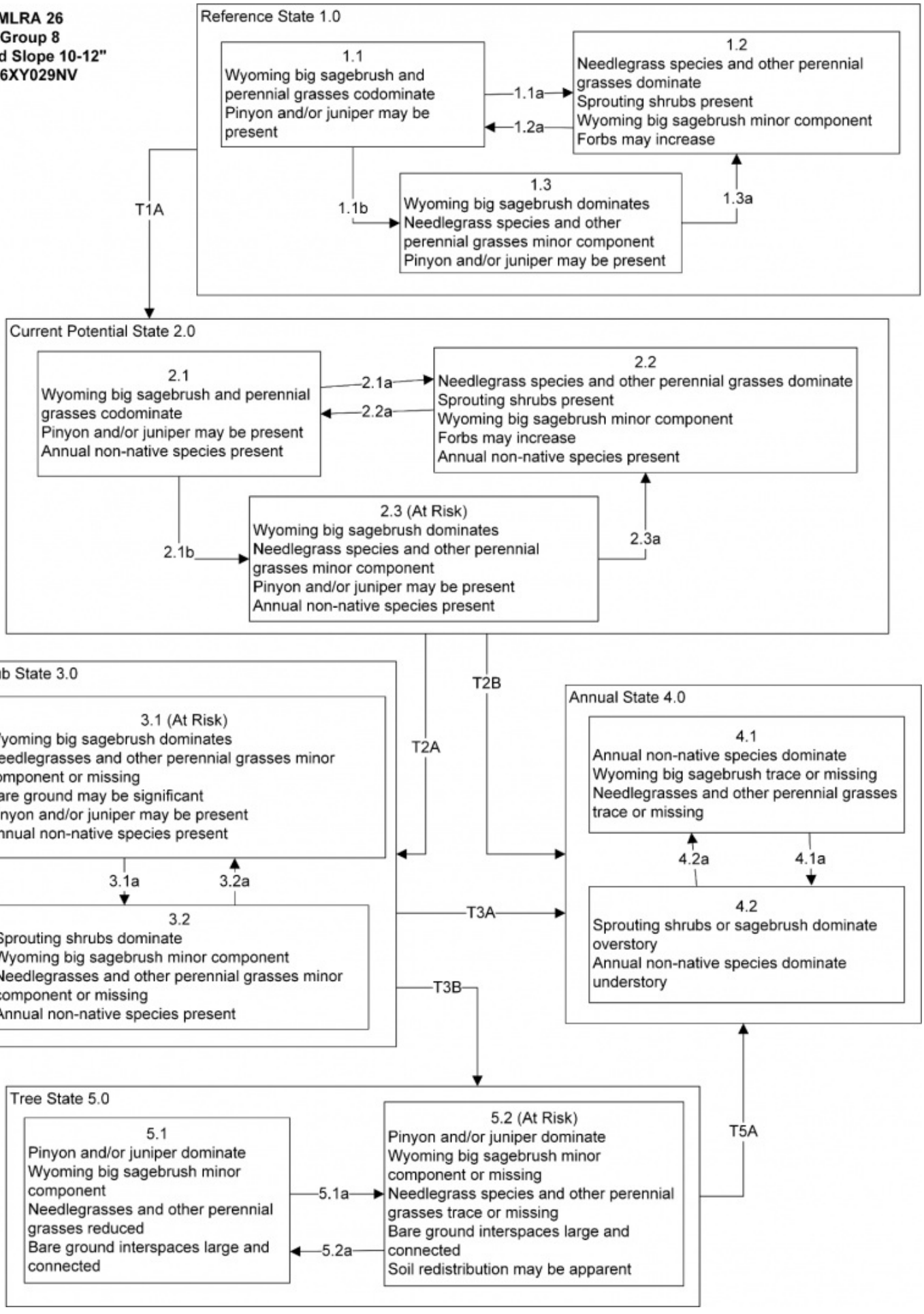
T5A: Transition from Tree State 5.0 to Annual State 4.0:
Trigger: Catastrophic crown fire would reduce or eliminate trees to transition the site to 4.1. Tree removal when annual non-natives such as cheatgrass are present would also transition the site to state 4.0.

Slow variable: 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.

State and transition model

MLRA 26
Group 8
Eroded Slope 10-12"
026XY029NV



MLRA 26
Group 8
Eroded Slope 10-12"
026XY029NV

Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/ mid-seral community, dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire. Excessive herbivory and/or long-term drought may also reduce perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire would create sagebrush/grass mosaic.

Transition T1A: Introduction of non-native annual species.

Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/ mid-seral community dominated by grasses and forbs; non-native annual species present.
2.1b: Time and lack of disturbance. Inappropriate grazing management and/or long-term drought may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire creates sagebrush/grass mosaic, herbivory or combinations. Brush management with minimal soil disturbance reduces sagebrush.

Transition T2A: Inappropriate grazing management (3.1), or high severity fire (3.2).
Transition T2B: Fire. Annuals may increase under an intact shrub canopy (to 4.2).

Shrub State 3.0 Community Phase Pathways
3.1a: Low severity fire.
3.2a: Time and lack of disturbance.

Transition T3A: Catastrophic fire and/or treatments that disturb the existing plant community. Annuals may increase under an intact shrub canopy (to 4.2).
Transition T3B: Time and lack of disturbance allows for maturation of tree community.

Annual State 4.0 Community Phase Pathways
4.1a: Time and lack of disturbance.
4.2a: Fire.

Tree State 5.0 Community Phase Pathways
5.1a: Time and lack of disturbance allows for maturation of tree community.
5.2a: Tree thinning treatment (typically for fuels management).

Transition T5A: Catastrophic fire.

State 1
Reference Plant Community

Community 1.1
Reference Plant Community

The reference plant community is dominated by Lahontan sagebrush, Douglas rabbitbrush, desert needlegrass and bottlebrush squirreltail. Potential vegetative composition is about 25% grasses, 10% forbs and 65% shrubs and trees. Approximate ground cover (basal and crown) is 10 to 20 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	63	95	125
Grass/Grasslike	25	37	50
Forb	10	15	20
Tree	2	3	5
Total	**100**	**150**	**200**

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**			26–50	
	desert needlegrass	ACSP12	*Achnatherum speciosum*	15–23	–
	squirreltail	ELEL5	*Elymus elymoides*	8–15	–
	Sandberg bluegrass	POSE	*Poa secunda*	3–12	–
2	**Secondary Perennial Grasses**			3–12	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	1–3	–
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	1–3	–
3	**Annual Grasses**			1–3	
	sixweeks fescue	VUOC	*Vulpia octoflora*	1–3	–
Forb					
4	**Perennial Forbs**			8–15	
	rockcress	ARABI2	*Arabis*	1–3	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	1–3	–
	buckwheat	ERIOG	*Eriogonum*	1–3	–
	phlox	PHLOX	*Phlox*	1–3	–
	desert princesplume	STPI	*Stanleya pinnata*	1–3	–
5	**Annual**			2–8	
Shrub/Vine					
6	**Primary Shrubs**			69–138	
	little sagebrush	ARARL3	*Artemisia arbuscula ssp. longicaulis*	53–68	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	8–35	–
	littleleaf horsebrush	TEGL	*Tetradymia glabrata*	8–35	–
7	**Secondary Shrubs**			3–8	
	fourwing saltbush	ATCA2	*Atriplex canescens*	2–5	–
	mormon tea	EPVI	*Ephedra viridis*	2–5	–
	spiny hopsage	GRSP	*Grayia spinosa*	2–5	–
	purple sage	SADOD3	*Salvia dorrii ssp. dorrii var. dorrii*	2–5	–
Tree					
8	**Evergreen**			2–5	
	Utah juniper	JUOS	*Juniperus osteosperma*	2–5	–

Animal community

Livestock Interpretations:
This site has limited use for livestock grazing due to steep slopes and low forage production. Grazing management should be keyed to desert needlegrass 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. Lahontan sagebrush is considered a valuable browse plant during the spring, fall and winter months. In some areas it is of little value in winter due to heavy snow. Mule deer utilize and sometimes prefer Lahontan sagebrush, particularly in winter and early spring.

Wildlife Interpretations:
Lahontan sagebrush is considered a valuable browse plant for pronghorn antelope and mule deer during the spring, fall and winter months. In some areas it is of little value in winter due to heavy snow. Mule deer utilize and sometimes prefer Lahontan sagebrush, particularly in winter and early spring. Desert needlegrass, bottlebrush squirreltail and Sandberg bluegrass are other important forage species for several wildlife species.

Hydrological functions

Runoff is very high and permeability is moderately slow. Rills are common on steeper slopes and most frequently occur in areas subjected to summer convection storms or rapid spring snowmelt. Water flow patterns are rare to slight. There are no gullies. Plant pedestalling due to erosion is slight to common and most frequently occur in areas subjected to summer convection storms or rapid spring snowmelt. Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., needlegrasses] slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact and provide opportunity for snow catch and 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 has potential for off-road vehicle use and hiking and has potential for upland and big game hunting.

Other information

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.

Type locality

Location 1: Washoe County, NV	
Township/Range/Section	T22N R20E S21
Latitude	39° 45′ 13″
Longitude	119° 44′ 56″
General legal description	Hungry Valley, north of Reno, NV

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

PNOVAK-ECHENIQUE

Approval

Kendra Moseley, 4/10/2024

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	04/25/2007
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are common on steeper slopes and most frequently occur in areas subjected to summer convection storms or rapid spring snowmelt.

2. **Presence of water flow patterns:** Water flow patterns are rare to slight.

3. **Number and height of erosional pedestals or terracettes:** Plant pedestalling due to erosion is slight to common and most frequently occur in areas subjected to summer convection storms or rapid spring snowmelt.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground ± 50%; surface rock fragments ±25%; shrub canopy <20%; foliar cover for perennial herbaceous plants ±10%.

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

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

7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage from grasses and annual & perennial forbs) is expected to move the distance of slope length during intense summer storms. Persistent litter (large woody material) will remain in place except during catastrophic 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 5 on the coarse surface 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 weak, medium platy parting to moderate, fine, subangular blocky. 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 [i.e., needlegrasses] 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

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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 = tall shrubs (Lahontan sagebrush). (By above ground production)

    Sub-dominant: Shallow-rooted, cool season, perennial grasses = deep-rooted, cool season, perennial forbs = fibrous, shallow-rooted, cool season, annual and perennial forbs. (By above ground production)

    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 20% of total woody canopy; some of the mature bunchgrasses (to 25%) have dead centers.

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14. **Average percent litter cover (%) and depth (in):** Between plant interspaces (± 2%)

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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 (March thru May) ± 150 lbs/ac; Spring 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: Cheatgrass, snakeweed, Russian thistle, filaree, annual mustards and bassia 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.
