USDA Natural Resources Conservation Service

Ecological site R026XY096NV
SANDY PLAIN

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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 Sierra Influenced Ranges LRU is characterized by wooded great basin mountains with climatic and biotic affinities to the Sierra Nevada mountain range. The Sierra Influences Ranges LRU receives greater precipitation that the mountain ranges of central NV. Amount of precipitation varies in relation to the local strength of the Sierra NV rain shadow, characterized by pinyon and juniper trees. The White, Sweetwater, Pine Nut, Wassuk, and Virginia ranges of Nevada support varying amounts of Sierra Nevada flora, such as ponderosa pine. Elevations range from 1610 to 2420 meters and slopes range from 5 to 49 percent, with a median value of 22 percent. Frost free days (FFD) ranges from 92 to 163.

Ecological site concept

The Sandy Plain site occurs on sand sheets covering inter-plateau valley fan remnants. Slopes range from 2 to 8 percent. Elevations are 5000 to 5300 feet. The soils are deep to very deep and well drained. The potential for sheet and rill erosion is low. Potential for wind erosion is high if vegetative cover is removed. The shrub component is primarily dominated by Wyoming big sagebrush (Artemisia tridentata ssp. wyomingensis) and basin big sagebrush (Artemisia tridentata ssp. tridentata). The understory is dominated by deep-rooted perennial bunchgrasses, primarily Indian ricegrass (Achnatherum hymenoides) and and Basin wildrye (Leymus cinereus).

Associated sites

R026XY016NV	**LOAMY 8-10 P.Z.**
R026XY022NV	**STONY SLOPE 8-10 P.Z.**
R026XY050NV	**GRAVELLY CLAY 10-12 P.Z.**

Similar sites

R026XY016NV	**LOAMY 8-10 P.Z.** ACSP12 dominant grass
R026XY102NV	**GRANITIC CLAY LOAM 8-10 P.Z.** ACTH7-ACSP12 codominant grasses
R026XY020NV	**SANDY 8-10 P.Z.** ACHY-HECO26 codominant; LECI4 minor spp.; less productive site
R026XY101NV	**SANDY LOAM 8-10 P.Z.** ARARL3 dominant shrub; ACSP12 dominant grass
R026XY099NV	**COARSE LOAMY 10-12 P.Z.** ACTH7-ACHY codominant grasses; PUTR2 important shrub
R026XY017NV	**LOAMY HILL 10-12 P.Z.** JUOS dominates visual aspect of site
R026XY022NV	**STONY SLOPE 8-10 P.Z.** ACSP12 dominant grass; associated with rock outcrop
R026XY010NV	**LOAMY 10-12 P.Z.** ACTH7 dominant grass

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. tridentata* (2) *Artemisia tridentata ssp. wyomingensis*

Herbaceous	(1) *Achnatherum hymenoides* (2) *Leymus cinereus*

Physiographic features

This site occurs on sand sheets covering inter-plateau valley fan remnants. Slopes range from 2 to 8 percent. Elevations are 4500 to 5300 feet.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant
Elevation	4,500–5,300 ft
Slope	2–8%
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is semiarid with cool, moist winters and warm, dry summers. Average annual precipitation is 8 to 10 inches. Mean annual air temperature is 48 to 51 degrees F. The average growing season is about 90 to 110 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)	100 days
Freeze-free period (average)	
Precipitation total (average)	9 in

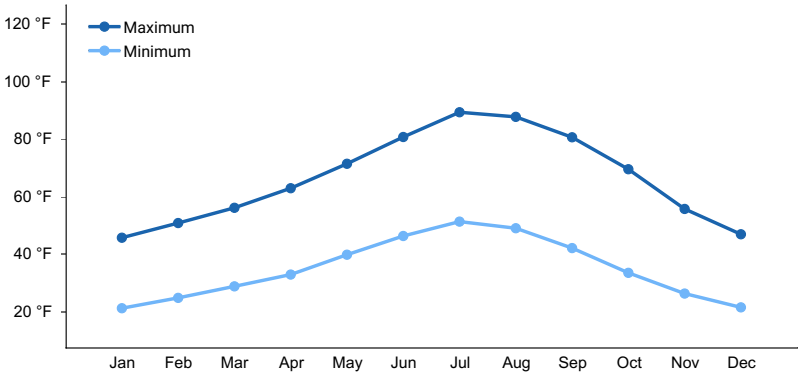

Figure 1. Monthly average minimum and maximum temperature

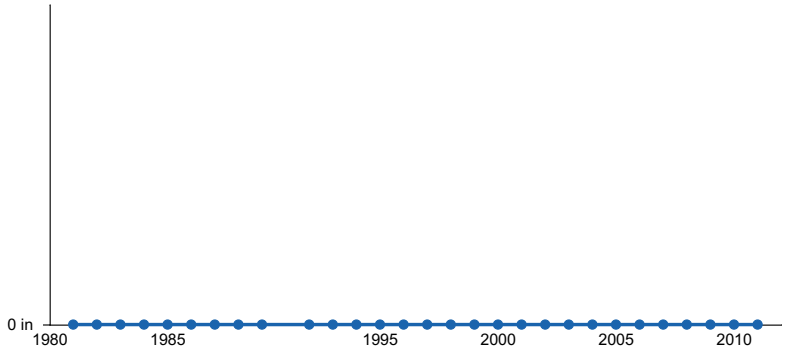

Figure 2. Annual precipitation pattern

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils are deep to very deep and well drained. Surface soils are coarse textured and normally 10 inches thick to the subsoil or underlying material. The available water capacity is moderate. Runoff is medium to very high. The potential for sheet and rill erosion is low. Potential for wind erosion is high if vegetative cover is removed. The mollic epipedon thickness is 9 to 18 inches. the argillic horizon is 21 to 36 inches. The moisture regime is aridic bordering on xeric. Soil series associated with this site include Galeppi.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Loamy sand
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow
Soil depth	72–84 in
Surface fragment cover <=3"	0–7%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	4.1–5 in
Calcium carbonate equivalent (0-40in)	0%

Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	6.6–7.8
Subsurface fragment volume <=3" (Depth not specified)	0–5%
Subsurface fragment volume >3" (Depth not specified)	0–3%

Ecological dynamics

As ecological condition declines, big sagebrush, Anderson's peachbrush, broom snakeweed, and rabbitbrush will increase, while perennial grasses decrease. Species most likely to invade this site are cheatgrass, mustards and other annual forbs. Utah juniper readily invades this site where it occurs adjacent to forests.

Fire Ecology:
Fire intervals in sagebrush-grass communities were Indian ricegrass occurs have been estimated at 7 to 70 years. Basin big sagebrush is readily killed when aboveground plant parts are charred by fire. Prolific seed production from nearby unburned plants coupled with high germination rates enables seedlings to establish rapidly following fire. 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.
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.
Basin wildrye is top-killed by fire. Older basin wildrye plants with large proportions of dead material within the perennial crown can be expected to show higher mortality due to fire than younger plants having little debris. Basin wildrye is generally tolerant of fire but may be damaged by early season fire combined with dry soil conditions.

State and Transition Model Narrative Group 10
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 10. Sites included in this group are: R026XY020NV, R026XY014NV, R026XY096NV, and R026XF005CA.

Reference State 1.0 Community Phase Pathways:
The Reference State 1.0 is a representation 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:
This community is dominated by needle and thread grass, Indian ricegrass and big sagebrush. Fourwing saltbush, ephedra, and other shrubs are present. Desert needlegrass, basin wildrye, and a variety of perennial and annual forbs are also present in this phase.

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. 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. Release from drought may allow needle and thread and Indian ricegrass to increase in production.

Community Phase Pathway 1.1b, from phase 1.1 to 1.3:
Time and lack of disturbance such as fire or drought allows shrubs to become dominant. Excessive herbivory and/or

long-term drought may also reduce perennial herbaceous understory.

Community Phase 1.2:
This community phase is characteristic of a post-disturbance, early seral community. Needle and thread, Indian ricegrass and other perennial grasses dominate. Big sagebrush is a minor component. Forbs and sprouting shrubs may increase.

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

Community Phase 1.3:
Big sagebrush increases in the absence of disturbance. Needle and thread, Indian ricegrass, and other perennial grasses may be a minor component.

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. 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. This pathway may also occur after a severe Aroga moth infestation that significantly reduces live sagebrush cover.

Community Phase Pathway 1.3b, from phase 1.3 to 1.1:
Aroga moth infestation reduces live sagebrush cover and allows grasses to increase in the understory. Release from drought may allow needle and thread and Indian ricegrass to increase in production.

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, mustard (Descurainia or Sisymbrium spp.), and Russian thistle (*Salsola tragus*).
Slow variables: Over time the annual non-native plants will increase within the community, decreasing organic matter inputs from deep-rooted perennial bunchgrasses. This leads to reductions in soil water holding capacity.
Threshold: Any amount of introduced non-native species causes an immediate reduction 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 Community Phase Pathways:
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 as the Reference State. 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 reduce 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 annual non-native species reduces State resilience because these species can promote fire where historically fire has been infrequent. This leads to positive feedbacks that further the degradation of the system.

Community Phase 2.1:
This community is dominated by needle and thread grass, Indian ricegrass and big sagebrush. Fourwing saltbush, ephedra, and other shrubs are present. Desert needlegrass, basin wildrye, and a variety of perennial and annual forbs are also present in this phase. Annual non-native species present.

Community Phase Pathway 2.1a, from phase 2.1 to 2.2:
Fire would decrease or eliminate the overstory of sagebrush and allow for the perennial bunchgrasses to dominate the site. 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.

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.

Community Phase 2.2:
This community phase is characteristic of a post-disturbance, early seral community. Needle and thread, Indian ricegrass and other perennial grasses dominate. Big sagebrush is a minor component. Forbs and sprouting shrubs may increase. Annual non-native species present.

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

Community Phase 2.3 (At-Risk):
Big sagebrush dominates and the perennial grasses become a minor component. Pinyon and juniper may be present. Annual non-native species present.

Community Phase Pathway 2.3a, from phase 2.3 to 2.2:
Fire would decrease or eliminate the overstory of sagebrush and allow for the perennial bunchgrasses to dominate the site. 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. This pathway may also occur after a severe Aroga moth infestation that significantly reduces live sagebrush cover. Brush treatments with minimal soil disturbance will also decrease sagebrush and release the perennial understory. Annual non-native species are present and may increase in the community.

Community Phase Pathway 2.3b, from phase 2.3 to 2.1:
A change in grazing management that reduces shrubs will allow the perennial bunchgrasses in the understory to dominate. Heavy late-fall or winter grazing may cause mechanical damage and subsequent death to sagebrush, facilitating an increase in the herbaceous understory. Brush treatments with minimal soil disturbance will also decrease sagebrush and release the perennial understory. A low severity fire would decrease the overstory of sagebrush or leave patches of shrubs, and would allow the understory perennial grasses to dominate. This pathway may also occur after a severe Aroga moth infestation that significantly reduces live sagebrush cover. Annual non-native species are present and may increase in the community.

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 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 Tree State 4.0:
Trigger: Time and lack of disturbance or management action allows juniper and/or Pinion to dominate. This may be coupled with grazing management that favors tree establishment by reducing understory herbaceous competition for site resources Feedbacks and ecological processes: Trees increasingly dominate use of soil water, contributing to reductions in soil water availability to grasses and shrubs. Overtime, grasses and shrubs are outcompeted. Reduced herbaceous and shrub production slows soil organic matter inputs and increases soil erodibility through loss of cover and root structure.
Slow variables: Over time the abundance and size of trees will increase.
Threshold: Trees dominate ecological processes and number of shrub skeletons exceed number of live shrubs. Minimal recruitment of new shrub cohorts.

Shrub State 3.0 Community Phase Pathways:
This state has two community phases: a 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. Shrubs dominate the plant community. If coming from phase 2.3, big sagebrush canopy cover is high and these plants may be decadent, reflecting stand maturity and lack of seedling establishment due to competition with mature plants. Typically, this state has little herbaceous understory and may be experiencing soil movement in the interspaces. The shrub overstory dominates site resources such that soil water, nutrient capture, nutrient cycling and soil organic matter are temporally and spatially redistributed.

Community Phase 3.1:
Big sagebrush and other shrubs dominate. Needle and thread, Indian ricegrass and other perennial grasses are only present in trace amounts, under shrubs, or may be missing entirely. Pinyon and/or juniper may be present. Annual non-native species may be present.

Community Phase Pathway 3.1a, from Phase 3.1 to 3.2:
Fire, heavy fall grazing that causes mechanical damage to shrubs, and/or brush treatments with minimal soil disturbance will greatly reduce the overstory shrubs to trace amounts and allow annual forbs and sprouting shrubs to dominate the site.

Community Phase 3.2:
Sprouting shrubs such as fourwing saltbush, spiny hopsage, ephedra, and desert peach dominate the site. Annual forbs may dominate the understory. Perennial grasses and sagebrush may be a minor component or missing entirely. Bitterbrush may be present. Bare ground may be significant. Annual non-native species may be present.

Community Phase Pathway 3.2a, from Phase 3.2 to 3.1:
Time and lack of disturbance allows the shrub component to recover. The establishment of sagebrush can take many years unless aided with restoration efforts.

T3A: Transition from Shrub State 3.0 to Tree State 4.0:
Trigger: Lack of fire allows trees to dominate site. This may be coupled with inappropriate grazing management that reduces fine fuels.
Slow variables: Increased establishment and cover of juniper 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.

T3B: Transition from Shrub State 3.0 to Eroded State 5.0:
Trigger: High-intensity fire (from 3.1) kills all non-sprouting shrubs and many sprouting shrubs.

Slow variables: Increased dominance of sagebrush and/or bitterbrush creates extreme woody fuel conditions. Loss of the deep-rooted bunchgrass understory leaves few plants capable of regenerating post-fire, and eliminates the seed bank of these species.
Threshold: Changes in plant community composition and spatial variability of vegetation due to the loss of perennial bunchgrasses truncates energy capture and impacts nutrient cycling and distribution. Large, potentially decadent shrubs dominate the landscape with a closed canopy.

Tree State 4.0 Community Phase Pathway:
This state has two community phases that are characterized by the dominance of Utah juniper and/or 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 4.1:
Utah juniper and/or singleleaf pinyon dominate the overstory and site resources. Trees are actively growing with noticeable leader growth. Trace amounts of bunchgrasses may be found under tree canopies and in interspaces. Sagebrush is stressed and dying. Annual non-native species are present under tree canopies. Bare ground interspaces are large and connected.

Community Phase Pathway 4.1a, from phase 4.1 to 4.2:
Time and lack of disturbance or management action allows Utah juniper and/or singleleaf pinyon to mature further and dominate site resources.

Community Phase 4.2:
Utah juniper and/or singleleaf pinyon dominate 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 shrub skeletons will be more numerous than live sagebrush. Bunchgrasses may or may not be present. Needle and thread or mat forming forbs may be present in trace amounts. Bare ground interspaces are large and connected. Soil redistribution is evident.

Eroded State 5.0:
This state has one community phase. Abiotic factors including soil redistribution, erosion, and soil temperature are primary drivers of ecological condition within this state. Soil moisture, soil nutrients, and soil organic matter distribution and cycling are severely altered due to degraded soil surface conditions. Soil movement inhibits the germination of new seedlings. Regeneration of shrubs is not evident.

Community Phase 5.1:
Vegetation is sparse and bare ground dominates the visual aspect. Plants that tolerate soil movement and may remain, including Indian ricegrass, needle and thread, desert peach, and annual forbs. Russian thistle may be present. Soil deposition is apparent at the bases of plants and may form small dunes. Skeletons of burned shrubs may be present.

State and transition model

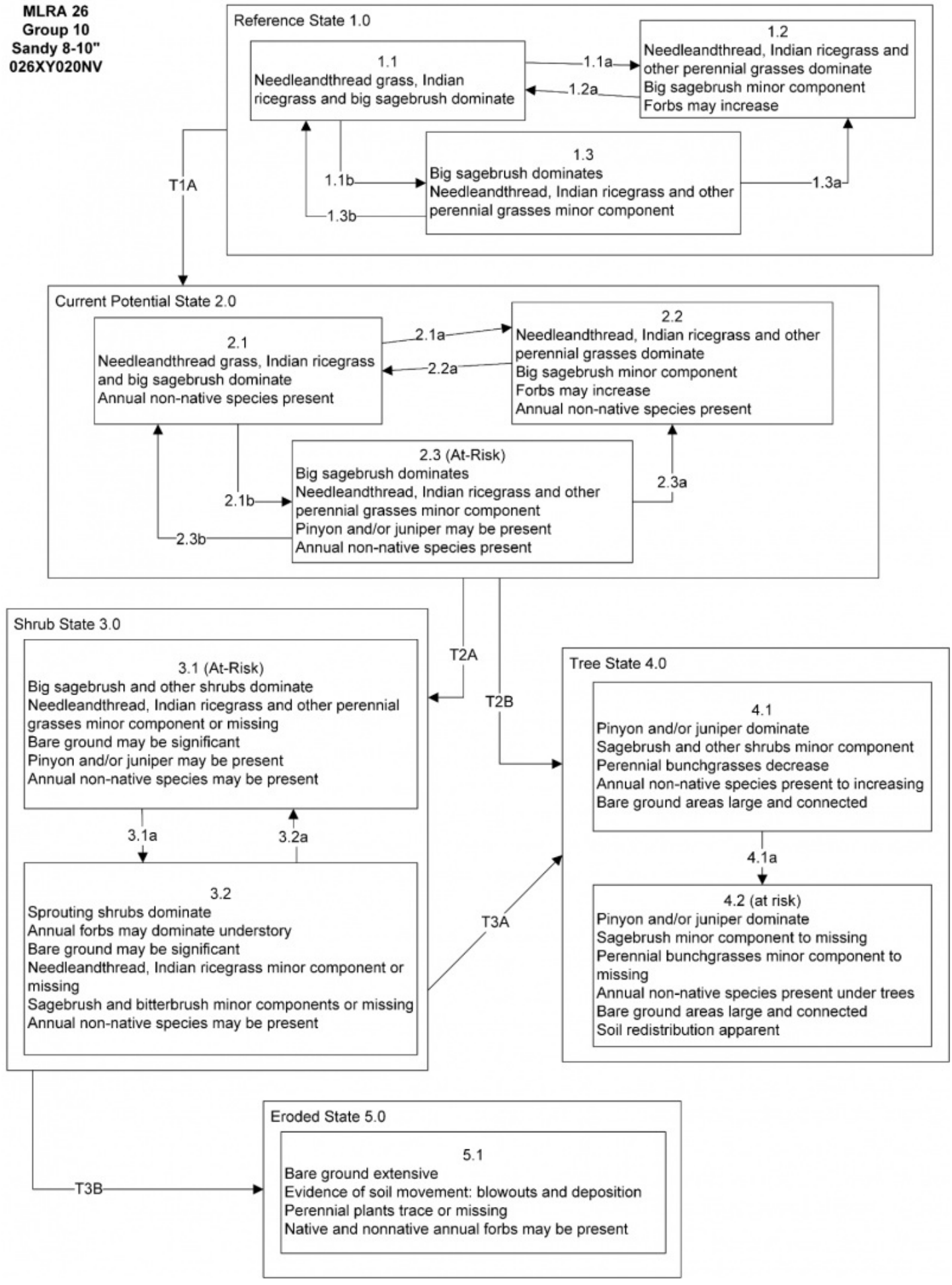

Figure 4. Disturbance Response Group 10 STM

MLRA 26
Group 10
Sandy 8-10"
026XY020NV
KEY

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 or drought. 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: High severity fire and/or severe Aroga moth infestation significantly reduces sagebrush cover leading to early mid-seral community.
1.3b: Low severity fire or Aroga moth infestation resulting in a mosaic pattern.

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.
2.3b: Low severity fire or Aroga moth infestation resulting in a mosaic pattern.

Transition T2A: Inappropriate grazing management (3.1), or high severity fire (3.2).
Transition T2B: Time and lack of disturbance allows maturation of the tree community.

Shrub State 3.0 Community Phase Pathways
3.1a: Fire reduces shrub canopy.
3.2a: Time and lack of disturbance allows for regeneration of sagebrush.

Transition T3A: Time and lack of disturbance allows maturation of the tree community.
Transition T3B: Catastrophic fire in dense shrub cover results in mortality of most perennial plants. Possible from phase 3.1.

Tree State 4.0 Community Phase Pathways
4.1a: Time and lack of disturbance allows for maturation of tree community.
4.2a: Tree thinning treatment (typically for fuels management).

Eroded State 5.0 Community Phase Pathways
None.

Figure 5. Disturbance Response Group STM Legend

State 1
Reference Plant Community

Community 1.1
Reference Plant Community

The reference plant community is dominated by Thurber's needlegrass and Wyoming big sagebrush and basin big sagebrush. Potential vegetative composition is about 50% grasses, 5% forbs and 45% shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	225	300	400
Shrub/Vine	202	270	360
Forb	23	30	40
Total	**450**	**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**			204–426	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	150–240	–
	basin wildrye	LECI4	*Leymus cinereus*	30–90	–
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	12–48	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	12–48	–
2	**Secondary Perennial Grasses**			30–60	
	desert needlegrass	ACSP12	*Achnatherum speciosum*	3–18	–
	squirreltail	ELEL5	*Elymus elymoides*	3–18	–
	needle and thread	HECO26	*Hesperostipa comata*	3–18	–
Forb					
3	**Perennial**			12–48	
Shrub/Vine					
4	**Primary Perennial Grasses**			114–258	
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	45–75	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	12–60	–
	spiny hopsage	GRSP	*Grayia spinosa*	12–48	–
5	**Secondary Shrubs**			12–60	
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	6–12	–
	jointfir	EPHED	*Ephedra*	6–12	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	6–12	–
	desert peach	PRAN2	*Prunus andersonii*	6–12	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	6–12	–
	littleleaf horsebrush	TEGL	*Tetradymia glabrata*	6–12	–

Animal community

Livestock Interpretations:
This site is suited to livestock grazing. Grazing management should be keyed to Indian ricegrass and basin wildrye. Indian ricegrass has good forage value for domestic sheep, cattle and horses. It can be important cattle forage in winter. Indian ricegrass is often used most heavily in the late winter, when succulent and nutritious new green leaves are produced. It supplies a source of green feed before most other native grasses have produced much new growth. The early growth and abundant production of basin wildrye make it a valuable source of forage for livestock. It is important forage for cattle and is readily grazed by cattle and horses in early spring and fall. Though coarse-textured during the winter, basin wildrye may be utilized more frequently by livestock and wildlife when snow has covered low shrubs and other grasses. Big sagebrush is eaten by domestic sheep and cattle, but has long been

considered to be of low palatability to domestic livestock, a competitor with more desirable species, and a physical impediment to grazing.

Wildlife Interpretations:
Basin wildrye provides winter forage for mule deer, though use is often low compared to other native grasses. Basin wildrye provides summer forage for black-tailed jackrabbits. Because basin wildrye remains green throughout early summer, it remains available for small mammal forage for longer time than other grasses. Big sagebrush is highly preferred and nutritious winter forage for mule deer. Sage grouse are also highly dependent on big sagebrush for both food and cover. Sagebrush-grassland communities provide critical sage-grouse breeding and nesting habitats. Open Wyoming sagebrush communities are preferred nesting habitat. Meadows surrounded by sagebrush may be used as feeding and strutting grounds. Sagebrush is a crucial component of their diet year-round, and sage-grouse select sagebrush almost exclusively for cover. Leks are often located on low sagebrush sites, grassy openings, dry meadows, ridgetops, and disturbed sites. Sage-grouse prefer mountain big sagebrush and Wyoming big sagebrush communities to basin big sagebrush communities. Indian ricegrass is also an important forage species for several wildlife species.

Hydrological functions

Runoff is medium to very high. Rills are none to rare. Water flow patterns are rare but a few may occur in areas subjected to summer convection storms. Flow patterns are short and stable. Pedestals are rare with occurrence typically limited to areas within water flow patterns. Gullies are rare in areas of this site that occur on stable landforms. Where this site occurs on inset fans, gullies and head-cuts associated with ephemeral channel entrenchment are common. Gullies and head-cuts should be healing or stable. Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., Indian ricegrass & basin wildrye]) 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. This site is used for camping and hiking and has potential for upland and big game hunting.

Other products

Some Native American peoples used the bark of big sagebrush to make rope and baskets.
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.
Indian ricegrass was traditionally eaten by some Native American peoples. The Paiutes used seed as a reserve food source.
Basin wildrye was used as bedding for various Native American ceremonies, providing a cool place for dancers to stand.

Other information

Basin big sagebrush shows high potential for range restoration and soil stabilization. Basin big sagebrush grows rapidly and spreads readily from seed.
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.
Indian ricegrass is well-suited for surface erosion control and desert revegetation although it is not highly effective in controlling sand movement.

Basin wildrye is useful in mine reclamation, fire rehabilitation and stabilizing disturbed areas. Its usefulness in range seeding, however, may be limited by initially weak stand establishment.

Type locality

Location 1: Storey County, NV	
Township/Range/Section	T18N R20E S1
General legal description	This site occurs in the Virginia Range, Storey County, Nevada. This site can also be found in Washoe Couny, 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, 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	02/21/2007
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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2. **Presence of water flow patterns:** Water flow patterns are rare but a few may occur in areas subjected to summer convection storms. Flow patterns are short and stable.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are rare with occurrence typically limited to areas within water flow patterns.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground to 40%; surface rock fragments <15%; shrub canopy to 30%; foliar cover for perennial herbaceous plants ±50%.

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5. **Number of gullies and erosion associated with gullies:** Gullies are rare in areas of this site that occur on stable landforms.

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

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7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage from grasses and annual & perennial forbs) is expected to move the distance of slope length during intense summer convection storms or rapid snowmelt events. 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 1 to 3 on most soil textures found on this site. (To be field tested.)

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface structure is weak very thick platy parting to strong medium and coarse granular. Soil surface colors are light. Organic carbon of the surface 2 to 3 inches is less than to 1 percent. Surface soils are typically very loamy coarse sands.

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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., Indian ricegrass & basin wildrye]) slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact and provide opportunity for snow catch and accumulation on site.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** Compacted layers are not typical. Platy or massive sub-surface horizons, subsoil argillic horizons or hardpans shallow to the surface are not to be interpreted as compacted layers.

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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, bunchgrasses (i.e., Indian ricegrass & basin wildrye) > tall shrubs (big sagebrush & fourwing saltbush). (By above ground production)

    Sub-dominant: Associated shrubs > shallow-rooted, cool season, bunchgrasses = rhizomatous grasses = perennial forbs

= annual 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 25% of total woody canopy; mature bunchgrasses commonly (±15%) have dead centers.

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (February thru April [May]) ± 600lbs/ac.

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Douglas rabbitbrush, broom snakeweed, and Anderson peachbrush are increasers on this site. Halogeton, Russian thistle, cheatgrass, and Utah juniper are invaders on this site.

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17. **Perennial plant reproductive capability:** All functional groups should reproduce in above average growing season years.
