USDA Natural Resources Conservation Service

Ecological site R025XY029NV
DEEP LOAMY 14+ 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): 025X–Owyhee High Plateau

MLRA Notes 25—Owyhee High Plateau
This area is in Nevada (56 percent), Idaho (30 percent), Oregon (12 percent), and Utah (2 percent). It makes up about 27,443 square miles. MLRA 25 is characteristically cooler and wetter than the neighboring MLRAs of the Great Basin. The western boundary is marked by a gradual transition to the lower and warmer basins of MLRA 24. The boundary to the south-southeast, with MLRA 28B, is marked by gradual changes in geology marked by an increased dominance of singleleaf pinyon and Utah juniper and a reduced presence of Idaho fescue. The boundary to the north, with MLRA 11, is a rapid transition from the lava plateau topography to the lower elevation Snake River Plain.
Physiography:
All of this area lies within the Intermontane Plateaus. The southern half is in the Great Basin section of the Basin and Range province. This part of the MLRA is characterized by isolated, uplifted fault-block mountain ranges separated by narrow, aggraded desert plains. This geologically older terrain has been dissected by numerous streams draining to the Humboldt River.
The northern half of the area lies within the Columbia Plateaus province. This part of the MLRA forms the southern boundary of the extensive Columbia Plateau basalt flows. Most of the northern half is in the Payette section, but the northeast corner is in the Snake River Plain section. Deep, narrow canyons draining into the Snake River have been incised into this broad basalt plain. Elevation ranges from 3,000 to 7,550 feet on rolling plateaus and in gently sloping basins. It is more than 9,840 feet on some steep mountains. The Humboldt River crosses the southern half of this area
Geology:
The dominant rock types in this MLRA are volcanic. They include andesite, basalt, tuff, and rhyolite. In the north and west parts of the area, Cretaceous granitic rocks are exposed among Miocene volcanic rocks in mountains. A Mesozoic igneous and metamorphic rock complex dominates the south and east parts of the area. Upper and Lower Paleozoic calcareous sediments, including oceanic deposits, are exposed with limited extent in the mountains. Alluvial fan and basin fill sediments occur in the valleys.
Climate:
The average annual precipitation in most of this area is typically 11 to 22 inches. It increases to as much as 49 inches at the higher elevations. Rainfall occurs in spring and sporadically in summer. Precipitation occurs mainly as snow in winter. The precipitation is distributed fairly evenly throughout fall, winter, and spring. The amount of precipitation is lowest from midsummer to early autumn. The average annual temperature is 33 to 51 degrees F. The freeze-free period averages 130 days and ranges from 65 to 190 days, decreasing in length with elevation. It is typically less than 70 days in the mountains.
Water:
The supply of water from precipitation and streamflow is small and unreliable, except along the Owyhee, Bruneau, and Humboldt Rivers. Streamflow depends largely on accumulated snow in the mountains. Surface water from mountain runoff is generally of excellent quality and suitable for all uses. The basin fill sediments in the narrow alluvial valleys between the mountain ranges provide some ground water for irrigation. The alluvial deposits along the large streams have the most ground water. Based on measurements of water quality in similar deposits in

adjacent areas, the basin fill deposits probably contain moderately hard water. The water is suitable for almost all uses. The carbonate rocks in this area are considered aquifers, but they are little used. Springs are common along the edges of the limestone outcrops.
Soils:
The dominant soil orders in this MLRA are Aridisols and Mollisols. The soils in the area dominantly have a mesic or frigid temperature regime and an aridic, aridic bordering on xeric, or xeric moisture regime. Soils with aquic moisture regimes are limited to drainage or spring areas, where moisture originates or runs on and through. These soils are of a very limited extent throughout the MLRA. They generally are well drained, clayey or loamy, and shallow or moderately deep. Most of the soils formed in mixed parent material. Volcanic ash and loess mantle the landscape. Surface soil textures are loam and silt loam with ashy texture modifiers in some areas. Argillic horizons occur on the more stable landforms. They are exposed nearer the soil surface on convex landforms, where ash and loess deposits are more likely to erode. Soils that formed in carbonatic parent material in areas that receive less than 12 inches of precipitation are characterized by calcic horizons throughout the profile, while soils in areas that receive more than 12 inches of precipitation do not have calcic horizons in the upper part of the profile. Soils that formed on stable landforms at the lower elevations are dominated by ochric horizons. Soils that formed at the middle and upper elevations are characterized by mollic epipedons. Soils in drainage areas at all elevations that receive moisture running on or through them are characterized by thicker mollic epipedons.
Biological Resources:
This MLRA supports shrub-grass vegetation. Lower elevations are characterized by Wyoming big sagebrush associated with bluebunch wheatgrass, western wheatgrass, and Thurber’s needlegrass. Other important plants include bluegrass, squirreltail, penstemon, phlox, milkvetch, lupine, Indian paintbrush, aster, and rabbitbrush. Black sagebrush occurs but is less extensive. Singleleaf pinyon and Utah juniper occur in limited areas. With increasing elevation and precipitation, vast areas characterized by mountain big sagebrush or low sagebrush/early sagebrush in association with Idaho fescue, bluebunch wheatgrass, needlegrasses, and bluegrass become common. Snowberry, curl-leaf mountain mahogany, ceanothus, and juniper also occur. Mountains at the highest elevations support whitebark pine, Douglas-fir, limber pine, Engelmann spruce, subalpine fir, aspen, and curl-leaf mountain mahogany.
Major wildlife species include mule deer, bighorn sheep, pronghorn, mountain lion, coyote, bobcat, badger, river otter, mink, weasel, golden eagle, red-tailed hawk, ferruginous hawk, Swainson’s hawk, northern harrier, prairie falcon, kestrel, great horned owl, short-eared owl, long-eared owl, burrowing owl, pheasant, sage grouse, chukar, gray partridge, and California quail. Reptiles and amphibians include western racer, gopher snake, western rattlesnake, side-blotched lizard, western toad, and spotted frog. Fish species include bull, red band, and rainbow trout.

Ecological site concept

This site occurs on mountain sideslopes on all aspects. At lower elevations, this site is restricted to concave positions of moderately steep to steep, north to northeast exposures. Higher elevations will find this site on mostly convex positions of strongly sloping to moderately steep, northwest to northeast exposures. Slope gradients of 8 to 30 percent are typical. Elevations range from 6,500 to 8,500 feet.

The soils associated with this site are more than 40 inches deep to bedrock and well drained. Surface soils are very thick, fertile and mostly medium textured. The available water capacity is high. Where this site occurs in concave positions, additional moisture is received as run-in off surrounding areas.

The reference state is the interpretative state for this site. The representative plant community is dominated by basin wildrye and Idaho fescue. Big bluegrass, mountain brome and oniongrass are important grasses associated with this site. Grasses dominate the aspect. Potential vegetative composition is about 85 percent grasses, 10 percent forbs and 5 percent shrubs. Approximate ground cover (basal and crown) is 50 to 70 percent.

Associated sites

R025XY004NV	**LOAMY SLOPE 16+ P.Z.**
R025XY010NV	**STEEP NORTH SLOPE**
R025XY012NV	**LOAMY SLOPE 12-16 P.Z.**

Similar sites

R025XY027NV	**LOAMY 12-14 P.Z.** FEID dominant grass
R025XY016NV	**SOUTH SLOPE 14-18 P.Z.** PSSPS-BRMA4 codominant grasses; PUTR2 important shrub
R025XY004NV	**LOAMY SLOPE 16+ P.Z.** BRMA4-ELTR7 codominant grasses
R025XY056NV	**LOAMY 14-16 P.Z.** FEID dominant grass
R025XY010NV	**STEEP NORTH SLOPE** FEID dominant grass; occurs on steep, convex to straight north aspects; less productive site
R025XY003NV	**LOAMY BOTTOM 8-14 P.Z.** ARTRT dominant shrub; lower elevations; different landscape position; more productive site

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata subsp. vaseyana*
Herbaceous	(1) *Leymus cinereus* (2) *Festuca idahoensis*

Physiographic features

The Deep Loamy 14+ P.Z. site occurs on mountain sideslopes on all aspects. At lower elevations, this site is restricted to concave positions of moderately steep to steep, north to northeast exposures. Higher elevations will find this site on mostly convex positions of strongly sloping to moderately steep, northwest to northeast exposures. Slope gradients of 8 to 30 percent are typical. Elevations are 6500 to 8500 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope
Runoff class	High to very high
Flooding frequency	None
Ponding frequency	None
Elevation	6,500–8,500 ft
Slope	8–30%
Water table depth	78 in
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is semiarid, characterized by cold, moist winters and warm, dry summers.
The average annual precipitation ranges from 10 to 12 inches. Mean annual air temperature is typically <45 degrees F.

Mean annual precipitation across the range in which this ES occurs is 18.58".

Monthly mean precipitation: January 1.65”; February 1.68”; March 1.98”; April 2.43”; May 2.41”; June 1.62”; July 0.61”; August 0.63”; September 0.84”; October 1.41”; November 1.51”; December 1.79”.

*The above data is averaged from the Jarbridge 4N and Lamoille PH WRCC climate stations.
Frost free days (>32): 83.5

Freeze free days (>28): 114

Table 3. Representative climatic features

Frost-free period (average)	64 days
Freeze-free period (average)	100 days
Precipitation total (average)	16 in

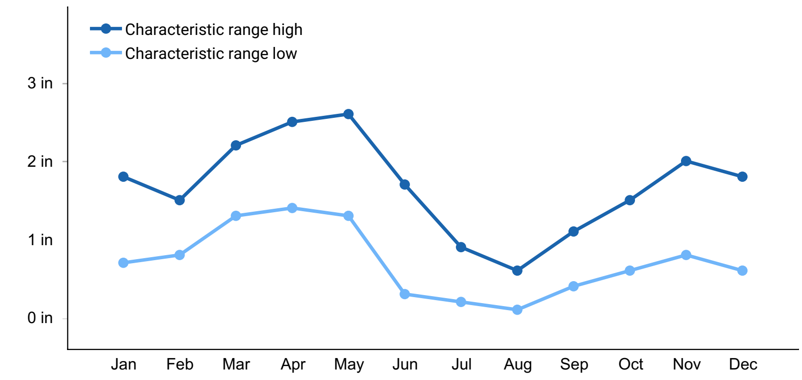


Figure 1. Monthly precipitation range

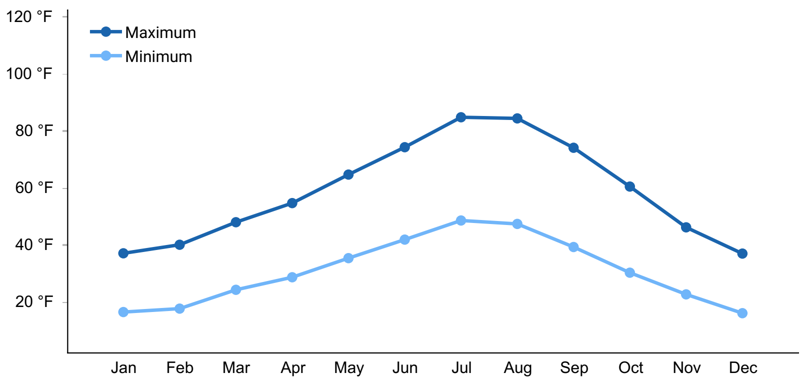


Figure 2. Monthly average minimum and maximum temperature

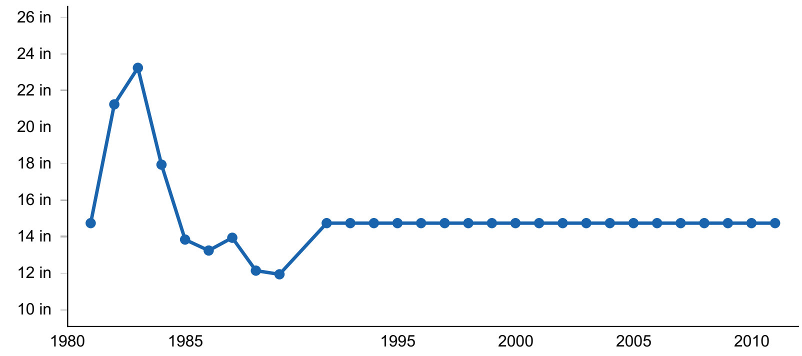


Figure 3. Annual precipitation pattern

Climate stations used

- (1) JARBIDGE 7 N [USC00264039], Jackpot, NV
- (2) LAMOILLE YOST [USC00264394], Spring Creek, NV

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are more than 40 inches deep to bedrock and well drained. Surface soils are very thick, fertile and mostly medium textured. The available water capacity is high. Where this site occurs in concave positions, additional moisture is received as run-in off surrounding areas. Snow accumulation persists on this site late into spring when the soil is not frozen. Snow melt, at this time, adds to the soil moisture supply. Runoff is very high. Potential for sheet and rill erosion is moderate to high depending on slope. The soil series associated with this site includes Tusk and Shalper.

The representative soil series is Tusk, classified as a fine-loamy, mixed, superactive, frigid Pachic Argixeroll. This soil is very deep, well drained and was formed in colluvium derived from rhyolite and other volcanic rocks. Reaction is neutral or slightly alkaline. Diagnostic horizons include a mollic epipedon that occurs from the soil surface to 23 inches and an argillic horizon that occurs from 14 to 59 inches. Clay content in the particle-size control section ranges from 27 to 35 percent. Rock fragments are 15 to 35 percent, mainly gravel.

Table 4. Representative soil features

Parent material	(1) Colluvium–rhyolite (2) Residuum
Surface texture	(1) Gravelly loam (2) Loam (3) Very gravelly loam
Family particle size	(1) Fine-loamy (2) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderately slow
Depth to restrictive layer	72 in
Soil depth	72 in
Surface fragment cover <=3"	0–7%
Surface fragment cover >3"	21–33%
Available water capacity (0-40in)	6 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)	0–2%
Subsurface fragment volume >3" (Depth not specified)	7–19%

Ecological dynamics

An ecological site is the product of all the environmental factors responsible for its development and has a set of key characteristics that influence a site’s resilience to disturbance and resistance to invasives. Key characteristics include 1) climate (precipitation and temperature), 2) topography (aspect, slope, elevation, and landform), 3) hydrology (infiltration and runoff), 4) soils (depth, texture, structure, and organic matter), 5) plant communities (functional groups and productivity), and 6) natural disturbance regime (fire, herbivory, etc.) (Caudle et al. 2013). Biotic factors that influence resilience include site productivity, species composition and structure, and population regulation and regeneration (Chambers et al. 2013).

The Deep Loamy 14”+ ecological site is dominated by deep-rooted cool season, perennial bunchgrasses and long-lived shrubs (50+ years) with high root to shoot ratios. The dominant shrubs usually root to the full depth of the winter-spring soil moisture recharge, which ranges from 1.0 to over 3.0 m (Dobrowolski et al. 1990). Root length of mature sagebrush plants was measured to a depth of 2 meters in alluvial soils in Utah (Richards and Caldwell 1987). These shrubs have a flexible generalized root system with development of both deep taproots and laterals near the surface (Comstock and Ehleringer 1992).

Basin wildrye is weakly rhizomatous and has been found to root to depths of up to 2 meters and to exhibit greater lateral root spread than many other grass species (Abbott et al. 1991, Reynolds and Fraley 1989). Basin wildrye is a large, cool-season perennial bunchgrass with an extensive deep coarse fibrous root system (Reynolds and Fraley 1989). Clumps may reach up to 6 feet in height (Ogle et al 2012). Basin wildrye does not tolerate long periods of inundation; it prefers cycles of wet winters and dry summers and is most commonly found in deep soils with high water holding capacities or seasonally high water tables (Ogle et al 2012, Perryman and Skinner 2007).

Periodic drought regularly influences sagebrush ecosystems and drought duration and severity has increased throughout the 20th century in much of the Intermountain West. Major shifts away from historical precipitation patterns have the greatest potential to alter ecosystem function and productivity. Species composition and productivity can be altered by the timing of precipitation and water availability within the soil profile (Bates et al. 2006).

The Great Basin sagebrush communities have high spatial and temporal variability in precipitation both among years and within growing seasons. Nutrient availability is typically low but increases with elevation and closely follows moisture availability. The invasibility of plant communities is often linked to resource availability. Disturbance can decrease resource uptake due to damage or mortality of the native species and depressed competition. It can also increase resource pools via the decomposition of dead plant material following disturbance. The invasion of sagebrush communities by cheatgrass (*Bromus tectorum*) has been linked to disturbances (fire, abusive grazing) that have resulted in fluctuations in resources (Chambers et al. 2007).

As ecological condition declines, mountain big sagebrush, rabbitbrush and other shrubs increase in overstory composition and will eventually dominate the site. Cheatgrass and thistles are species likely to invade this site.

This ecological site has high resilience to disturbance and resistance to invasion. Increased resilience increases with elevation, aspect, increased precipitation and increased nutrient availability. Two possible states have been identified for this ecological site.

Fire Ecology:
Pre-settlement fire return intervals in mountain big sagebrush communities varied from 15 to 25 years (Burkhardt and Tisdale 1969, Houston 1973, Miller 2000). Mountain big sagebrush is killed by fire (Neuenschwander 1980, Blaisdell et al. 1982), and does not resprout (Blaisdell 1953). Post-fire regeneration occurs from seed and will vary depending on site characteristics, seed source, and fire characteristics. Mountain big sagebrush seedlings can grow rapidly and may reach reproductive maturity within 3 to 5 years (Bunting et al. 1987). Mountain big sagebrush may return to pre-burn density and cover within 15 to 20 years following fire, but establishment after severe fires may proceed more slowly and can take up to 50 years (Bunting et al. 1987, Ziegenhagen 2003, Miller and Heyerdahl 2008, Ziegenhagen and Miller 2009). The introduction of annual weedy species, such as cheatgrass, may cause an increase in fire frequency.

This is a very resilient site with high productivity. Fire is the main disturbance within the reference state. Inappropriate grazing management may decrease perennial bunchgrasses, leaving the site vulnerable to annual non-native species invasion and an increase in mountain big sagebrush. With fire, this site returns to a community dominated by bunchgrasses. Perennial forbs such as lupine (Lupinus spp.), hawksbeard (Crepis spp.), sunflowers, and balsamroot (Balsamorhiza spp.) may be significant components on this site for a few years after a fire.

The effect of fire on bunchgrasses relates to culm density, culm-leaf morphology, and the size of the plant. The initial condition of bunchgrasses within the site along with seasonality and intensity of the fire all factor into the individual species response. For most forbs and grasses, the growing points are located at or below the soil surface, providing relative protection from disturbances which decrease above-ground biomass such as grazing or fire.

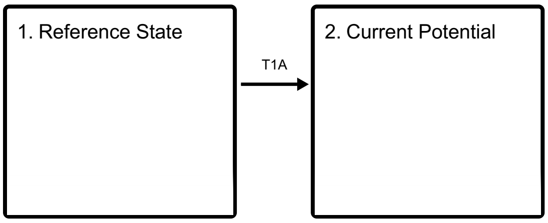
Thus, fire mortality is more correlated to duration and intensity of heat which is related to culm density, culm-leaf morphology, size of plant and abundance of old growth (Wright 1971, Young 1983).

Basin wildrye is relatively resistant to fire – particularly dormant season fire – as plants sprout from surviving root crowns and rhizomes (Zschaechner 1985). Miller et al. (2013) reported increased total shoot and reproductive shoot densities in the first year following fire. By year two, however, there was little difference between burned and control treatments. Additionally, basin wildrye seed viability has been found to be low and seedlings lack vigor (Young and Evans 1981).

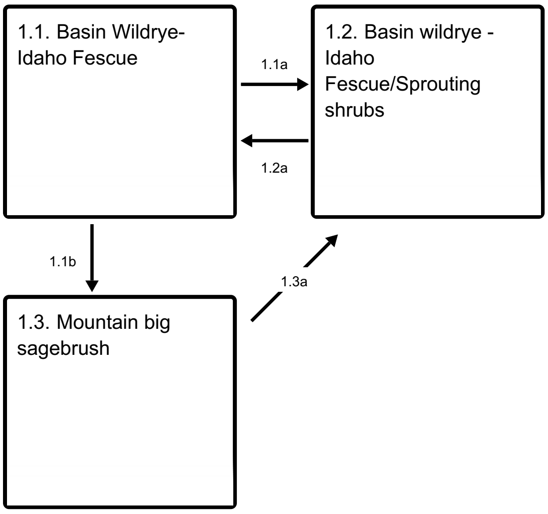
Idaho fescue response to fire varies with condition and size of the plant, season and severity of fire, and ecological conditions. Mature Idaho fescue plants are commonly reported to be severely damaged by fire in all seasons (Wright et al. 1979). Initial mortality may be high (in excess of 75 percent) on severe burns, but usually varies from 20 to 50 percent (Barrington et al 1988). Rapid burns have been found to leave little damage to root crowns, and new tillers are produced with onset of fall moisture (Johnson et al. 1994). However, Wright and others (1979) found the dense, fine leaves of Idaho fescue provided enough fuel to burn for hours after a fire had passed, thereby killing or seriously injuring the plant regardless of fire intensity (Wright et al. 1979).

State and transition model

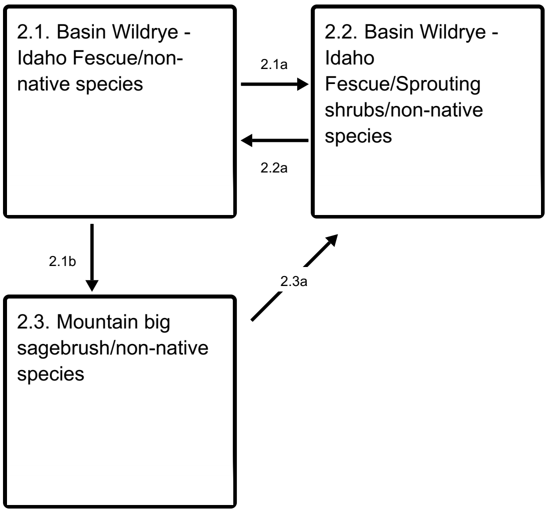
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Reference State

The Reference State 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 1.1
Basin Wildrye-Idaho Fescue

The reference state is the interpretative state for this site. The representative plant community is dominated by basin wildrye and Idaho fescue. Big bluegrass, mountain brome and oniongrass are important grasses associated with this site. Grasses dominate the aspect. Potential vegetative composition is about 85 percent grasses, 10 percent forbs and 5 percent shrubs. Approximate ground cover (basal and crown) is 50 to 70 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1105	1445	1700
Forb	130	170	200
Shrub/Vine	65	85	100
Total	**1300**	**1700**	**2000**

Community 1.2
Basin wildrye - Idaho Fescue/Sprouting shrubs

This community phase is characteristic of a post-disturbance, early-seral community. Basin wildrye dominates in concave areas in this plant community while Idaho fescue dominates in convex areas. Lupine or other perennial forbs may increase and dominate the site for several years post-fire. Mountain big sagebrush is present in trace amounts. Sprouting shrubs are stable to increasing.

Community 1.3
Mountain big sagebrush

Woody shrubs such as mountain big sagebrush and antelope bitterbrush increase. Perennial bunchgrasses in the understory decrease. Sandberg bluegrass may increase in the understory.

Pathway 1.1a
Community 1.1 to 1.2

Fire will reduce or eliminate mountain big sagebrush, allowing sprouting shrubs, forbs and perennial grasses to increase.

Pathway 1.1b
Community 1.1 to 1.3

Time and lack of disturbance such as fire allows for sagebrush to increase and become decadent. Long-term drought, herbivory, or combinations of these will cause a decline in perennial bunchgrasses and fine fuels leading to a reduced fire frequency allowing big sagebrush to increase.

Pathway 1.2a
Community 1.2 to 1.1

Time and lack of disturbance will allow for the woody species to recover.

Pathway 1.3a
Community 1.3 to 1.2

Fire will reduce the mountain big sagebrush to trace amounts and allow for perennial bunchgrasses in the understory to dominate the site.

State 2
Current Potential

This state is similar to the Reference State with three similar community phases. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. Non-natives may increase in abundance but will not become dominant within this State. These non-natives can be highly flammable and can promote fire where historically fire had been infrequent. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These feedbacks include the presence of all structural and functional groups, low fine fuel loads and retention of organic matter and nutrients. Positive feedbacks decrease ecosystem resilience and stability of the state. These include the non-natives' high seed output, persistent seed bank, rapid growth rate, ability to cross pollinate and adaptations for seed dispersal.

Community 2.1
Basin Wildrye - Idaho Fescue/non-native species

This community phase is similar to the Reference State Community 1.1, with the presence of non-native species in trace amounts. The plant community is dominated by basin wildrye and Idaho fescue with a smaller component of mountain brome. Mountain big sagebrush is present, as well as a small component of forbs. Cheatgrass and thistles are most likely to invade this site.

Community 2.2
Basin Wildrye - Idaho Fescue/Sprouting shrubs/non-native species

Figure 6. Deep Loamy 14+” (R025XY029NV) Phase 2.2 T.K. Stringham, Jul. 2011

Figure 7. eep Loamy 14+” (R025XY029NV) Phase 2.2 T.K. Stringham, Jul. 2011

This community phase is characteristic of a post-disturbance, early seral community where annual non-native species are present. Basin wildrye dominates in concave areas in this plant community while Idaho fescue dominates in convex areas. Mountain big sagebrush is present in trace amounts. Sprouting shrubs are stable to increasing. Annual non-native species are stable to increasing within the community.

Community 2.3
Mountain big sagebrush/non-native species

Woody shrubs such as mountain big sagebrush and antelope bitterbrush increase. Perennial bunchgrasses in the understory decrease. Cheatgrass and other non-native species may be stable to increasing within the community.

Pathway 2.1a
Community 2.1 to 2.2

Fire will reduce the mountain big sagebrush to trace amounts and allow for sprouting shrubs, perennial bunchgrasses and forbs to dominate the site.

Pathway 2.1b
Community 2.1 to 2.3

Time and lack of disturbance allows for sagebrush to increase and become decadent. Long-term drought and/or inappropriate grazing management will reduce fine fuels and lead to a reduced fire frequency allowing big sagebrush to increase.

Pathway 2.2a

Community 2.2 to 2.1

Time and lack of disturbance and/or grazing management that favors the establishment and growth of sagebrush allows for the woody species to recover. The establishment of big sagebrush can take many years.

Pathway 2.3a
Community 2.3 to 2.2

Fire will reduce the mountain big sagebrush to trace amounts and allow for perennial bunchgrasses in the understory to dominate the site. 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 respond well to fire and may increase post-burn.

Transition T1A
State 1 to 2

Trigger: This transition is caused by the introduction of non-native annual plants, such as cheatgrass and mustards. Slow variables: Over time the annual non-native species will increase within the community. Organic matter inputs are reduced. 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.

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**			1088–1836	
	basin wildrye	LECI4	*Leymus cinereus*	680–1020	–
	Idaho fescue	FEID	*Festuca idahoensis*	340–510	–
	mountain brome	BRMA4	*Bromus marginatus*	34–170	–
2	**Secondary Perennial Grasses**			34–255	
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	9–51	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	9–51	–
	melicgrass	MELIC	*Melica*	9–51	–
	bluegrass	POA	*Poa*	9–51	–
	bluebunch wheatgrass	PSSPS	*Pseudoroegneria spicata ssp. spicata*	9–51	–
Forb					
3	**Perennial**			85–255	
	melicgrass	MELIC	*Melica*	9–51	–
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	7–42	–
	hawksbeard	CREPI	*Crepis*	7–42	–
	helianthella	HELIA	*Helianthella*	7–42	–
	lupine	LUPIN	*Lupinus*	7–42	–
	ragwort	SENEC	*Senecio*	7–42	–
Shrub/Vine					
4	**Primary Shrubs**			34–85	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	34–85	–
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	9–51	–
	hawksbeard	CREPI	*Crepis*	9–51	–
	helianthella	HELIA	*Helianthella*	9–51	–
	lupine	LUPIN	*Lupinus*	9–51	–
	ragwort	SENEC	*Senecio*	9–51	–
5	**Secondary Shrubs**			34–136	
	Utah serviceberry	AMUT	*Amelanchier utahensis*	7–42	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	7–42	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	7–42	–
	snowberry	SYMPH	*Symphoricarpos*	7–42	–

Animal community

Livestock/Wildlife Grazing Interpretations:
This site is suited to livestock grazing. Considerations for grazing management include timing, intensity and duration of grazing.

Overgrazing leads to an increase in sagebrush and a decline in understory plants like basin wildrye and Idaho fescue. Squirreltail or Sandberg bluegrass will increase temporarily with further degradation. Invasion of annual weedy forbs and cheatgrass could occur with further grazing degradation, leading to a decline in squirreltail and bluegrass and an increase in bare ground. A combination of overgrazing and prolonged drought leads to soil erosion, increased bare ground, and a loss in plant production. Wildlife in sites with cheatgrass present could transition to cheatgrass-dominated communities, and without management, cheatgrass and annual forbs are likely to dominate.

Reduced bunchgrass vigor or density provides an opportunity for Sandberg bluegrass expansion and/or cheatgrass and other invasive species to occupy interspaces, leading to increased fire frequency and potentially an annual plant community. Sandberg bluegrass increases under grazing pressure (Tisdale and Hironaka 1981) and is capable of co-existing with cheatgrass. Excessive sheep grazing favors Sandberg bluegrass; however, where cattle are the dominant grazers, cheatgrass often dominates (Daubenmire 1970). Thus, depending on the season of use, the grazer and site conditions, either Sandberg bluegrass or cheatgrass may become the dominant understory with inappropriate grazing management.

Long-term disturbance response may be influenced by small differences in landscape topography. Concave areas hold a little more moisture and may retain deep-rooted perennial grasses whereas convex areas are slightly less resilient and may have more Sandberg bluegrass present.

During settlement, many of the cattle in the Great Basin were wintered on extensive basin wildrye stands; due to sensitivity to spring, use many stands were decimated by the early 20th century (Young et al. 1976). Less palatable species, such as big sagebrush and rabbitbrush (Chrysothamnus spp.), increased in dominance along with invasive non-native species such as Russian thistle, mustards, and cheatgrass (Roundy 1985). The early growth and abundant production of basin wildrye make it a valuable source of forage for livestock. It is important forage for livestock 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. Basin wildrye is used often as a winter feed for livestock and wildlife by not only providing roughage above the snow but also cover in the early spring months (Majerus 1992). Inadequate rest and recovery from defoliation causes a decrease in basin wildrye and an increase in basin big sagebrush and rubber rabbitbrush (Ericameria nauseosa) (Young et al. 1976, Roundy 1985). Spring defoliation of basin wildrye and/or consistent, heavy grazing during the growing season has been found to significantly reduce basin wildrye production and density (Krall et al. 1971). Additionally, native basin wildrye seed viability has been found to be low and seedlings lack vigor (Young and Evans 1981). Roundy (1985) found that although basin wildrye is adapted to seasonally dry saline soils, high and frequent spring precipitation is necessary to establish it from seed. This suggests that establishment of native basin wildrye seedlings occurs only during years of unusually high precipitation; thus, reestablishment of a stand may be episodic.

Mountain brome is ranked as excellent forage for both cattle and horses and good for domestic sheep, though domestic animals will graze mountain brome only when it is fairly succulent. Mountain brome increases with grazing (Leege et al. 1981). A study by Mueggler (1967) found that with clipping, mountain brome increased in herbage production when clipped in June. When clipped in July, mountain brome increased due to reduced competition from forb species. The study also found that after three successive years of clipping, mountain brome started to exhibit adverse effects. Mountain brome is ranked as highly valuable as elk winter forage (Kufeld 1973).

Idaho fescue provides important forage for many types of domestic livestock. The foliage cures well and is preferred by livestock in the late fall and winter. Idaho fescue tolerates light to moderate grazing (Ganskopp and Bedell 1980) and is moderately resistant to trampling (Cole 1987). Heavy grazing may lead to replacement of Idaho fescue with non-native species such as cheatgrass (Mueggler 1984).

Mountain big sagebrush is eaten by domestic livestock but has long been considered to be of low palatability, and a competitor to more desirable species.

Antelope bitterbrush is an important shrub species to domestic livestock (Wood 1995). Grazing tolerance of antelope bitterbrush is dependent on site conditions (Garrison 1953). This species is most commonly found on soils which provide minimal restriction to deep root penetration, such as coarse-textured soil or finer-textured soil with high stone content (Driscoll 1964, Clements and Young 2002).

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:
Mountain big sagebrush is a highly preferred winter forage for mule deer: In a study by Personius et al. (1987), mountain big sagebrush was the most preferred sagebrush species. Fecal samples from ungulates in Montana showed that bighorn sheep, mule deer, and elk all consumed mountain big sagebrush in small amounts in winter, while cattle showed no sign of sagebrush use. Reliance on the big sagebrush ecosystem by many wild animals for both food and cover has been documented and reviewed extensively. Sagebrush-grassland communities provide critical sage-grouse breeding and nesting habitats. 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. Sage-grouse prefer mountain big sagebrush and Wyoming big sagebrush communities to basin big sagebrush communities.
Bitterbrush is critical browse for mule deer, as well as domestic livestock, antelope, and elk (Wood 1995).

Idaho fescue is an important source of forage for pronghorn and deer in ranges of northern Nevada.

Mountain brome seedheads and seeds provide food for many birds and small mammals. Pronghorn antelope will consume mountain brome primarily in the spring. The palatability of mountain brome is excellent for deer, particularly during the late spring and early summer.

Recreational uses

Aesthetic value is derived from the colorful flowering of numerous forbs backgrounded by the verdure of native grasses in the spring and early summer. Diverse floral and faunal populations offer rewarding opportunities to photographers and for nature study. This site has potential for deer and upland game hunting.

Wood products

None

Other products

Native peoples used big sagebrush leaves and branches for medicinal teas, and the leaves as a fumigant. Bark was woven into mats, bags and clothing. Basin wildrye was used as bedding for various Native American ceremonies, providing a cool place for dancers to stand.

Other information

Basin wildrye is useful in mine reclamation, fire rehabilitation and stabilizing disturbed areas. Its usefulness in range seeding, however, may be limited by initially weak stand establishment. Mountain brome is an excellent native bunchgrass for seeding alone or in mixtures in disturbed areas, including depleted rangelands, burned areas, roadways, mined lands, and degraded riparian zones.

Inventory data references

NRCS-RANGE-417 - 3 records
Soils and Physiographic features were gathered from NASIS.

Type locality

Location 1: Elko County, NV	
Township/Range/Section	T35N R56E S26
General legal description	Approximately 1,500 feet east of radio facility off north slope of Elko Mountain, Elko County, Nevada.

Location 2: Elko County, NV	
Township/Range/Section	T38N R51E S19

General legal description	About 12 miles south of Tuscarora, near Sugarloaf Butte, Elko County, Nevada.

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Contributors

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Approval

Kendra Moseley, 4/25/2024

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)	P NOVAK-ECHENIQUE
Contact for lead author	State Rangeland Management Specialist
Date	04/07/2014
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are typically non-existent.

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2. **Presence of water flow patterns:** Water flow patterns are none to rare. Water flow patterns may rarely be observed on steeper slopes in areas recently subjected to summer convection storms or rapid spring snowmelt. Water flow patterns are short (<1 m) and stable.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are none to rare. Occurrence is limited to areas of 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 ± 25%; varies depending on soil surface rock fragments ±25%

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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 and annual & perennial forbs) expected to move distance of slope length during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during large rainfall events.

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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 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 typically very fine platy. Soil surface colors are dark brown and soils are typified by a thick mollic epipedon. Organic matter of the surface 2 to 4 inches is typically more than 3.5 percent.

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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., Idaho fescue & 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 none. Subsoil argillic horizons are not to be interpreted as compacted.

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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: Deep-rooted, cool season, perennial bunchgrasses (basin wildrye, Idaho fescue)

    Sub-dominant: tall shrubs (mountain big sagebrush & mixed mountain browse species) > deep-rooted, cool season, perennial forbs > shallow-rooted, cool season, perennial grasses and grass-like plants = fibrous, shallow-rooted, cool season, perennial and annual forbs

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead branches within individual shrubs common. Standing-dead shrub canopy material ± 10% of total woody canopy; some of the mature bunchgrasses (<10%) have dead centers.

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (through mid-June) ± 1700 lbs/ac; Favorable years + 2000 lbs/ac; Unfavorable years + 1300 lbs/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:** Potential invaders are cheatgrass, annual mustards, and knapweeds.

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