

Ecological site R025XY080NV Shrubby Snowfield

Last updated: 4/25/2024
Accessed: 09/27/2024

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

The Shrubby Snowfield site occurs on linear to usually concave mountain sideslopes. Although this site may occur on all aspects, northerly exposures are most common. Slopes range from 15 to over 50 percent, but slope gradients of 30 to 75 percent are typical. Elevations are 6500 to 10000 feet.

The average growing season is about 60 to 80 days. Characteristic landscape positions and elevations for this site encourage the accumulation of snow. Slowly melting snow in the late spring and early summer on this site prolongs the availability of soil moisture for plant growth and maintains soil moisture at levels higher than on soils of surrounding landscapes.

The soils associated with this site are very deep and have formed in colluvium. These soils are medium textured throughout and normally have from 35 to 60 percent gravels, cobbles, and stones (by volume) distributed throughout their profile. Available water capacity is moderate and runoff is slow to medium.

The reference plant community is dominated by mountain snowberry, Utah serviceberry, mountain brome, slender wheatgrass, Columbia needlegrass, and oniongrass.

Associated sites

F025XY065NV	Backslope Aspen
R025XY002NV	ASPEN THICKET
R025XY004NV	LOAMY SLOPE 16+ P.Z.

R025XY024NV	MOUNTAIN RIDGE
R025XY052NV	CEANOTHUS THICKET
R025XY056NV	LOAMY 14-16 P.Z.

Similar sites

R025XY046NV	FRACTURED STONY LOAM 14+ P.Z. Fractured Stony Loam 14+
R025XY056NV	LOAMY 14-16 P.Z. Loamy 16+
R025XY072NV	GRAVELLY LOAM 16+ P.Z. Gravelly Loam 16+
R025XY004NV	LOAMY SLOPE 16+ P.Z. Loamy Slope 16+

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Symphoricarpos oreophilus</i> (2) <i>Amelanchier utahensis</i>
Herbaceous	(1) <i>Bromus marginatus</i> (2) <i>Elymus trachycaulus</i>

Physiographic features

The Shrubby Snowfield site occurs on linear to usually concave mountain sideslopes. Although this site may occur on all aspects, northerly exposures are most common. Slopes range from 15 to over 50 percent, but slope gradients of 30 to 75 percent are typical. Elevations are 6500 to 10000 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Runoff class	Medium to high
Flooding frequency	None
Ponding frequency	None
Elevation	1,981–3,048 m
Slope	15–75%
Water table depth	183 cm
Aspect	W, NW, N, NE, E, SE, S, SW

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.

Table 3. Representative climatic features

Frost-free period (characteristic range)	53-55 days
Freeze-free period (characteristic range)	90-93 days
Precipitation total (characteristic range)	356-406 mm
Frost-free period (actual range)	52-56 days
Freeze-free period (actual range)	89-94 days
Precipitation total (actual range)	356-432 mm
Frost-free period (average)	54 days
Freeze-free period (average)	92 days
Precipitation total (average)	381 mm

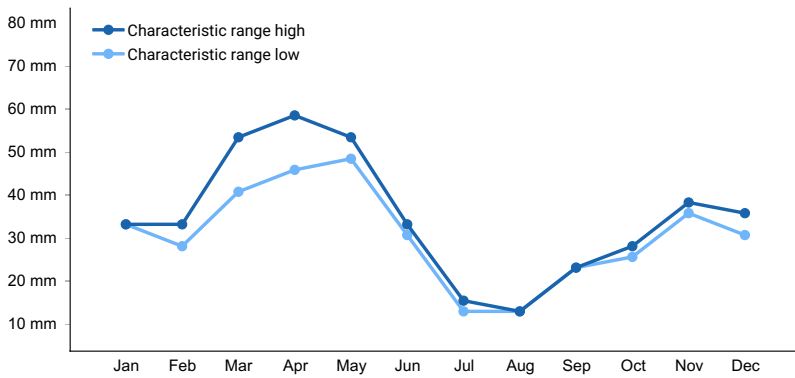


Figure 1. Monthly precipitation range

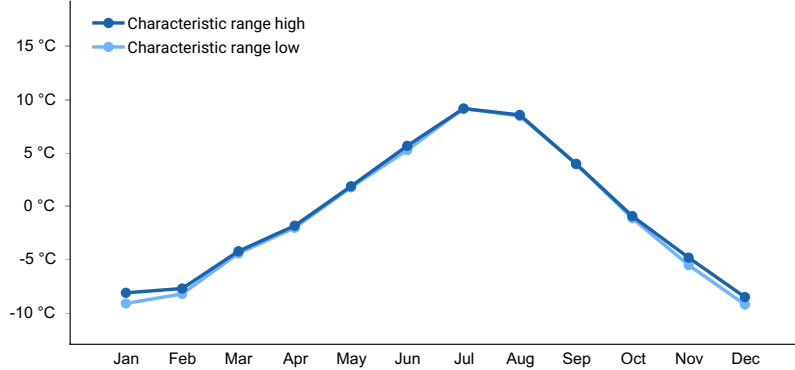


Figure 2. Monthly minimum temperature range

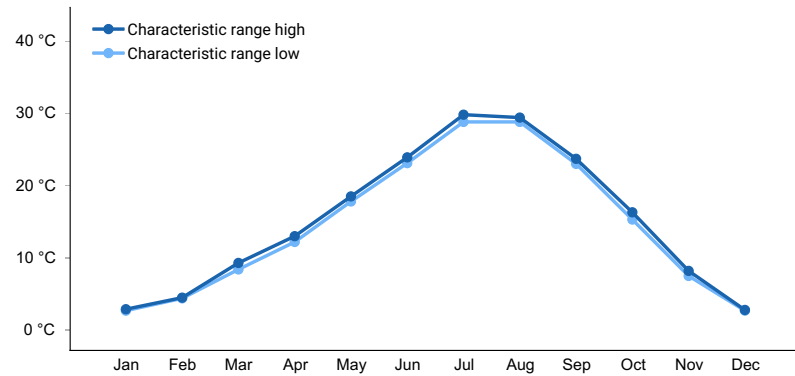


Figure 3. Monthly maximum temperature range

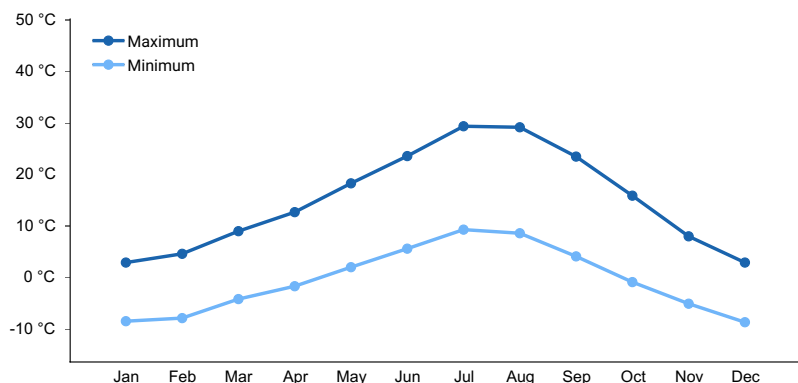


Figure 4. Monthly average minimum and maximum temperature

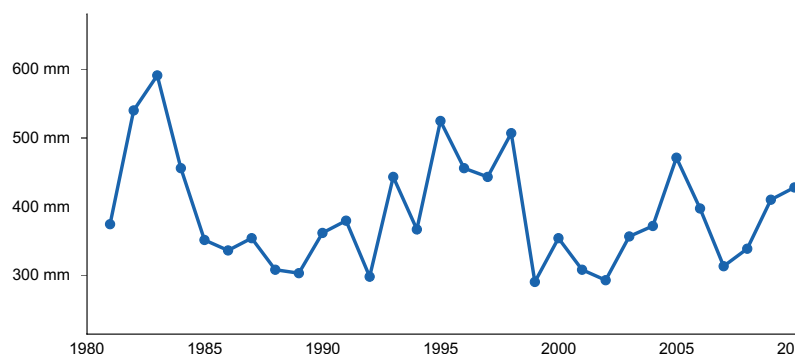


Figure 5. Annual precipitation pattern

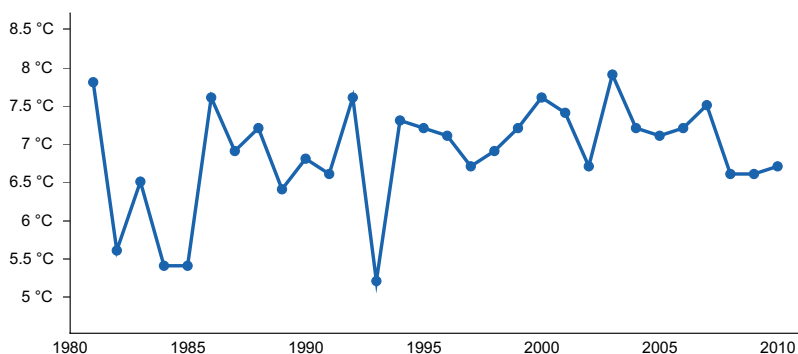


Figure 6. Annual average temperature pattern

Climate stations used

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

Influencing water features

Slowly melting snow in the late spring and early summer on this site prolongs the availability of soil moisture for plant growth and maintains soil moisture at levels higher than on soils of surrounding landscapes.

Soil features

The soils are very deep and have formed in colluvium. These soils are medium textured throughout and normally have from 35 to 60 percent gravels, cobbles, and stones (by volume) distributed throughout their profile. Available water capacity is moderate and runoff is slow to medium.

Soil series correlated with this site are: Glideski and Wrenza

Table 4. Representative soil features

Parent material	(1) Colluvium
Surface texture	(1) Extremely gravelly sandy loam (2) Gravelly loam
Family particle size	(1) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	51–152 cm
Soil depth	51–152 cm
Surface fragment cover <=3"	25–65%
Surface fragment cover >3"	0–30%
Available water capacity (0-101.6cm)	4.06–8.89 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.6–7.3
Subsurface fragment volume <=3" (Depth not specified)	30–35%
Subsurface fragment volume >3" (Depth not specified)	4–40%

Ecological dynamics

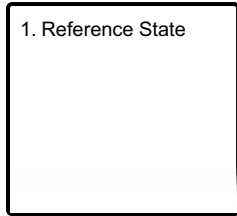
As ecological condition degrades, perennial grasses decline in the understory as mountain snowberry and rabbitbrush increase. In the absence of periodic wildfire, mountain snowberry can eventually dominate the plant community.

Fire Ecology:

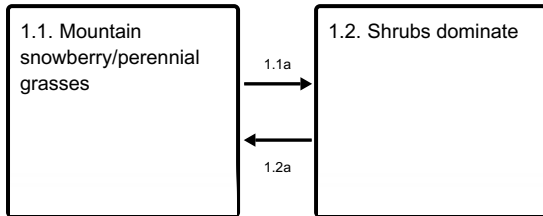
Fires top-kill mountain snowberry. Although plant survival may be variable, mountain snowberry root crowns usually survive even severe fires. Mountain snowberry sprouts from basal buds at the root crown following fire. Aboveground parts of Utah serviceberry may be killed or consumed under fire conditions with sufficient flame lengths. Utah serviceberry may be slightly harmed by fire, depending on moisture conditions, but is generally considered to be fire tolerant. Utah serviceberry sprouts from the root crown following fire. Soil moisture is important to aid sprouting. Chokecherry is well adapted to disturbance by fire. Although susceptible to top-kill by fire, it resprouts rapidly and prolifically from surviving root crowns and rhizomes. The effects of fire on slender wheatgrass are dependent on its growth form. Tall, decadent plants with many leaves sustain the most fire damage, while those with short, sparse growth form, is the least likely to sustain damage to the root system during a fire. Perennial needlegrasses tend to be among the least fire resistant bunchgrass due to the densely tufted stems. Columbia needlegrass is only slightly to moderately damaged by fire, because it has relatively few culms per clump which may help to minimize the amount of subsurface heat transfer and subsequent damage. Oniongrass has high fire tolerance due to the rhizomatous growth.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1 Reference State

The Reference State is representative of the natural range of variability under pristine conditions. The reference state has two general community phases: a shrub-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 Mountain snowberry/perennial grasses

The reference plant community is dominated by mountain snowberry, Utah serviceberry, mountain brome, slender wheatgrass, Columbia needlegrass, and oniongrass. The visual aspect is dominated by snowberry and a variety of mountain brush species associated with this site. Potential vegetative composition is about 50 percent grasses, 20 percent forbs and 30 percent shrubs. Approximate ground cover (basal and crown) is 40 to 65 percent.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1009	1233	1401
Shrub/Vine	585	715	813
Forb	404	493	560
Tree	20	25	28
Total	2018	2466	2802

Community 1.2 Shrubs dominate

Shrubs dominate community phase 1.2.

Pathway 1.1a Community 1.1 to 1.2

Increased shrubs due to disturbance to remove grasses or disturbance to increase shrubs.

Pathway 1.2a

Community 1.2 to 1.1

Disturbance that removes shrub canopy allowing more resources for perennial grass understory.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Primary Perennial Grasses			1110–2712	
	mountain brome	BRMA4	<i>Bromus marginatus</i>	370–740	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	247–616	–
	Columbia needlegrass	ACNE9	<i>Achnatherum nelsonii</i>	247–616	–
	melicgrass	MELIC	<i>Melica</i>	123–370	–
	Cusick's bluegrass	POCU3	<i>Poa cusickii</i>	41–123	–
	muttongrass	POFE	<i>Poa fendleriana</i>	41–123	–
2	Secondary Perennial Grasses			123–370	
	Letterman's needlegrass	ACLE9	<i>Achnatherum lettermanii</i>	12–123	–
	sedge	CAREX	<i>Carex</i>	12–123	–
	big squirreltail	ELMU3	<i>Elymus multisetus</i>	12–123	–
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	12–123	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	12–123	–
Forb					
3	Primary Perennial Forbs			197–641	
	lupine	LUPIN	<i>Lupinus</i>	49–197	–
	nettleleaf giant hyssop	AGUR	<i>Agastache urticifolia</i>	49–197	–
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	49–123	–
	mule-ears	WYAM	<i>Wyethia amplexicaulis</i>	49–123	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	12–123	–
4	Secondary Perennial Forbs			247–616	
	sedge	CAREX	<i>Carex</i>	12–123	–
Shrub/Vine					
5	Primary Shrubs			370–1110	
	Forb, perennial	2FP	<i>Forb, perennial</i>	247–616	–
	Utah serviceberry	AMUT	<i>Amelanchier utahensis</i>	123–370	–
	black chokecherry	PRVIM	<i>Prunus virginiana var. melanocarpa</i>	123–370	–
	mountain snowberry	SYOR2	<i>Symphoricarpos oreophilus</i>	123–370	–
	nettleleaf giant hyssop	AGUR	<i>Agastache urticifolia</i>	49–197	–
	lupine	LUPIN	<i>Lupinus</i>	49–197	–
	mule-ears	WYAM	<i>Wyethia amplexicaulis</i>	49–123	–
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	49–123	–
6	Secondary Perennial Shrubs			111–321	
	mountain big	ARTRV	<i>Artemisia tridentata ssp. vasevana</i>	25–74	–

	sagebrush				
	yellow rabbitbrush	CHVIL4	<i>Chrysothamnus viscidiflorus ssp. lanceolatus</i>	25–74	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	25–74	–
	currant	RIBES	<i>Ribes</i>	25–74	–
	willow	SALIX	<i>Salix</i>	25–74	–
Tree					
7	Trees			12–49	
	quaking aspen	POTR5	<i>Populus tremuloides</i>	12–49	–

Animal community

Livestock Interpretations:

This site is suited for livestock grazing. Grazing management should be keyed to perennial grass production. Mountain brome is one of the most important forage grasses in the quaking aspen zone. Mountain brome is ranked as excellent forage for both cattle and horses and good for domestic sheep. Domestic cattle will graze mountain brome only when it is fairly succulent. Slender wheatgrass is grazed by all classes of livestock. Columbia needlegrass provides valuable forage for all classes of livestock. Overall production is generally low in the upper sagebrush and mountain brush zones and at the limits of its range where Columbia needlegrass grows only in scattered patches. It is especially valuable to cattle and horses on summer ranges and to domestic sheep on lambing grounds. It is more often cropped closely by cattle and horses than by sheep. Columbia needlegrass is palatable to livestock throughout its range. As with most needlegrasses, it is most palatable early in the season before the foliage becomes coarse and wiry. Palatability to cows and horses is increased because large amounts of fine leafage remain green throughout the growing season. Palatability of Columbia needlegrass is rated fair to good for cattle and horses, becoming nearly unpalatable at maturity. Snowberry is readily eaten by all classes of livestock, particularly domestic sheep.

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:

Snowberry is an important forage species for deer and elk on high elevation summer ranges. Snowberry is frequently one of the first species to leaf out, making it a highly sought after food in the early spring. 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. Slender wheatgrass is grazed by sage grouse, deer, elk, moose, bighorn sheep, mountain goat, pronghorn, various rodents, and all classes of livestock. The seeds are eaten by various seed predators. Slender wheatgrass provides hiding and thermal cover for songbirds, upland game birds, waterfowl, and small mammals. Columbia needlegrass provides valuable forage for many species of wildlife. It is also consumed by mule deer and other wildlife species throughout the growing season. Needlegrasses are a significant component in the diet of pocket gophers. Columbia needlegrass is palatable to many species of wildlife throughout its range. As with most needlegrasses, it is most palatable early in the season before the foliage becomes coarse and wiry. Palatability of Columbia needlegrass is rated fair for wildlife overall, becoming nearly unpalatable at maturity.

Hydrological functions

Runoff is slow to medium.

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 offers rewarding opportunities to photographers and for nature study. This site is used for hiking and has potential for upland and big game hunting.

Other products

Utah serviceberry fruits were used by Native Americans and early European explorers in North America for food and medicine.

Other information

Mountain snowberry is useful for establishing cover on bare sites and has done well when planted onto roadbanks. Utah serviceberry has been used to revegetate big game winter range and for surface stabilization. It grows slowly from seed and therefore transplanting may be more successful than seeding for revegetation projects. 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. Slender wheatgrass is widely used for revegetating disturbed lands. It has been used for rehabilitating mine spoils, livestock ranges, and wildlife habitat and watershed areas. Slender wheatgrass is used for rehabilitating alpine meadows and other high elevation habitats.

Inventory data references

Soils and Physiographic features were gathered from NASIS.

Type locality

Location 1: Elko County, NV	
Township/Range/Section	T34N R60E S18
UTM zone	N
UTM northing	4521247
UTM easting	647653
Latitude	40° 49' 44"
Longitude	115° 14' 56"
General legal description	Steep slopes below northeast face of Secret Peak. Humboldt-Toiyabe National Forest, Elko County, Nevada.

Other references

Fire Effects Information System (online <http://www.fs.fed.us/database/feis>)

Houghton, J.G., C.M. Sakamoto, and R.O. Gifford. 1975. Nevada's Weather and Climate, Special Publication 2. Nevada Bureau of Mines and Geology, Mackay School of Mines, University of Nevada, Reno, NV.

National Oceanic and Atmospheric Administration. 2004. The North American Monsoon. Reports to the Nation. National Weather Service, Climate Prediction Center. Available online: <http://www.weather.gov/>

USDA-NRCS Plants Database (online <http://plants.usda.gov/>)

Contributors

GKB

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)	
Contact for lead author	
Date	09/27/2024
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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:

Sub-dominant:

Other:

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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:**

17. **Perennial plant reproductive capability:**
