

Ecological site R023XY061NV MOUNTAIN SHOULDERS 14-18 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.

Ecological site concept

Currently there is only a draft of the initial concept for this ecological site. The initial concept for this site places it within the Ashy or Loamy Skeletal Mod Deep 10-20 PZ High-Resilience Mountain Big Sagebrush and Idaho Fescue Ecological Site Group. To view the General STM and other information available for this ESG please go to <https://edit.jornada.nmsu.edu/catalogs/esg/023X/R023XY906NV>

This site is significantly less productive than the modal site with only 700 lbs/ac in normal years. Soils on this site are shallow and have high amounts of coarse fragments in the soil profile. This community occurs on wind-swept mountain summits and shoulders and tends to have heavy snowpack until late spring. Mountain big sagebrush on this site tends to be low in stature due to these severe environmental conditions. Needlegrasses such as Columbia, western, and Letterman's are common grasses along with Idaho fescue and bluebunch wheatgrass. Forbs are common. Slopes typically range from 2 to 15 percent, elevations range from 6700 to 8500 feet, and precipitation ranges from 14 to over 18 inches. This site is similar to the group modal site with 2 stable states.

Associated sites

R023XY007NV	LOAMY 14-16 P.Z.
R023XY008NV	MOUNTAIN RIDGE
R023XY019NV	LOAMY 16+ P.Z.
R023XY026NV	MAHOGANY SAVANNA

Similar sites

R023XY043NV	GRANITIC SLOPE 14-16 P.Z. FEID-PSSPS codominant grasses
R023XY084NV	DEEP LOAMY 14-16 P.Z. much more productive site
R023XY007NV	LOAMY 14-16 P.Z. FEID-PSSPS, codominant grasses; mountain browse spp. prevalent; more productive site
R023XY094NV	ASHY SLOPE 12-14 P.Z. more productive site
R023XY054NV	STEEP NORTH SLOPE Steeper slopes; more productive site

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata</i> var. <i>vaseyana</i>
Herbaceous	(1) <i>Festuca idahoensis</i> (2) <i>Achnatherum</i>

Physiographic features

This site occurs on convex shoulders and summits of mountains and plateaus on all aspects. Slopes range from 4 to over 75 percent, but slope gradients of 8 to 30 percent are most typical. Elevations are 6000 to 8500 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain
Elevation	1,829–2,591 m
Slope	4–75%
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is semiarid and characterized by cold, moist winters and warm, dry summers. Average annual precipitation is 14 to over 18 inches. Mean annual air temperature is 38 to 45 degrees F. The average growing season is about 30 to 100 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).

Average annual precipitation is 16 to over 20 inches. Mean annual air temperature is 41 to 44 degrees F. The average growing season is about 50 to 70 days.

Mean annual precipitation at the Bear Creek, Nevada SNOTEL station (170501020301) is 37.69 inches.

monthly mean precipitation is:

January 3.84; February 3.75; March 4.38; April 4.9;
 May 3.99; June 2.82; July .95; August 1.66;
 September 1.22; October 2.12;
 November 3.67; December 4.38.

Table 3. Representative climatic features

Frost-free period (average)	65 days
Freeze-free period (average)	
Precipitation total (average)	406 mm

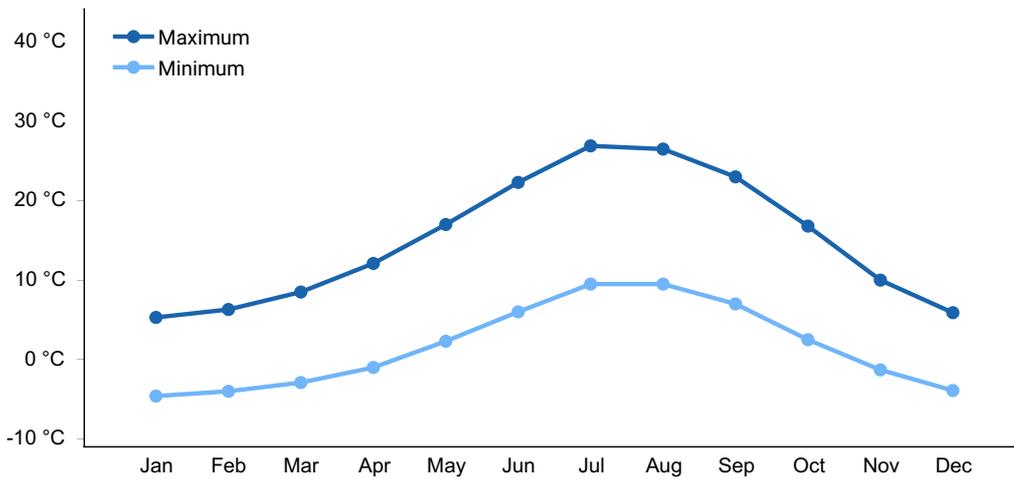


Figure 1. Monthly average minimum and maximum temperature

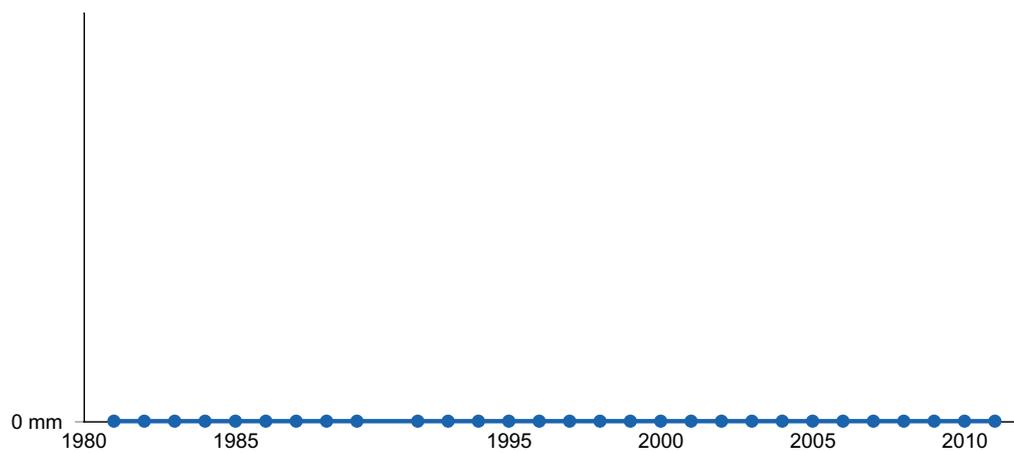


Figure 2. Annual precipitation pattern

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site have formed in residuum and colluvium from volcanic rock sources. The low-stature growth form of mountain big sagebrush found on this site is due to a combination of environmental factors: a shallow soil depth, high amounts of coarse fragments in the soil profile, the plant community's occurrence on wind swept summits and shoulders, and the heavy snow pack that usually remains on these high elevation sites from early winter to late spring. The soil series associated with this site include: Cavid, Croesus, and Westbutte.

Table 4. Representative soil features

Surface texture	(1) Very gravelly sandy loam (2) Extremely stony loam (3) Very gravelly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Soil depth	51–213 cm
Surface fragment cover <=3"	28–64%
Surface fragment cover >3"	2–40%
Available water capacity (0-101.6cm)	4.06–6.1 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)	5.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	24–64%
Subsurface fragment volume >3" (Depth not specified)	4–39%

Ecological dynamics

Should management result in abusive use by livestock and/or feral horses, Idaho fescue and needlegrasses will decrease as mountain big sagebrush and other unpalatable shrubs increase in the overstory. Cheatgrass, thistle, and other annuals are plants likely to invade this site.

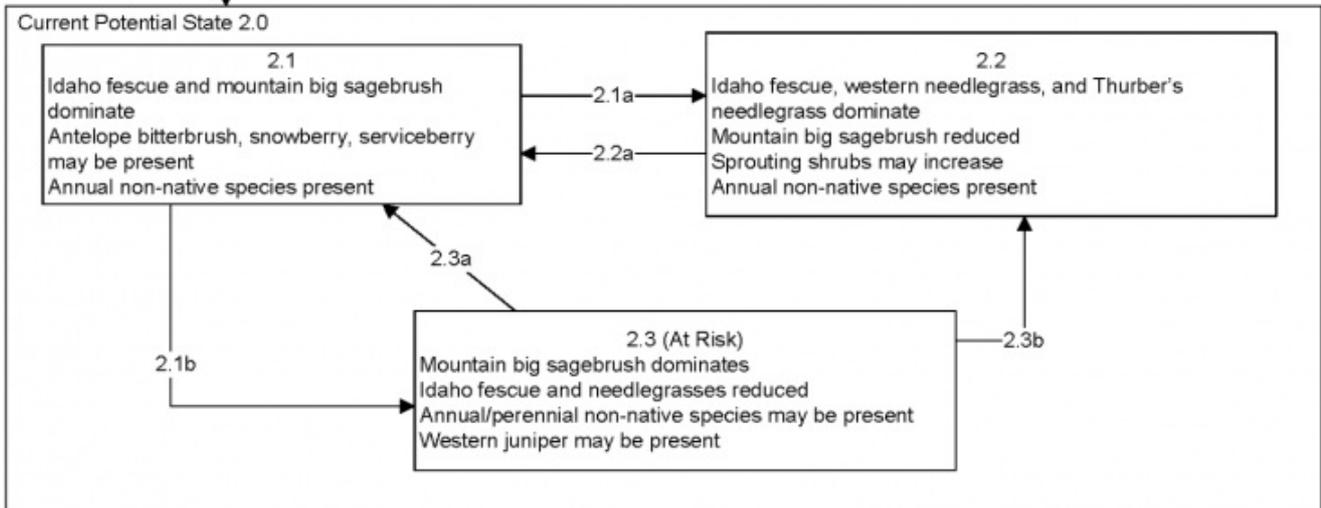
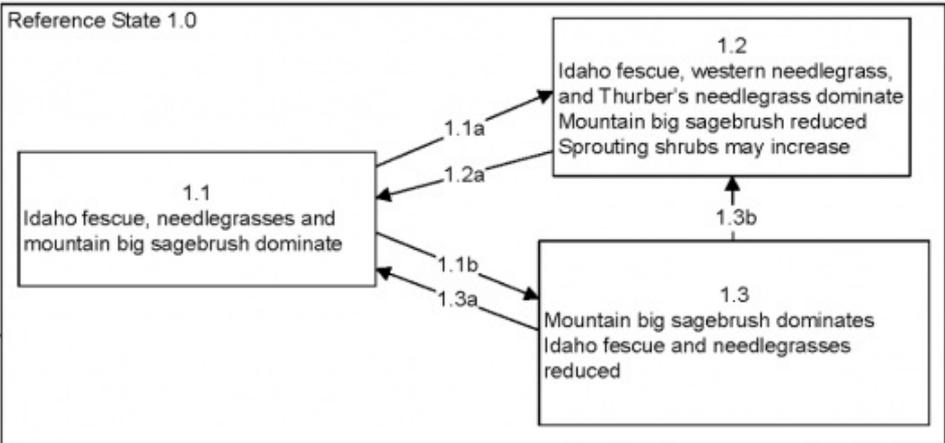
Fire Ecology:

Presettlement fire return intervals in mountain big sagebrush communities varied from 15 to 25 years. Plants are readily killed in all seasons, even light severity fires. Mountain big sagebrush is highly susceptible to injury from fire. It is often top-killed by fire and will not resprout. Idaho fescue grows in a dense, fine-leaved tuft. Fires tend to burn within the accumulated fine leaves at the base of the plant and may produce temperatures sufficient to kill some of the root crown. Mature Idaho fescue plants are commonly reported to be severely damaged by fire in all seasons. Little specific information is available on adaptations of Letterman's needlegrass to fire. It is morphologically similar to Columbia

needlegrass, which is only slightly to moderately damaged by fire. Season of burn affects the plant's ability to survive a fire. Post-fire regeneration is through seeding and tillering. 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. Western needlegrass is moderately damaged by fire. The recovery time is between 3 and 5 years. Burning bluebunch wheatgrass may remove most of the aboveground biomass but does not usually result in plant mortality. Bluebunch wheatgrass is generally favored by burning. Burning stimulates flowering and seed production. However, season of burning affects mortality. Cusick's bluegrass is unharmed to slightly harmed by light-severity fall fires. Cusick's bluegrass regenerates after fire from seed and by tillering. Sedge is top-killed by fire, with rhizomes protected by insulating soil. The rhizomes of sedge species may be killed by high-severity fires that remove most of the soil organic layer. Reestablishment after fire occurs by seed establishment and/or rhizomatous spread.

State and transition model

MLRA 23
Group 6
Mountain Shoulders 14-18"
R023XY061NV



T1A

MLRA 23
Group 6
Mountain Shoulders 14-18"
R023XY061NV
KEY

Reference State 1.0 Community 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. A high severity Aroga moth infestation could also reduce sagebrush cover.

1.1b: Time and lack of disturbance allows for sagebrush to increase and become decadent; herbivory and/or chronic drought may also reduce fine fuels and lead to reduced fire frequency and increased shrub cover.

1.2a: Time and lack of disturbance allows for shrub regeneration.

1.3a: Low severity fire, Aroga moth and/or herbivory, would create sagebrush/grass mosaic.

1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community. A high severity Aroga moth infestation may also reduce sagebrush cover.

Transition T1A: Introduction of non-native annual species.

Current Potential State 2.0 Community 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. A high severity Aroga moth infestation could also reduce sagebrush cover; non-native annual species present.

2.1b: Time and lack of disturbance allows for shrubs to increase and become decadent; inappropriate grazing management and/or chronic drought may also reduce fine fuels and lead to reduced fire frequency and increased shrub cover.

2.2a: Time and lack of disturbance allows for regeneration of sagebrush.

2.3a: Low severity fire, Aroga moth and/or grazing management creates sagebrush/grass mosaic.

2.3b: High severity fire significantly reduces sagebrush cover, leading to early mid-seral community.

State 1 Reference Plant Community

Community 1.1 Reference Plant Community

The reference plant community is dominated by Idaho fescue, and mountain big sagebrush. Letterman's and western needlegrass are important grass species associated with this site. Potential vegetative composition is about 60% grasses, 10% forbs and 30% shrubs. Approximate ground cover (basal and crown) is about 20 to 40 percent.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	336	471	605
Shrub/Vine	168	235	303
Forb	56	78	101
Total	560	784	1009

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/Grasslikes			267–573	
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	157–235	–
	bluebunch wheatgrass	PSSPS	<i>Pseudoroegneria spicata</i> <i>ssp. spicata</i>	39–118	–
	muttongrass	POFEF	<i>Poa fendleriana ssp.</i> <i>fendleriana</i>	16–63	–
	Letterman's needlegrass	ACLE9	<i>Achnatherum lettermanii</i>	13–39	–
	Columbia needlegrass	ACNEN2	<i>Achnatherum nelsonii ssp.</i> <i>nelsonii</i>	13–39	–
	western needlegrass	ACOCO	<i>Achnatherum occidentale</i> <i>ssp. occidentale</i>	12–39	–
	sedge	CAREX	<i>Carex</i>	16–39	–
2	Secondary Perennial Grasses			39–78	
	big squirreltail	ELMU3	<i>Elymus multisetus</i>	4–16	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	4–16	–
Forb					
3	Perennial			39–118	

	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	4–16	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	4–16	–
	buckwheat	ERIOG	<i>Eriogonum</i>	4–16	–
	western stoneseed	LIRU4	<i>Lithospermum ruderale</i>	4–16	–
	desertparsley	LOMAT	<i>Lomatium</i>	4–16	–
	lupine	LUPIN	<i>Lupinus</i>	4–16	–
	beardtongue	PENST	<i>Penstemon</i>	4–16	–
	phlox	PHLOX	<i>Phlox</i>	4–16	–
	mule-ears	WYETH	<i>Wyethia</i>	4–16	–
Shrub/Vine					
4	Primary Shrubs			118–235	
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>	118–235	–
5	Secondary Shrubs			1–39	
	Utah serviceberry	AMUT	<i>Amelanchier utahensis</i>	8–16	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	8–16	–
	oceanspray	HOLOD	<i>Holodiscus</i>	8–16	–
	snowberry	SYMPH	<i>Symphoricarpos</i>	8–16	–
	spineless horsebrush	TECA2	<i>Tetradymia canescens</i>	8–16	–

Animal community

Livestock Interpretations:

This site is suitable for livestock grazing. Grazing management should be keyed to perennial grass production. Idaho fescue provides important forage for many types of domestic livestock. The foliage cures well and is preferred by livestock in late fall and winter. Letterman's needlegrass begins growth early in the year and remains green throughout the relatively long growing season, thus, making it valuable forage for 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 described as fair to good for cattle and horses, becoming nearly unpalatable at maturity. Western needlegrass has a spreading and deeply penetrating root system, which makes it resistant to trampling. Bluebunch wheatgrass is considered one of the most important forage grass species on western rangelands for livestock. Although bluebunch wheatgrass can be a crucial source of forage, it is not necessarily the most highly preferred species. Cusick's bluegrass makes up only a small proportion of the biomass of the sagebrush communities in which it lives, but it is often taken preferentially by cattle, especially early in the season. Sedge provides good to fair forage for domestic grazing. 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.

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 highly preferred and nutritious winter forage for mule deer and elk. 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. Idaho fescue provides important forage for several wildlife species. It is reported to be good forage for pronghorn, and deer in ranges of northern Nevada. Letterman's needlegrass provides valuable forage for many species of wildlife. It is consumed by mule deer and is most palatable early in the season before the foliage becomes coarse and wiry. 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 described as fair for wildlife overall, becoming nearly unpalatable at maturity. Western needlegrass provides valuable forage for many species of wildlife. Bluebunch wheatgrass is considered one of the most important forage grass species on western rangelands for wildlife. Bluebunch wheatgrass does not generally provide sufficient cover for ungulates, however, mule deer are frequently found in bluebunch-dominated grasslands. Deer, elk, and mountain goat also use Cusick's bluegrass early in the season. The value of Cusick's bluegrass as cover for small animals has been rated as poor to fair. Sedges have a high to moderate resource value for elk and a medium value for mule deer. Elk consume beaked sedge later in the growing season.

Hydrological functions

Runoff is low to medium. Permeability is moderate to moderately rapid. Hydrologic soil group is A and C.

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 camping and hiking and has potential for upland and big game hunting.

Other products

Native Americans used big sagebrush leaves and branches for medicinal teas, and the leaves as a fumigant. Bark was woven into mats, bags and clothing.

Other information

Letterman's needlegrass has been used successfully in revegetating mine spoils. This species also has good potential for erosion control.

Type locality

Location 1: Washoe County, NV	
Township/Range/Section	T36N R22E S6
UTM zone	N
UTM northing	285623
UTM easting	4545174
Latitude	41° 1' 46"
Longitude	119° 33' 0"
General legal description	SW 1/4 SW 1/4, Fox Mountain, southeast aspect about 400 feet east of microwave station, Washoe County, 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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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	03/10/2026
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:**
