USDA Natural Resources Conservation Service

Ecological site R029XY053NV
MOUNTAIN RIDGE 16+ 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): 029X–Southern Nevada Basin and Range

The Southern Nevada Basin and Range MLRA (29) represents the transition from the Mojave Desert to the Great Basin. It is cooler and wetter than the Mojave. It is warmer and typically receives more summer precipitation than the Great Basin. This area is in Nevada (73 percent), California (25 percent), and Utah (2 percent). It makes up about 26,295 square miles (68,140 square kilometers). Numerous national forests occur in the area, including the San Bernardino, Angeles, Sequoia, Inyo, Humboldt-Toiyabe, and Dixie National Forests. Portions of Death Valley National Monument, the Nuclear Regulatory Commission's Nevada Test Site, the Hawthorne Ammunition Depot, and the Nellis Air Force Range in Nevada and the China Lake Naval Weapons Center in California also are in this MLRA. The northeast part of the Paiute Indian Reservation and the southern third of the Walker River Indian Reservation are in the part of this MLRA in Nevada, and the Lone Pine, Fort Independence, and Big Pine Indian Reservations are in the part in California.
Physiography:
The entire area is in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. The area of broad, nearly level, aggraded desert basins and valleys between a series of mountain ranges trending north to south. The basins are bordered by sloping fans and pluvial lake terraces. The mountains are uplifted fault blocks with steep side slopes and not well dissected due to limited annual precipitation. Most of the valleys in this MLRA are closed basins or bolsons containing sinks or playa lakes.
Geology:
The mountains are dominated by Pliocene and Miocene andesite and basalt rocks, Paleozoic and Precambrian carbonate rocks prominent in some areas. Scattered outcrops of older Tertiary intrusives and very young tuffaceous sediments (Pliocene and Miocene) are in the western and eastern thirds of this MLRA. The valleys consist mostly of alluvial fill and playa deposits at the lowest elevations in the closed basins.
Climate:
The average annual precipitation is 3 to 12 inches (75 to 305 millimeters) in most of this area. It may be as high as 29 inches (735 millimeters), on the higher mountain slopes. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. Summers are dry, but sporadic storms are common in July and August.
Water Resources:
Water resources are scarce. Ground water and surface water sources are limited. Streams are small and intermittent. Quality of surface water in naturally degraded as streams cross area of valley fill effected by dissolved salts. Irrigation water may raise the levels of dissolved salts and suspended sediments causing contamination.
Soils:
Dominant soil orders include Entisols and Aridisols.

Ecological site concept

The Mountain Ridge 16+ P.Z. site is on high elevation, wind blown, mountain ridges and summits on all exposures. Slopes range from 8 to over 50 percent. Elevations are 7,000 to over 10,000 feet. The soils formed in residuum from volcanic rocks. The soils are shallow to very shallow to bedrock and well drained.

Associated sites

R029XY027NV	**MAHOGANY THICKET** This site is on mountain sideslopes on all aspects. Slopes range from 15 to 50 percent. Elevations are 6,400 to about 10,000 feet. Soils are moderately deep and well drained. The available water capacity is low to moderate. Permeability is slow to moderate. These soils are typically modified with high volumes of rock fragments throughout the soil profile.
R029XY051NV	**LOAMY SLOPE 16+ P.Z.** This site occurs on straight to convex mountain sideslopes on all exposures. This site is restricted to northerly aspects at the lower elevations of its occurrence. Slopes range from 2 to 75 percent, but slope gradients of 15 to 75 percent are typical. Elevations are 7,000 to about 10,000 feet. The soils are from residuum and colluvium derived from volcanic rocks. These soils are typically well drained.
R029XY052NV	**CLAYPAN 16+ P.Z.** This site is on straight to convex mountain summits, ridges, and sideslopes on all exposures. This site is restricted to northerly aspects at the lower elevations of its occurrence. Slopes range from 8 to 50 percent. Elevations range from 5,800 to about 10,000 feet. The soils have formed in residuum and colluvium. They are shallow to very deep with a layer restrictive to root development close to the soil surface.

Similar sites

R029XY055NV	**CLAYPAN 12-16 P.Z.** ACTH7 dominant grass.
R029XY052NV	**CLAYPAN 16+ P.Z.** More productive site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia arbuscula*
Herbaceous	(1) *Achnatherum* (2) *Poa fendleriana*

Physiographic features

The Mountain Ridge 16+ P.Z. site occurs on high elevation, wind blown, mountain ridges and summits on all exposures. Slopes range from 8 to over 50 percent. Elevations are 7,000 to over 10,000 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain (2) Ridge
Runoff class	High to very high
Elevation	7,000–10,000 ft
Slope	8–50%
Water table depth	72 in
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is arid, characterized by cold, moist winters and warm, dry summers. Average annual precipitation is 16 to over 20 inches. Mean annual air temperature is 43 to 48 degrees F. The average growing season is about 60 to 90 days. There is no climate station associated with this site.

Table 3. Representative climatic features

Frost-free period (average)	75 days

Freeze-free period (average)	
Precipitation total (average)	18 in

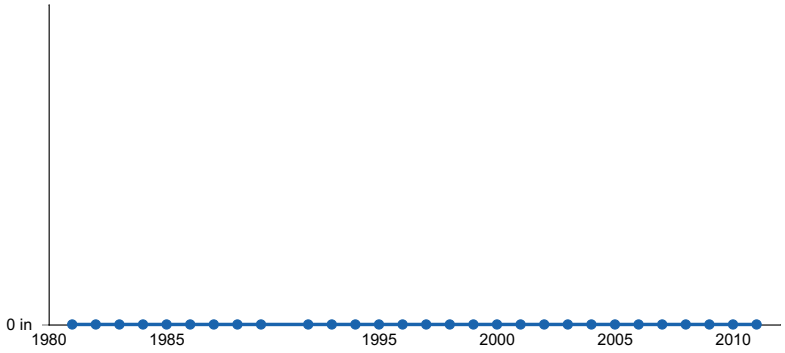

Figure 1. Annual precipitation pattern

Influencing water features

Influencing water features are not associated with this site.

Soil features

The soils formed in residuum from volcanic rocks. The soils are shallow to very shallow to bedrock and well drained. Available water capacity is very low. Soil surface textures are medium to moderately fine with high amounts of gravel, cobble or rock fragments at the surface and throughout the soil profile. Runoff is high to very high. The soils are usually moist in winter and spring and dry in summer and fall, except for 10 to 20 days between July and October due to convection storms. The soil moisture regime is aridic bordering on xeric and the soil temperature regime is mesic.

Soil series associated with this site include: Hiridge, a loamy-skeletal, mixed, superactive, shallow Xeric Argicryoll, and Schoolmarm, an ashy-skeletal, glassy, frigid Aridic Lithic Argixeroll. The soils are typified by a mollic epipedon and an argillic horizon. Clay content is from 25 to 35 percent.

Table 4. Representative soil features

Parent material	(1) Colluvium–volcanic rock (2) Residuum–andesite (3) Residuum–volcanic rock
Surface texture	(1) Very gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid
Soil depth	10–20 in
Surface fragment cover <=3"	30–50%
Surface fragment cover >3"	7–20%
Available water capacity (0-40in)	1.3–1.8 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)	6.7–7.2
Subsurface fragment volume <=3" (Depth not specified)	20–40%
Subsurface fragment volume >3" (Depth not specified)	0–15%

Ecological dynamics

Where management results in abusive grazing use livestock or feral horses, needlegrass and other palatable grasses and forbs decrease while rabbitbrush and low sagebrush increase. Phlox, goldenweed, and other mat-forming forbs are generally the dominant herbaceous species on sites in lower condition. Cheatgrass is the species most likely to invade this site.

Fire Ecology:
Prior to 1897, mean fire return intervals for low and fringed sagebrush communities have been estimated to be from 35 to over 100 years. Fire most often occurs during wet years with high forage production. Low and fringed sagebrush is very susceptible to fire damage. Low and fringed sagebrush is usually killed by fire and does not re-sprout. The recovery in burned areas is usually via small, light, wind-dispersed seed for all low and fringed sagebrush subspecies. Partially injured low sagebrush may re-grow from living branches, but sprouting does not occur. Douglas' rabbitbrush is usually top-killed by fire. It has high resin content, and both foliage and stems may be consumed, even with relatively high moisture content. Fuel distribution as well as overall fuel loading affects the potential survival of Douglas' rabbitbrush. Douglas' rabbitbrush regenerates after fire by sprouting and by establishing from off-site seed. Perennial needlegrasses tend to be among the least fire resistant bunchgrass due to the densely tufted stems. 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. Needlegrasses are damaged by burning due to the dense plant material that can burn slowly and long, charring to the growing points. Late summer and early fall fires are the least harmful. Muttongrass is unharmed to slightly harmed by light-severity fall fire. Muttongrass appears to be harmed by and slow to recover from severe fire. Sandberg bluegrass is generally unharmed by fire. It produces little litter, and its small bunch size and sparse litter reduces the amount of heat transferred to perennating buds in the soil. Its rapid maturation in the spring also reduces fire damage, since it is dormant when most fires occur. Prairie Junegrass is reported as showing little or no damage to moderate damage from fire. The small stature of prairie Junegrass and coarse textured foliage aid in protection of these meristematic tissue areas. Possessing coarsely textured foliage and a small clump size also limits the potential for fire damage.

The reference plant community is dominated by low sagebrush, Letterman's needlegrass, and muttongrass. Potential vegetative composition is about 35 percent grasses, 15 percent forbs, and 50 percent shrubs. Approximate ground cover (basal and crown) is 10 to 25 percent.

State and transition model

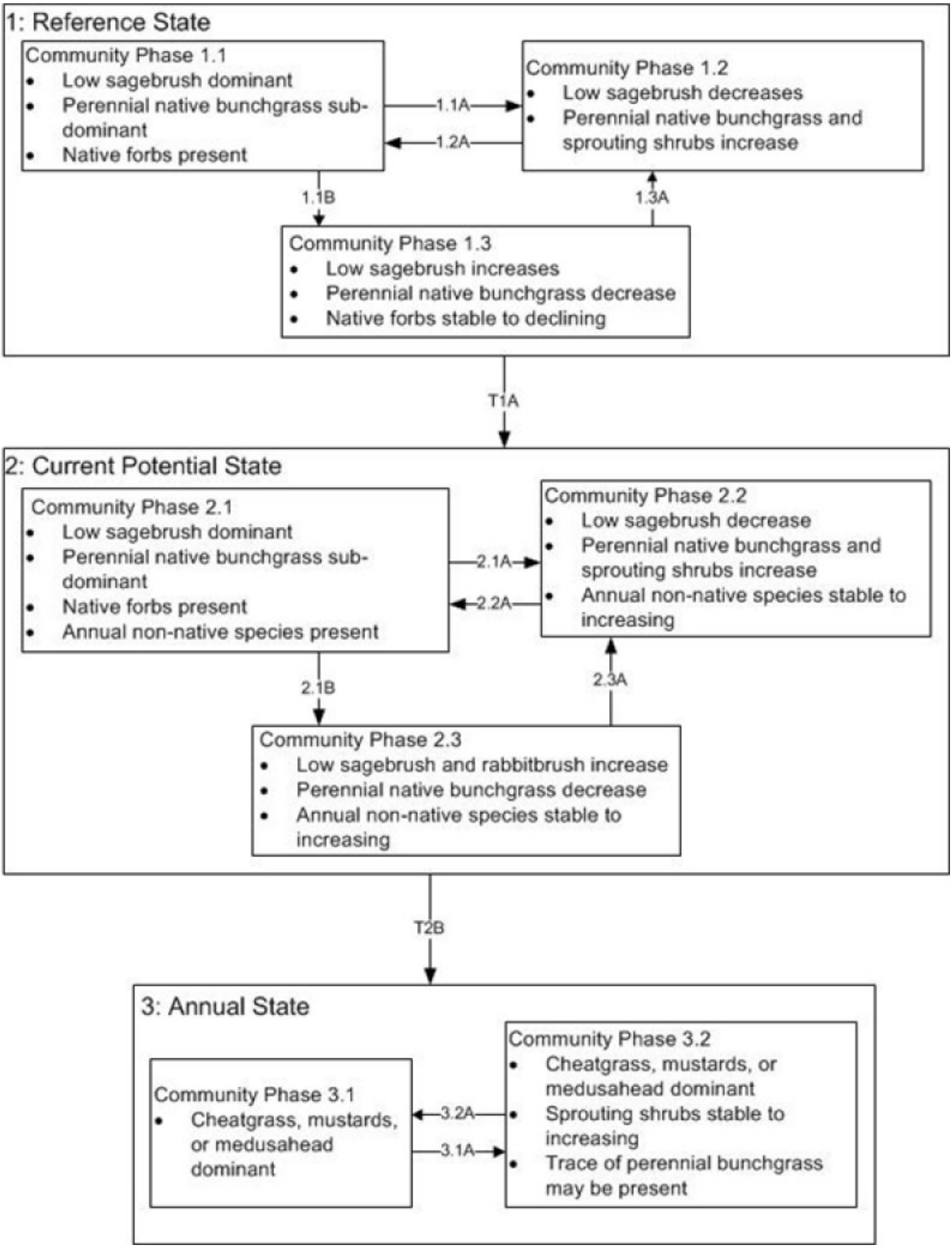

Figure 3. DRAFT STM

State 1: Representative of the reference conditions prior to Euro-American settlement in the west.
1.1A: fire or other disturbance that removes sagebrush canopy
1.1B: absence of disturbance and natural regeneration over time. may be coupled with drought

1.2A: absence of disturbance and natural regeneration over time

1.3A: fire or other disturbance that removes sagebrush canopy

T1A: introduction of non-native species

State 2: Representative of the current potential with the presence of non-native annuals. Non-native annuals have the ability to significantly change disturbance regimes and nutrient cycling dynamics.
2.1A: fire or other disturbance that removes sagebrush canopy
2.1B: absence of disturbance and natural regeneration over time, may be coupled with drought and inadequate rest and recovery from defoliation

2.2A: absence of disturbance and natural regeneration over time

2.3A: fire or other disturbance that removes sagebrush canopy
T3A: reoccurring severe fire

State 3: Dominated by non-native annuals. Changes in disturbance return interval and nutrient cycling dynamics create a positive feedback loop preventing recovery of long-lived native perennials .
3.1A: absence of disturbance and natural regeneration over time
3.2A: fire or other disturbance that removes shrub canopy

Figure 4. DRAFT STM LEGEND

Animal community

Livestock Interpretations:
This site has limited value for livestock grazing, due to the low forage production, steep slopes, and high altitude. Grazing management should be keyed to perennial grass production. 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. Pine needlegrass provides a palatable and nutritious feed for livestock during the spring and early summer. Muttongrass is excellent forage for domestic livestock especially in the early spring. Muttongrass begins growth in late winter and early spring, which makes it available before many other forage plants. Sandberg bluegrass is a palatable species, but its production is closely tied to weather conditions. It produces little forage in drought years, making it a less dependable food source than other perennial bunchgrasses. All classes of livestock species utilize prairie Junegrass. Rapid seasonal development of prairie Junegrass provides good, early-spring forage for livestock. Domestic sheep and to a much lesser degree cattle consume low and fringed sagebrush, particularly during the spring, fall and winter. Douglas' rabbitbrush is tolerant of grazing and may be rejuvenated by

foliage removal. Douglas' rabbitbrush commonly increases on degraded rangelands as more palatable species are removed.

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:
Low and fringed sagebrush are considered valuable browse plant during the spring, fall and winter months. In some areas it is of little value in winter due to heavy snow. Mule deer utilize and sometimes prefer low and fringed sagebrush, particularly in winter and early spring. Douglas' rabbitbrush provides an important source of browse for wildlife, particularly in the late fall and early winter after more palatable species have been depleted. Wild ungulates show varying preference for Douglas' rabbitbrush depending on season, locality, and subspecies. Mature or partially mature plants are generally preferred to green, immature ones. Douglas' rabbitbrush provides important cover for pronghorn fawns. In parts of the Great Basin, plants regrew rapidly after they were nearly completely consumed by spring-browsing black-tailed jackrabbits. 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. Pine needlegrass provides a palatable and nutritious feed for wildlife during the spring and early summer. Deer and elk make heavy use of muttongrass, especially in early spring when other green forage is scarce. Depending upon availability of other nutritious forage, deer may use muttongrass in all seasons. Muttongrass cures well and is an important fall and winter deer food in some areas. Sandberg bluegrass is desirable for pronghorn antelope and mule deer in the spring and preferable in the spring, summer, and fall for elk and desirable as part of their winter range. Prairie Junegrass is also utilized by bighorn sheep, mountain goats, elk, and mule deer in the spring and in fall after curing. Although, due to scattered distribution, prairie Junegrass does not maintain a significant role in the diet of most wildlife species The short stature and scattered distribution of prairie Junegrass provide minimum coverage for larger birds and mammals.

Hydrological functions

Runoff is high to very high. Permeability is moderate to moderately slow.

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

Douglas' rabbitbrush can be a source of rubber and possibly valuable resins.

Other information

Low sagebrush can be successfully transplanted or seeded in restoration. Letterman's needlegrass has been used successfully in revegetating mine spoils. This species also has good potential for erosion control. Prairie Junegrass can recolonize areas that have been subjected to severe water stress. Recolonization by prairie Junegrass provides protective cover to help subsequent post-drought, successional plant species growth.

Inventory data references

NASIS data used for abiotic narratives and tables.

Type locality

Location 1: Nye County, NV	
Township/Range/Section	T1N R49E S2

Latitude	37° 58′ 3″
Longitude	116° 27′ 45″
General legal description	Section 2, T1N. R49E. MDBM. About 5 miles west of Eden Creek Ranch, Kawich Peak, Kawich Range, Nye County, Nevada. This site also occurs in Esmerelda, Mineral and Lincoln Counties, Nevada.

Other references

Fire Effects Information System (Online; http://www.fs.fed.us/database/feis/plants/).

United States Department of Agriculture, Natural Resources Conservation Service. 2022. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture, Agriculture Handbook 296.

USDA-NRCS Plants Database (Online; http://www.plants.usda.gov

Contributors

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Approval

Kendra Moseley, 2/20/2025

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)	PATTI NOVAK-ECHENIQUE
Contact for lead author	State Rangeland Management Specialist.
Date	12/01/1983
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are none. Gravels and cobbles armor the surface.

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2. **Presence of water flow patterns:** Water flow patterns are none to rare. A few can be expected on steeper slopes in areas recently subjected to summer convection storms or rapid spring snow melt. Waterflow 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 usually limited to waterflow paths.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground ± 5-20%. Rock fragments 50 to 75 percent.

5. **Number of gullies and erosion associated with gullies:** Gullies are none.

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

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.

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.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically medium granular. Soil surface colors are dark and soils have a mollic epipedon. Organic matter of the surface 2 to 4 inches is typically 2 to 3 percent dropping off quickly below. Organic matter content can be more or less depending on micro-topography.

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) slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact and provide opportunity for snow catch and accumulation on site.

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. Subangular blocky or subsoil argillic horizons are not to be interpreted as compacted.

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: low shrubs (low sagebrush) > deep-rooted cool season perennial bunchgrasses

    Sub-dominant: associated shrubs > shallow-rooted, cool season, perennial bunchgrasses > deep-rooted, cool season, perennial forbs > fibrous, shallow-rooted, cool season, perennial forbs > annual forbs

    Other: rhizomatous grasses, succulents

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead branches within individual shrubs common and standing dead shrub canopy material may be as much as 20 percent of total woody canopy; some of the mature bunchgrasses (less than 10 percent) have dead centers.

14. **Average percent litter cover (%) and depth (in):** Between plant interspaces (±25 percent) and litter depth is ±¼ inch.

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) ± 250 lbs/ac; Favorable years + 400 lbs/ac and unfavorable years + 100 lbs/ac.

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 include cheatgrass and annual mustards.

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