

## **Ecological site R029XY052NV CLAYPAN 16+ P.Z.**

Last updated: 2/20/2025  
Accessed: 05/21/2025

---

### **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 is 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 Claypan 16+ P.Z site occurs 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.

## Associated sites

R029XY027NV	<b>MAHOGANY THICKET</b> 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.
R029XY043NV	<b>MAHOGANY SAVANNA</b> This site is on mountain summits, crests, and sideslopes. Slopes range from 15 to 50 percent. Elevations are 5,800 to about 10,000 feet. The soils are typically shallow to moderately deep and are well drained. There typically are high amounts of stones or boulders on the soil surface.
R029XY051NV	<b>LOAMY SLOPE 16+ P.Z.</b> This site is 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.

R029XY053NV	<b>MOUNTAIN RIDGE 16+ P.Z.</b> This 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.
-------------	--

## Similar sites

R029XY053NV	<b>MOUNTAIN RIDGE 16+ P.Z.</b> Less productive site
R029XY055NV	<b>CLAYPAN 12-16 P.Z.</b> ACTH7 dominant grass

**Table 1. Dominant plant species**

Tree	Not specified
Shrub	(1) <i>Artemisia arbuscula</i>
Herbaceous	(1) <i>Achnatherum lettermanii</i> (2) <i>Poa fendleriana</i>

## Physiographic features

The Claypan 16+ P.Z site occurs 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.

**Table 2. Representative physiographic features**

Landforms	(1) Mountain (2) Mountain slope
Runoff class	High to very high
Elevation	1,768–3,048 m
Slope	8–50%
Water table depth	183 cm
Aspect	Aspect is not a significant factor

## Climatic features

The climate is subhumid with cold, moist winters and cool, 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 30 to 80 days. There is no climate station available for this site.

Table 3. Representative climatic features

Frost-free period (average)	55 days
Freeze-free period (average)	
Precipitation total (average)	457 mm

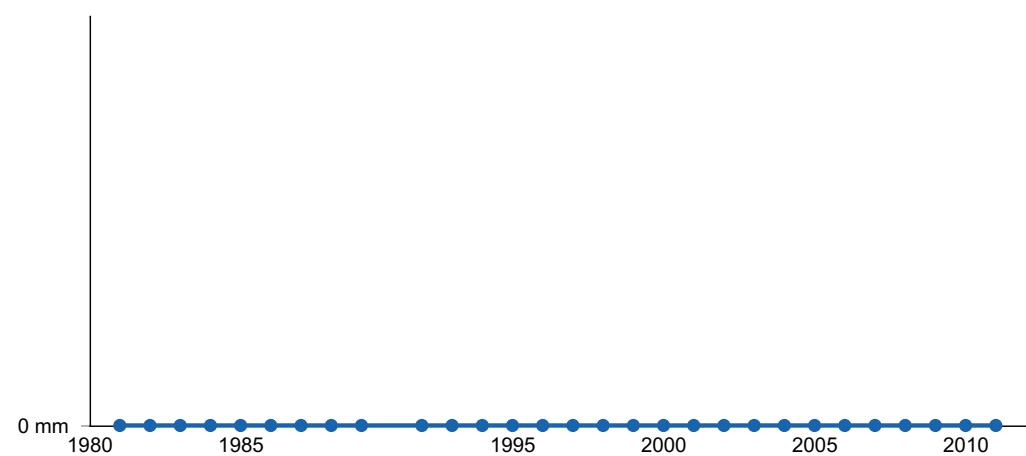


Figure 1. Annual precipitation pattern

Influencing water features

Influencing water features are not associated with this site.

Soil features

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. Water intake rates are slow to moderate and available water holding capacity is low to moderate. Runoff is high to very high and the potential for sheet and rill erosion is moderate. Soil series associated with this site include Layview, Notstew, and Packer.

Table 4. Representative soil features

Parent material	(1) Residuum–volcanic rock (2) Colluvium–volcanic rock
Surface texture	(1) Very gravelly loam (2) Very gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderate

Soil depth	25–152 cm
Surface fragment cover <=3"	28–48%
Surface fragment cover >3"	5–20%
Available water capacity (0-101.6cm)	3.05–9.14 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)	6.6–7.8
Subsurface fragment volume <=3" (Depth not specified)	21–42%
Subsurface fragment volume >3" (Depth not specified)	5–36%

## Ecological dynamics

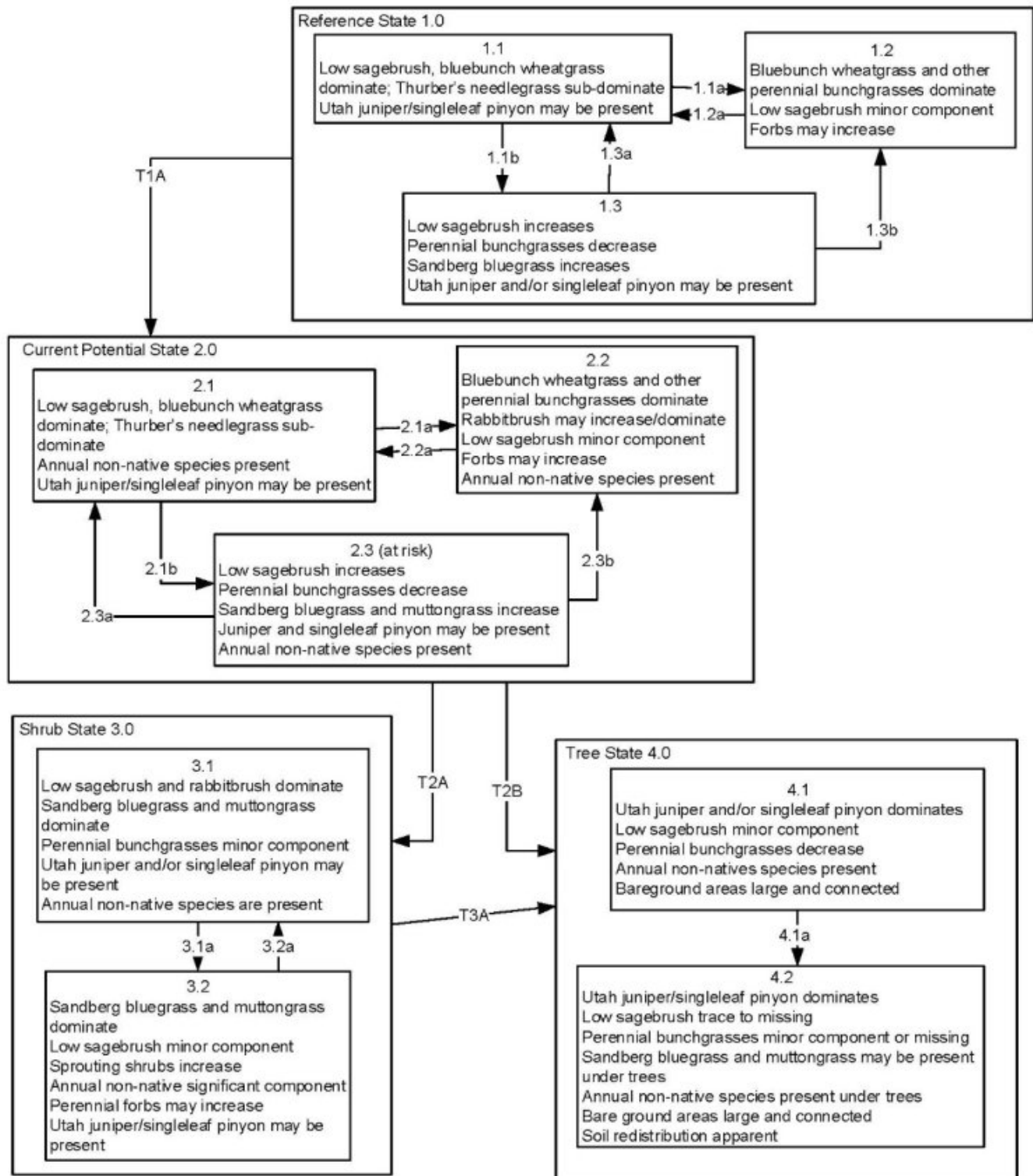
Where management results in abusive grazing use by livestock and/or feral horses, Letterman's needlegrass and other palatable grasses and forbs decrease, while rabbitbrush, snowberry, low sagebrush, and Sandberg's bluegrass increase. Species likely to invade this site are annual mustards, cheatgrass, Russian thistle and halogeton.

### Fire Ecology

Prior to 1897, mean fire return intervals for low sagebrush have been estimated to be from 90 to 138 years. Fire most often occurs during wet years with high forage production. Low sagebrush is very susceptible to fire damage. Low 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 sagebrush subspecies. Partially injured low sagebrush may re-grow from living branches, but sprouting does not occur. 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. Muttongrass is unharmed to slightly harmed by light-severity fall fire. Muttongrass appears to be harmed by and slow to recover from severe fire. 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. Prairie Junegrass is reported as showing little or no damage to moderate damage from fire. The small stature of prairie 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.

## State and transition model





#### Reference State 1.0 Community Phase Pathways

- 1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community, dominated by grasses and forbs.
- 1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
- 1.2a: Time and lack of disturbance allows for shrub regeneration.
- 1.3a: Low severity fire results in a mosaic pattern.
- 1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.

Transition T1A: Introduction of non-native species such as bulbous bluegrass, cheatgrass and thistles.

#### Current Potential State 2.0 Community Phase Pathways

- 2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community dominated by grasses and forbs; non-native annual species present
- 2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
- 2.2a: Time and lack of disturbance allows for regeneration of sagebrush
- 2.3a: Low severity fire creates sagebrush/grass mosaic. Brush management with minimal soil disturbance; late-fall/winter grazing causing mechanical damage to sagebrush.
- 2.3b: High severity fire significantly reduces sagebrush cover leading to early mid-seral community

Transition T2A: Time and lack of disturbance may be coupled with inappropriate grazing management (3.1), fire (3.2)

Transition T2B: Time and lack of disturbance allows for maturation of tree community

#### Shrub State 3.0 Community Phase Pathways

- 3.1a: Fire, inappropriate grazing, and/or brush management with minimal soil disturbance
- 3.2a: Time and lack of disturbance and/or grazing management that favors shrubs. This is a slow transition, the establishment of low sagebrush can take many years.

Transition T3A: Time and lack of disturbance or management action

#### Tree State 4.0 Community Phase Pathways

- 4.1a: Time and lack of disturbance allows for maturation of tree community

Transition T4A: Inappropriate tree removal practices and/or catastrophic fire

## **Animal community**

Livestock Interpretations:



This site is suited to livestock grazing. 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. 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. Pine needlegrass provides a palatable and nutritious feed for livestock during the spring and early summer. 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 sagebrush, particularly during the spring, fall and winter.

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 sagebrush is considered a valuable browse plant during the spring, fall and winter months. In some areas it is of little value in winter due to heavy snow. Sagebrush-grassland communities provide critical sage-grouse breeding and nesting habitats. Open Wyoming sagebrush communities are preferred nesting habitat. Meadows surrounded by sagebrush may be used as feeding and strutting grounds. Sagebrush is a crucial component of their diet year-round, and sage-grouse select sagebrush almost exclusively for cover. Lekks are often located on low sagebrush sites, grassy openings, dry meadows, ridgetops, and disturbed sites. Sage-grouse prefer mountain big sagebrush and Wyoming big sagebrush communities to basin big sagebrush communities. Mule deer utilize and sometimes prefer low sagebrush, particularly in winter and early spring. 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. 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. Pine needlegrass provides a palatable and nutritious feed for wildlife during the spring and early summer. 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

Rills and water flow patterns are rare, but a few can be expected on steeper slopes in areas subjected to summer convection storms or rapid spring snowmelt, usually on steeper slopes. Pedestals are rare. Occurrence is usually limited to areas of water flow patterns. Frost heaving of shallow rooted plants should not be considered an indicator of

soil erosion. Gullies are rare in areas of this site that occur on stable landforms. Where this site occurs on inset fans, gullies and head cuts associated with ephemeral channel entrenchment are rare to common. Gullies and head cuts should be healing or stable. Fine litter (foliage from grasses and annual & perennial forbs) is expected to move the distance of slope length during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during catastrophic events. Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., muttongrass]) slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact and provide opportunity for snow catch and accumulation on site.

## Recreational uses

Aesthetic value is derived from the diverse floral and faunal composition 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 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 used to populate abiotic table and narratives.

## Type locality

Location 1: Nye County, NV	
Township/Range/Section	T2N R49E S23
General legal description	About 3 miles south of Bellehelen Ranch, north Kawich Peak, Kawich Range, Nye County, 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.

## Contributors

HA  
TK Stringham

## 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)	GK BRACKLEY
Contact for lead author	State Rangeland Management Specialist
Date	02/21/2007
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:** Rills are rare. A few rills can be expected on steeper slopes in areas subjected to summer convection storms or rapid spring snowmelt.

- 
2. **Presence of water flow patterns:** Water flow patterns are rare but can be expected in areas recently subjected to summer convection storms or rapid snowmelt, usually on steeper slopes.
-

3. **Number and height of erosional pedestals or terracettes:** Pedestals are rare. Occurrence is usually limited to areas of water flow patterns. Frost heaving of shallow rooted plants should not be considered an indicator of soil erosion.
- 

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground  $\pm$  40 percent; surface cover of rock fragments variable but often more than 35 percent; shrub canopy 25 to 35 percent; foliar cover of perennial herbaceous plants  $\pm$  40 percent.
- 

5. **Number of gullies and erosion associated with gullies:** Gullies are rare in areas of this site that occur on stable landforms. Where this site occurs on inset fans, gullies and head cuts associated with ephemeral channel entrenchment are rare to common. Gullies and head cuts should be healing or stable.
- 

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

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 3 to 6 on most soil textures found on this site. (To be field tested.)
- 

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically thin to thick platy, subangular blocky or massive. Soil surface colors are dark and soils are typified by a mollic epipedon. Organic carbon of the surface 2 to 4 inches is typically 1.25 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 [i.e., muttongrass]) 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 not typical. Platy or massive sub-surface horizons, subsoil argillic horizons or hardpans shallow to the surface 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: Reference Plant Community: Deep-rooted, cool season, perennial bunchgrasses >> low shrubs (low sagebrush). (By above ground production)

Sub-dominant: deep-rooted, cool season, perennial forbs > shallow-rooted, cool season, perennial bunchgrasses > associated shrubs > fibrous, shallow-rooted, cool season, perennial forbs = annual forbs. (By above ground production)

Other:

Additional:

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead branches within individual shrubs are common and standing dead shrub canopy material may be as much as 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 ( $\pm 25$  percent) and litter depth is  $\pm \frac{1}{4}$  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)  $\pm 450$  lbs/ac; Spring moisture significantly affects total 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: Cheatgrass is an invader on this site. Rabbitbrush and snowberry are increasers on this site.
- 

17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season years.
-