

Ecological site R029XY015NV SHALLOW CALCAREOUS HILL 8-10 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 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 Shallow Calcareous Hill 8-10 P.Z. site occurs on summits and backslopes of mountains and low hills. Slopes range from 2 to over 50 percent, but slope gradients of 8 to 50 percent are typical. Elevations are 4600 to about 7000 feet. The soils are very shallow and have been derived from volcanic sources. These soils are calcareous with slight to violent effervescence in all parts.

Associated sites

R029XY010NV	<p>LOAMY SLOPE 8-10 P.Z.</p> <p>This site occurs on piedmont slopes, rock pediments, hills, and lower mountain sideslopes on all exposures. Slopes range from 4 to 75 percent, but slope gradients of 15 to 50 percent are typical. Elevations are 4400 to about 8200 feet. The soils are very shallow to moderately deep and are derived from a variety of parent materials. The surface may be stony, cobbly or gravelly.</p>
R029XY014NV	<p>SHALLOW CALCAREOUS SLOPE 8-12 P.Z.</p> <p>This site occurs on summits and backslopes of hills and mountains, fan remnants, and rock pediments. Slopes range from 2 to over 75 percent, but slope gradients of 15 to 50 percent are typical. Elevations are 4300 to about 8800 feet. The soils on this site are calcareous or carbonatic and have a shallow effective rooting zone with depth to a hardpan or bedrock ranging from 5 to 20 inches. The soils have high amounts of gravels throughout the soil profile and are well drained to moderately well drained. The soil surface typically has a cover of 75 percent or more rock fragments.</p>
F029XY071NV	<p>Shallow Rocky Loam 10-12" P.Z</p> <p>is found on shallow soils on mountains and hills at greater than 15 percent slopes. The dominant vegetation is typically Utah juniper (<i>Juniperus osteosperma</i>), black sagebrush (<i>Artemisia nova</i>), and Indian ricegrass (<i>Achnatherum hymenoides</i>). The Shallow Rocky Loam 10-12" P.Z. was previously known as JUOS WSG 0D0404 10 to 12.</p>
R029XY008NV	<p>SHALLOW CALCAREOUS LOAM 8-12 P.Z.</p> <p>This site occurs on fan remnants, inset fans, and mountains on all exposures. Slopes range from 0 to 75 percent, but slope gradients of 4 to 30 percent are most typical. Elevations are 4200 to 8000 feet. The soils associated with this site are very shallow to very deep or they have a restrictive layer within the main rooting depth. These soils are moderately to strongly calcareous and soil reaction increases with soil depth. Some soils will accumulate variable concentrations of salts and sodium in their lower substratum.</p>
R029XY081NV	<p>SHALLOW CALCAREOUS HILL 10-14 P.Z.</p> <p>This site occurs on summits and sideslopes of hills, mountains, fan remnants, and rock pediments on all aspects. Slopes range from 4 to 75 percent, but slope gradients of 15 to 50 are typical. Elevations are 4400 to about 8800 feet. The soils are very shallow to shallow to bedrock or duripan and well drained.</p>

Similar sites

R029XY028NV	<p>SHALLOW CALCAREOUS SLOPE 12-14 P.Z.</p> <p>PSSPI dominant grass</p>
R029XY081NV	<p>SHALLOW CALCAREOUS HILL 10-14 P.Z.</p> <p>More productive site; PUST and JUOS major species</p>
R029XY099NV	<p>STONY CALCAREOUS HILL</p> <p>BEFR important shrub</p>
R029XY014NV	<p>SHALLOW CALCAREOUS SLOPE 8-12 P.Z.</p> <p>PUST and JUOS minor species, if present</p>
R029XY045NV	<p>STONY CALCAREOUS SLOPE 8-12 P.Z.</p> <p>More productive site</p>
R029XY008NV	<p>SHALLOW CALCAREOUS LOAM 8-12 P.Z.</p> <p>More productive site</p>

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Purshia stansburiana</i> (2) <i>Artemisia nova</i>
Herbaceous	(1) <i>Achnatherum hymenoides</i>

Physiographic features

The Shallow Calcareous Hill 8-10 P.Z. site occurs on summits and backslopes of mountains and low hills. Slopes range from 2 to over 50 percent, but slope gradients of 8 to 50 percent are typical. Elevations are 4600 to about

7000 feet.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mountain (3) Pediment
Runoff class	Very high
Elevation	4,600–7,000 ft
Slope	2–50%
Water table depth	72 in
Aspect	Aspect is not a significant factor

Climatic features

The climate is semiarid, characterized by cold, moist winters and warm, somewhat dry summers. Average annual precipitation is 5 to 8 inches. Mean annual air temperature is 52 to 58 degrees F. The average growing season is about 140 to 200 days. No climate station is available.

Table 3. Representative climatic features

Frost-free period (average)	200 days
Freeze-free period (average)	
Precipitation total (average)	8 in

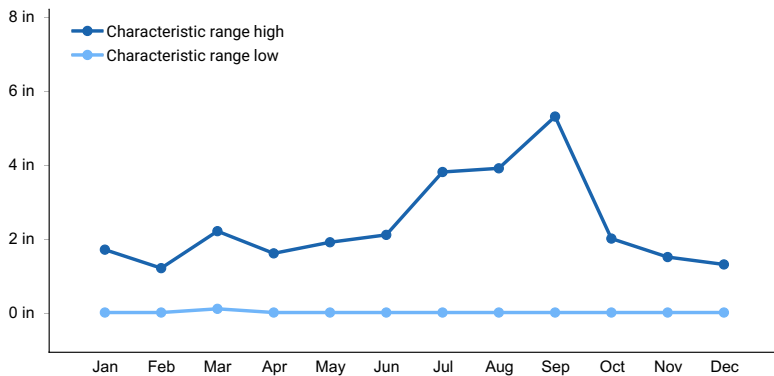


Figure 1. Monthly precipitation range

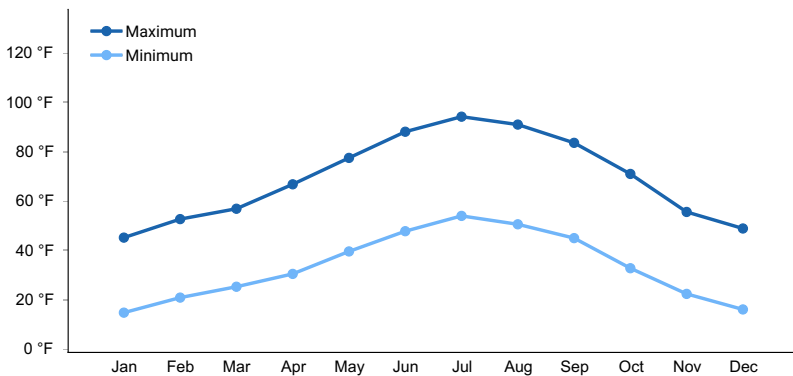


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils are very shallow and have been derived from volcanic sources. These soils are calcareous with slight to violent effervescence in all parts. The soils are well drained and have slow to moderately rapid permeability. Available water capacity is very low. Runoff is high to very high and the potential for sheet and rill erosion is high. Soil series associated with this site include: Acana, Chubard, Lomoine and Stewwal.

Table 4. Representative soil features

Parent material	(1) Residuum–granite (2) Residuum–welded tuff (3) Colluvium–granite (4) Colluvium–welded tuff
Surface texture	(1) Very gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Slow to moderately rapid
Soil depth	4–14 in
Surface fragment cover <=3"	0–54%
Surface fragment cover >3"	0–57%
Available water capacity (0-40in)	0.3–1 in
Calcium carbonate equivalent (0-40in)	0–35%
Electrical conductivity (0-40in)	0–8 mmhos/cm
Sodium adsorption ratio (0-40in)	0–6
Soil reaction (1:1 water) (0-40in)	6.6–9
Subsurface fragment volume <=3" (Depth not specified)	4–54%
Subsurface fragment volume >3" (Depth not specified)	5–57%

Ecological dynamics

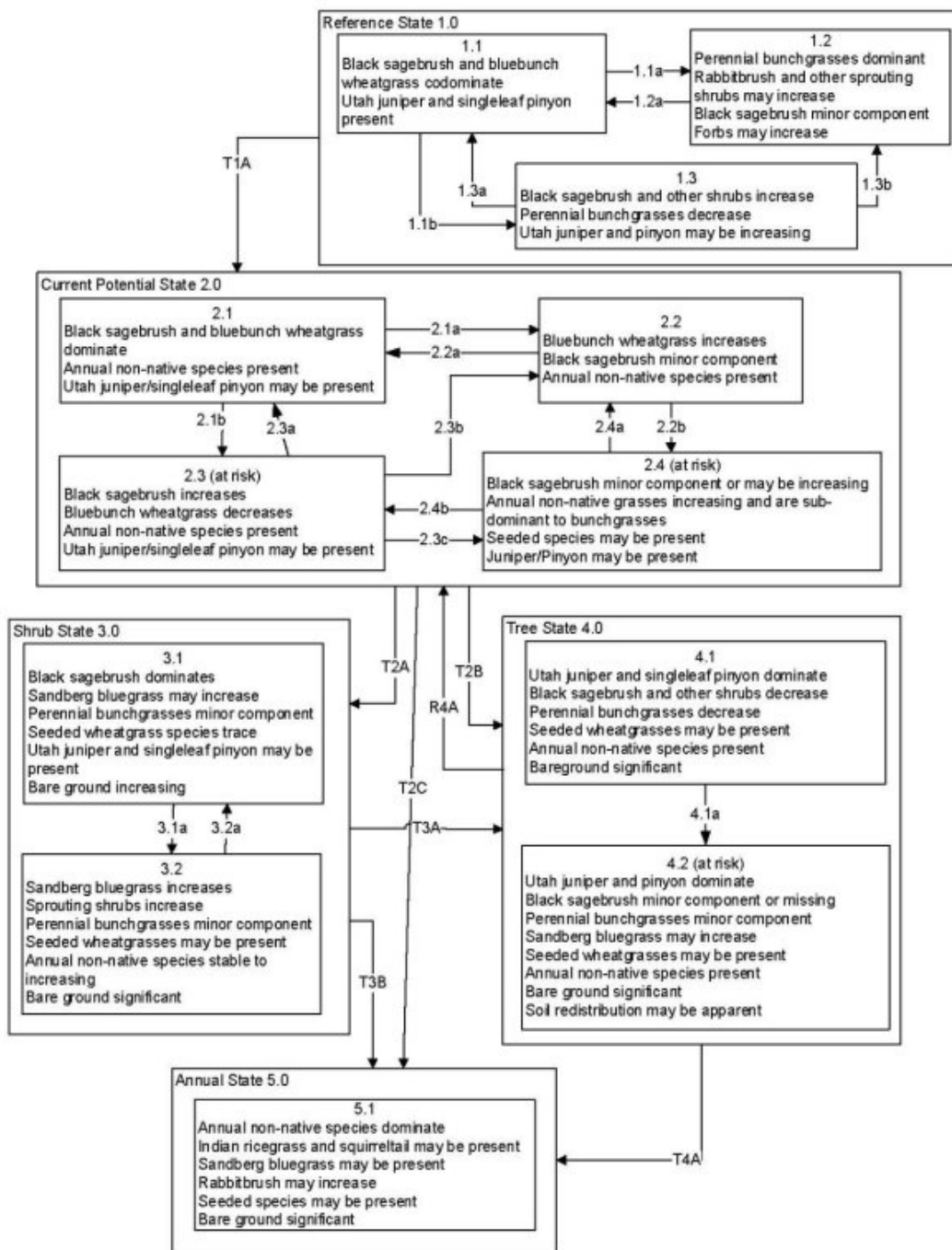
Where abusive management results in abusive use by cattle, herbaceous species decrease as black sagebrush and rabbitbrush increase. With excessive use by sheep, black sagebrush and palatable forbs decrease as rabbitbrush increases. Rabbitbrush, snakeweed and cheatgrass are often dominant after fire, particularly where fire occurs on this site in lower ecological condition. Species likely to invade this site are annuals such as cheatgrass. Utah juniper occurs throughout the site and typically provides less than 8 percent total canopy cover.

Fire Ecology:

The fire return interval where Stansbury cliffrose occurs prior to the invasion of exotic weeds was 30 to 70 years; after the invasion of cheatgrass the fire return interval is about 5.5 years. Fire effects on Stansbury cliffrose are variable. Fire may kill or severely damage plants. Late-season fire also increases the risk of mortality. Stansbury cliffrose is a weak sprouter that is generally killed by severe fire. Black sagebrush is highly susceptible to fire-caused mortality; plants are readily killed by all fire intensities. Following burning, reestablishment occurs through off-site sources. Ephedra generally sprouts after fire damages aboveground vegetation. Underground regenerative structures commonly survive when aboveground vegetation is consumed by fire. However, severe fires may kill shallowly buried regenerative structures. Indian ricegrass can be killed by fire, depending on severity and season of burn. Indian ricegrass reestablishes on burned sites through seed dispersed from adjacent unburned areas. Galleta

is a rhizomatous perennial which can resprout after top-kill by fire. Needle and thread is top-killed by fire. It may be killed if the aboveground stems are completely consumed. Needle and thread is classified as slightly to severely damaged by fire. Needle and thread sprouts from the caudex following fire, if heat has not been sufficient to kill underground parts. Recovery usually takes 2 to 10 years.

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 would also reduce perennial understory.

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

1.3a: Low severity fire resulting in a mosaic pattern, fall/winter herbivory may cause mechanical damage to shrubs and reduce shrub density.

1.3b: High severity fire significantly reduces sagebrush cover and leads to early/mid-seral community, dominated by grasses and forbs.

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 fire or drought. Inappropriate grazing management may also reduce perennial understory.

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

2.2b: Late spring moisture that favors the germination and production of non-native, annual grasses. Pathway typically occurs 3 to 5 years post-fire and may be a transitory plant community.

2.3a: Low severity fire resulting in a mosaic pattern. Brush management with minimal soil disturbance; late-fall/winter grazing causing mechanical damage to sagebrush.

2.3b: High severity fire significantly reduces sagebrush cover and leads to early/mid-seral community dominated by grasses and forbs; non-native annual species present.

2.3c: Late spring moisture that favors the germination and production of non-native annual grasses.

2.4a: Moisture pattern unfavorable to non-native annual grasses.

2.4b: Moisture pattern unfavorable to non-native annual grasses.

Transition T2A: Inappropriate grazing management (3.1). Fire or brush treatment; may be coupled with inappropriate grazing management (3.2).

Transition T2B: Time and lack of disturbance allows for maturation of trees, may be coupled with inappropriate grazing management (4.1).

Transition T2C: High severity fire, failed seeding

Shrub State 3.0 Community Phase Pathways

3.1a: Fire or brush management (i.e. mowing) with minimal soil disturbance.

3.2a: Time and lack of disturbance.

Transition T3A: Time and lack of disturbance allows for tree maturation; may be coupled with inappropriate grazing management (4.1).

Transition T3B: Catastrophic fire and/or soil disturbing treatments (5.1).

Tree State 4.0 Community Phase Pathways

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

Transition T4A: Catastrophic fire and/or inappropriate tree removal practices (5.1)

Restoration R4A: Tree removal with minimal soil disturbance and seeding of desired species.

Animal community

Livestock Interpretations:

This site is suited to livestock grazing. Grazing management should be keyed to perennial grass production. Indian ricegrass is highly palatable to all classes of livestock in both green and cured condition. It supplies a source of

green feed before most other native grasses have produced much new growth. When actively growing, galleta provides good to excellent forage for cattle and horses and fair forage for domestic sheep. Although not preferred, all classes of livestock may use galleta when it is dry. Domestic sheep show greater use in winter than summer months and typically feed upon central portions of galleta tufts, leaving coarser growth around the edges. Galleta may prove somewhat coarse to domestic sheep. Needle and thread provides highly palatable forage, especially in the spring before fruits have developed. Needlegrasses are grazed in the fall only if the fruits are softened by rain. Stansbury cliffrose is an important browse species for livestock, especially in the winter. In winter, at lower elevations, black sagebrush is heavily utilized by domestic sheep. Ephedra is important winter range browse for domestic cattle, sheep and goats.

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:

Stansbury cliffrose is an important browse species for mule deer, pronghorn, game birds, and songbirds. Wild ungulates use it heavily in winter. Black sagebrush is a significant browse species within the Intermountain region. It is especially important on low elevation winter ranges in the southern Great Basin, where extended snow free periods allow animal's access to plants throughout most of the winter. In these areas it is heavily utilized by pronghorn and mule deer. 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. Mule deer, bighorn sheep, and pronghorn browse ephedra, especially in spring and late summer when new growth is available. Indian ricegrass is an important forage species for several wildlife species. Galleta provides moderately palatable forage when actively growing and relatively unpalatable forage during dormant periods. Galleta provides poor cover for most wildlife species. Needle and thread is moderately important spring forage for mule deer, but use declines considerably as more preferred forages become available.

Hydrological functions

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

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

Triterpenoids extracted from Stansbury cliffrose have been shown to have inhibitory effects on HIV and Epstein-Barr virus.

Native Americans used the inner bark for making clothing and ropes, and the branches for making arrows. Native Americans used Nevada ephedra as a tea to treat stomach and kidney ailments. Indian ricegrass was traditionally eaten by some Native American peoples. The Paiutes used seed as a reserve food source.

Other information

Black sagebrush is an excellent species to establish on sites where management objectives include restoration or improvement of domestic sheep, pronghorn, or mule deer winter range. Stansbury cliffrose is recommended for wildlife, roadside, construction, and mine spoils plantings; and for restoring pinyon-juniper woodland, mountain brushland, basin big sagebrush grassland, black sagebrush, and black greasewood communities. It can be established on disturbed seedbeds by broadcast seeding, drill seeding, or transplanting. Fall or winter seeding is recommended. Ephedra is useful for erosion control, and seedlings have been successfully planted onto reclaimed strip mines, with survival ranging from 12 to 94 percent. Atrazine may be effective in controlling ephedra, though some plants can survive through crown sprouting. Irrigation may increase control by atrazine. Indian ricegrass is well-suited for surface erosion control and desert revegetation although it is not highly effective in controlling sand movement. Needle and thread is useful for stabilizing eroded or degraded sites.

Inventory data references

NASIS soil component data.

Type locality

Location 1: Nye County, NV	
Township/Range/Section	T2S R54E S7
General legal description	Quinn Canyon Range north of Queen City Summit, Nye County, Nevada. This site also occurs in Lincoln County, Nevada.

Other references

Fire Effect 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)	
Contact for lead author	
Date	02/24/2025
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:**
