USDA Natural Resources Conservation Service

Ecological site R043CY810OR
Open Canyon Slopes and Fans (PSSPS-SPCR)

Last updated: 9/08/2023
Accessed: 05/19/2024

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 043C–Blue and Seven Devils Mountains

This MLRA covers the Blue and Seven Devils Mountains of Oregon, Washington and Idaho. The area is characterized by thrust and block-faulted mountains and deep canyons composed of sedimentary, metasedimentary, and volcanic rocks. Elevations range from 1,300 to 9,800 feet (395 to 2,990 meters). The climate is characterized by cold, wet winters and cool, dry summers. Annual precipitation, mostly in the form of snow, averages 12 to 43 inches (305 to 1,090 millimeters) yet ranges as high as 82 inches (2,085 millimeters) at upper elevations. Soil temperature regimes are predominately Frigid to Cryic and soil moisture regimes are predominately Xeric to Udic. Mollisols and Andisols are the dominant soil orders. Ecologically, forests dominate but shrub and grass communities may occur on south aspects and lower elevations as well as in alpine meadow environments. Forest composition follows moisture, temperature and elevational gradients and typically ranges from ponderosa pine and Douglas-fir plant associations at lower elevations, grand fir at middle elevations and subalpine fir and Engelman spruce at upper elevations. Historical fire regimes associated with these forest types range from frequent surface fires in ponderosa pine - Douglas Fir forest types to mixed and stand replacing fire regimes in grand fir and subalpine fir types. A large percentage of the MLRA is federally owned and managed by the U.S. Forest Service for multiple uses.

Classification relationships

Plant Assoc. of Wallowa-Snake Province (R6 E 255-86)
bluebunch wheatgrass-sand dropseed-red three awn plant - GB1911

USDA Forest Service Ecological Sub-region
M332 “Blue Mountains”

U.S. National Vegetation Classification Standard (NVCS)
Group: G311. Intermountain Semi-Desert Grassland
Alliance: A3976. Pseudoroegneria spicata - Opuntia polyacantha Dry Canyon Slope Grassland Alliance
Association: CEGL001589. Aristida purpurea var. longiseta - Pseudoroegneria spicata - Sporobolus cryptandrus Grassland

Ecological site concept

This ecological site represents large areas of terraces, alluvial fans, and benches in lower elevation canyons. The historical reference community for most of these sites would be a community dominated by bluebunch wheatgrass (Pseudoroegneria spicata), Sandberg bluegrass (Poa secunda), and other dry site perennial forbs. Sand dropseed (Sporabolous cryptandrus) and red three awn (Aristida purpurea) increase with grazing. Other associated plants common to this mid seral community are annual fescues (Vulpia myuros, Vulpia microstachys), common yarrow (Achillea millefolium), shaggy fleabane (Erigeron pumilus), and woolly plantain (Plantago patagonica). Soil temperature regimes are typically mesic and soil moisture regimes are aridic or xeric bordering on aridic.

This is a provisional ecological site that groups characteristics at a broad scale with little to no field verification and is subject to extensive review and revision before final approval. All data herein was developed using existing information and literature and should be considered provisional and contingent upon field validation prior to use in conservation planning.

Associated sites

R043CY809OR	**Warm Foothills and Mountains (PSSPS-POSE)** Cooler, higher elevation

Similar sites

R043CY809OR	**Warm Foothills and Mountains (PSSPS-POSE)** Cooler, higher elevation

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Pseudoroegneria spicata* (2) *Sporobolus cryptandrus*

Physiographic features

This site occurs on terraces, alluvial fans, and benches in lower elevation canyons. This site occurs on all aspects with slopes typically ranging from 0 to 30%. Elevations range from 1,200 to 3,000 feet (365 – 900 meters). This site does not experience ponding or flooding and no water table is present within the upper two meters of soil.

Table 2. Representative physiographic features

Landforms	(1) Mountain valleys or canyons > Bench (2) Mountain valleys or canyons > Alluvial fan (3) Mountain valleys or canyons > Terrace
Flooding frequency	None
Ponding frequency	None
Elevation	366–914 m
Slope	0–30%
Ponding depth	0 cm
Water table depth	254 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

The annual precipitation ranges from 10 to 15 inches (255 to 380 mm). Limited deep seasonal subsurface flows augment the precipitation. The precipitation occurs as rain and snow during the months of November through March. Localized, occasionally severe, convection storms occur during the summer. The mean annual air temperature is approximately 50 degrees F (10 degrees C). Extreme temperatures range from 100 to -20 degrees F (38 to -29 degrees C). Soil temperature regimes are mesic. The frost-free period ranges from 90 to 140 days. The period of optimum plant growth is from April through mid-July. Climate graphs are populated from the closest available weather stations and are included to represent general trends rather than representative values.

Table 3. Representative climatic features

Frost-free period (characteristic range)	90-140 days

Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	254-381 mm
Frost-free period (average)	120 days
Freeze-free period (average)	
Precipitation total (average)	305 mm

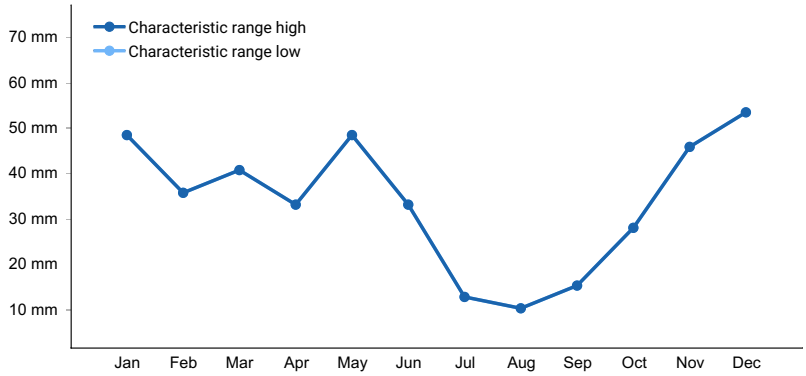


Figure 1. Monthly precipitation range

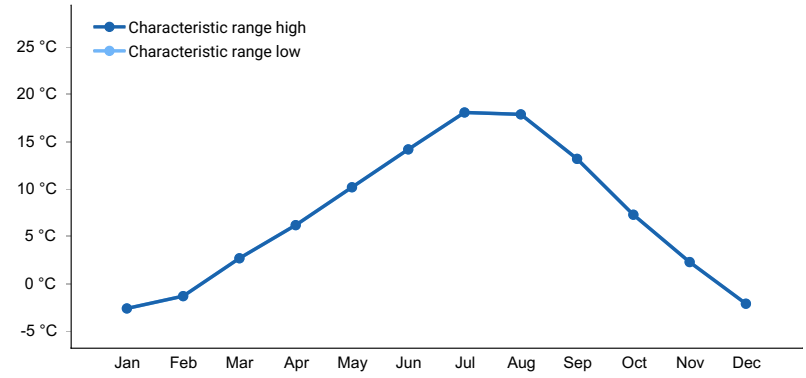


Figure 2. Monthly minimum temperature range

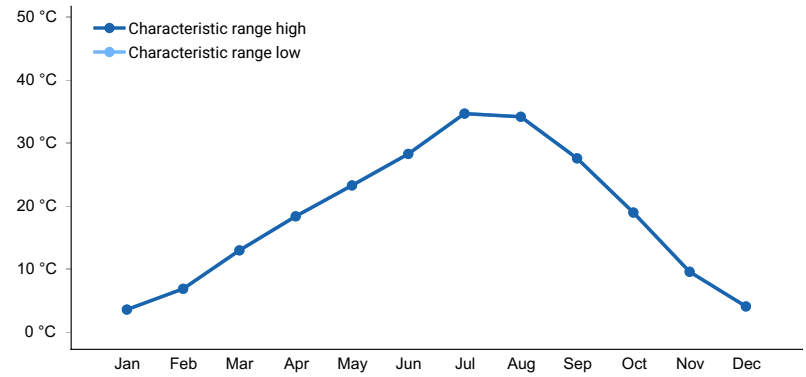


Figure 3. Monthly maximum temperature range

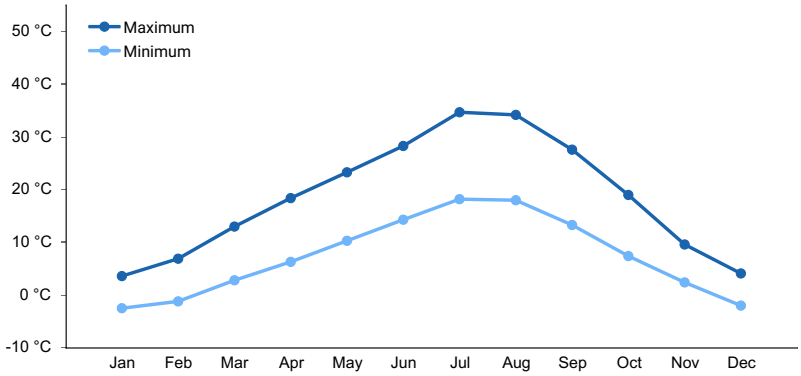


Figure 4. Monthly average minimum and maximum temperature

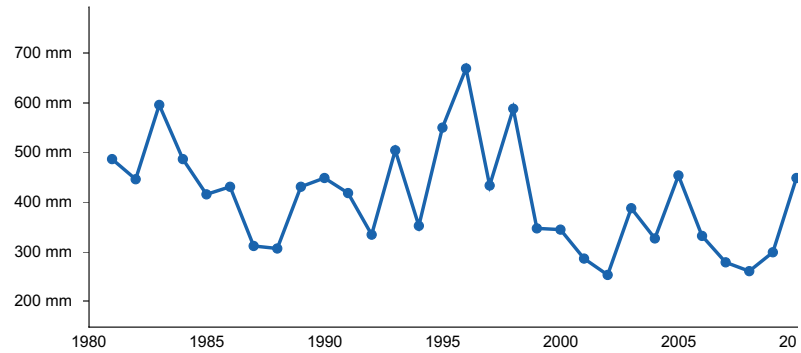


Figure 5. Annual precipitation pattern

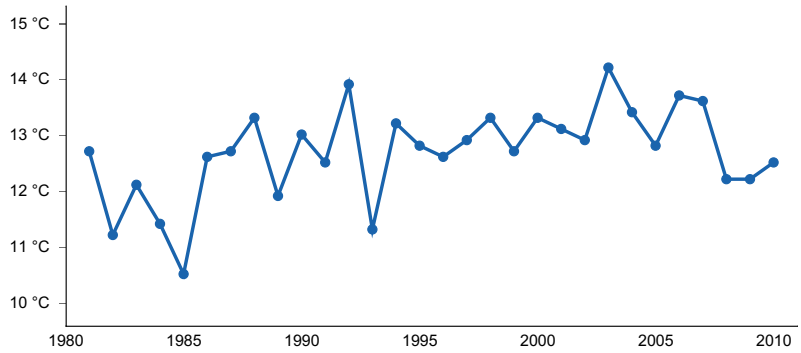


Figure 6. Annual average temperature pattern

Climate stations used

- (1) BROWNLEE DAM [USC00101180], Halfway, ID

Influencing water features

This site is not influenced by water from a wetland or stream.

Soil features

The soils of this site are formed in deep alluvium, colluvium and loess. They are deep to very deep. Typically, the surface texture is a ashy loam, ashy silt loam or gravelly loam over a loamy to cobbly clay loam subsoil. Stoniness is variable. Soil permeability is moderate to moderately slow. Localized, deep, seasonal subsurface flows augment the available water. The erosion potential is moderate. See Phys, Doublecreek, and Collegecreek for modal series concepts.

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Colluvium–volcanic rock (3) Loess
Surface texture	(1) Ashy loam (2) Ashy silt loam (3) Gravelly loam
Family particle size	(1) Ashy over loamy (2) Coarse-loamy (3) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderate to moderately slow
Depth to restrictive layer	152–203 cm
Soil depth	152–203 cm
Surface fragment cover <=3"	0–45%
Surface fragment cover >3"	0–45%
Available water capacity (0-101.6cm)	10.16–22.35 cm
Soil reaction (1:1 water) (0-101.6cm)	6.2–8
Subsurface fragment volume <=3" (10.2-152.4cm)	5–35%
Subsurface fragment volume >3" (10.2-152.4cm)	0–30%

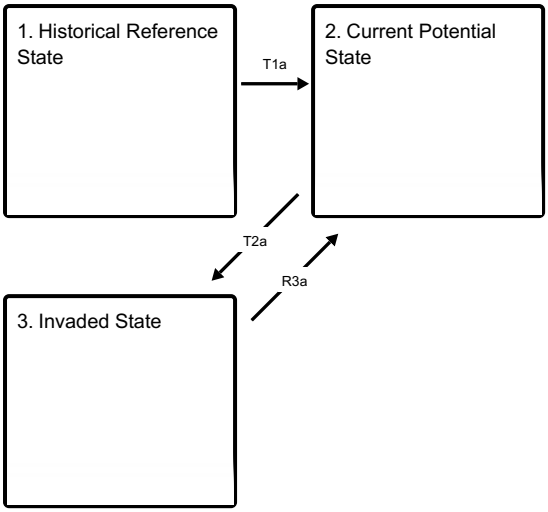
Ecological dynamics

Range in Characteristics:
Variability in plant composition and yield is dependent on soil depth and the extent of lateral subsurface water flow. Netleaf Hackberry increases on alluvial fans, riparian fringes and along seeps, with availability of localized subsurface flows. Bluebunch wheatgrass increases in drier areas. Sand dropseed is more prevalent on sandier soils and on disturbed sites.

Response to Disturbance:
If the condition of the site deteriorates as a result of improperly managed grazing, bluebunch wheatgrass decreases along with other palatable understory grasses and forbs. Sand dropseed increases along with lesser amounts of red three awn. Cheatgrass (*Bromus tectorum*), Japanese brome (Bromus japonicus) and annual fescues invade along with marestail (*Conyza canadensis*) and a variety of other unpalatable forbs. Hackberry reproduction becomes limited. Minor amounts of rhizomatous shrubs, sumac (*Rhus glabra*) and western poison ivy (*Toxicodendron rydbergii*), continue to increase slowly. With further deterioration, areas of bare ground increases, forage production decreases and soil erosion accelerates. Much of the range of site has been heavily impacted by grazing, flooded by dam construction or altered by agricultural production. As a site susceptible to fire, the amount of netleaf hackberry is influenced by fire frequency. It typically resprouts and persists under light fuel burns. Higher mortality occurs in dense stands with heavy fuel loads. Hackberry is a slow-growing species averaging 13 feet in 50 years. Recruitment rates are typically low. Sand dropseed is generally killed by fire but its seed may remain viable for reestablishment afterwards. Bluebunch wheatgrass is resistant to fire with protected growing points and often recovers quickly following fire. Cheatgrass will often increase on this site following fire.

State and transition model

Ecosystem states

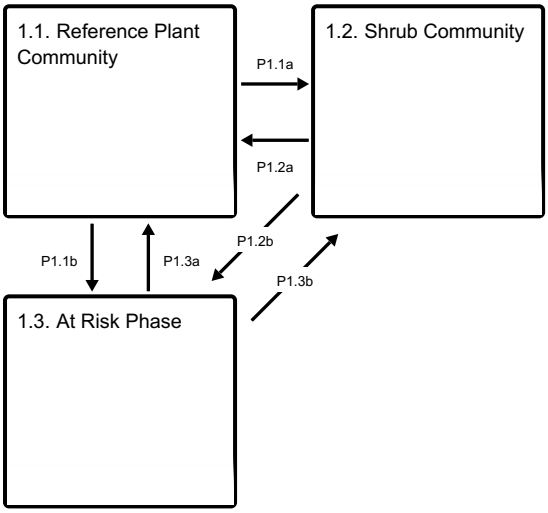


T1a - Introduction of non-native species

T2a - Severe or continuous disturbance in the presence of non-native annual species

R3a - Seeding with native perennial bunchgrasses (or non-native perennial grasses in some cases); mechanical, biological or chemical treatment of exotic species; and/or alteration of grazing management.

State 1 submodel, plant communities



P1.1a - Time without fire

P1.1b - Extended drought in combination with disturbance

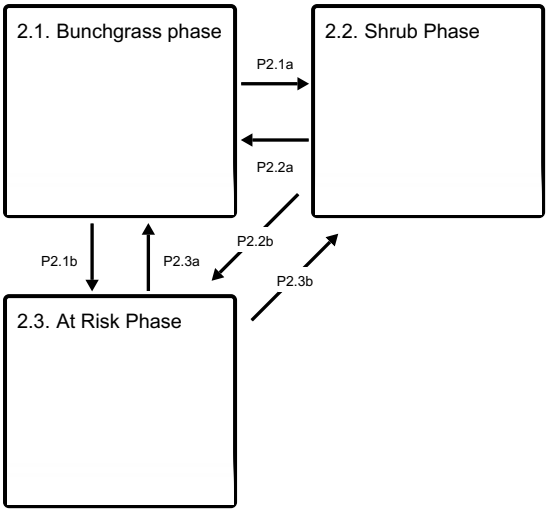
P1.2a - Fire

P1.2b - Fire in combination with extended drought

P1.3a - Time after drought; fire cycle frequent enough to prevent expansion of shrubs

P1.3b - Time after drought without fire

State 2 submodel, plant communities



P2.1a - Time without fire

P2.1b - Extended drought in combination with disturbance

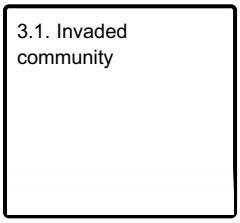
P2.2a - Fire

P2.2b - Fire in combination with extended drought

P2.3a - Time after drought; fire cycle frequent enough to prevent expansion of shrubs

P2.3b - Time after drought without fire

State 3 submodel, plant communities



State 1
Historical Reference State

The Reference State 1.0 is representative of the natural range of variability under pristine conditions. The reference state is bunchgrass dominated with a diverse forb component. State dynamics are maintained by interactions between climatic patterns and disturbance regimes. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These are maintained by elements of ecosystem structure and function such as the presence of all structural and functional groups, and retention of organic matter and nutrients. Plant community phase changes are primarily driven by fire and/or periodic drought.

Dominant plant species

- bluebunch wheatgrass (*Pseudoroegneria spicata ssp. spicata*), grass
- sand dropseed (*Sporobolus cryptandrus*), grass

Community 1.1
Reference Plant Community

The reference plant community is dominated by bluebunch wheatgrass with a secondary component of Sandberg bluegrass and a variety of forbs in the understory. This phase is maintained by frequent, low intensity fire.

Community 1.2
Shrub Community

Extended time without fire will favor expansion and establishment of hackberry and other less prominent shrubs.

Community 1.3
At Risk Phase

Extended drought in combination with disturbance causes a decline in bluebunch wheatgrass and favors increaser species – sand dropseed and lesser amounts of red three awn.

Pathway P1.1a
Community 1.1 to 1.2

Time without fire

Pathway P1.1b
Community 1.1 to 1.3

Extended drought in combination with disturbance

Pathway P1.2a
Community 1.2 to 1.1

Fire

Pathway P1.2b
Community 1.2 to 1.3

Fire in combination with extended drought

Pathway P1.3a
Community 1.3 to 1.1

Time after drought; fire cycle frequent enough to prevent expansion of shrubs

Pathway P1.3b
Community 1.3 to 1.2

Time after drought without fire

State 2
Current Potential State

This state is similar to the Reference State 1.0. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. Non-natives may increase in abundance but will not become dominant within this State. These non-natives can be highly flammable and can promote increased fire frequency. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These are maintained by elements of ecosystem structure and function such as the presence of all structural and functional groups and retention of organic matter and nutrients. Positive feedbacks decrease ecosystem resilience and stability of the state. Processes and characteristics that contribute to positive feedbacks include the non-natives species' high seed output, persistent seed bank, rapid growth rate, ability to cross pollinate, and adaptations for seed dispersal.

Dominant plant species

- bluebunch wheatgrass (*Pseudoroegneria spicata ssp. spicata*), grass
- sand dropseed (*Sporobolus cryptandrus*), grass

Community 2.1
Bunchgrass phase

This plant community is dominated by bluebunch wheatgrass with a secondary component of Sandberg bluegrass and a variety of forbs in the understory. This phase is maintained by frequent, low intensity fire. Non-native annual species present.

Community 2.2
Shrub Phase

Extended time without fire will favor expansion and establishment of hackberry and other less prominent shrubs. Non-native annual species present.

Community 2.3
At Risk Phase

Extended drought in combination with disturbance causes a decline in bluebunch wheatgrass and favors increaser species – sand dropseed and lesser amounts of red three awn. Non-native annual species present to increasing.

Pathway P2.1a
Community 2.1 to 2.2

Time without fire

Pathway P2.1b
Community 2.1 to 2.3

Extended drought in combination with disturbance

Pathway P2.2a
Community 2.2 to 2.1

Fire

Pathway P2.2b
Community 2.2 to 2.3

Fire in combination with extended drought

Pathway P2.3a
Community 2.3 to 2.1

Time after drought; fire cycle frequent enough to prevent expansion of shrubs

Pathway P2.3b
Community 2.3 to 2.2

Time after drought without fire

State 3
Invaded State

This state is dominated by primarily annual non-native species. This state is maintained by frequent fire outside the natural range of variability and continued impacts of heavy grazing.

Dominant plant species

- cheatgrass (*Bromus tectorum*), grass
- medusahead (*Taeniatherum caput-medusae*), grass

Community 3.1
Invaded community

This community is characterized by the dominance of annual non-native species. Small amounts of red three awn and sand dropseed may persist but are not controlling site function.

Transition T1a
State 1 to 2

Introduction of non-native species

Transition T2a
State 2 to 3

Severe or continuous disturbance in the presence of non-native annual species (e.g. catastrophic fire and/or soil disturbing treatments and/or inappropriate grazing management resulting in utilization of perennial bunchgrasses that impacts the plant's ability to recover)

Restoration pathway R3a
State 3 to 2

Restoration of some structural and functional plant groups may be possible with a combination of intensive management inputs and significant time. Inputs may include seeding with native perennial bunchgrasses (or non-native perennial grasses in some cases); mechanical, biological or chemical treatment of exotic species; and alteration of grazing management.

Context dependence. Success will likely be somewhat contingent upon favorable weather patterns following treatment. Multiple attempts may be required and likelihood of failure is high given hot and dry site conditions and low site resilience.

Additional community tables

References

. USNVC [United States National Vegetation Classification]. 2019. United States National Vegetation Classification Database, V2.03. Federal Geographic Data Committee, Vegetation Subcommittee, Washington DC.. USNVC: http://usnvc.org/.

Johnson, C.G. and S.A. Simon. 1987. Plant Association of the Walla-Snake Province, Wallowa-Whitman National Forest. R6-ECOL-TP-225A-86.. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Wallow-Whitman National Forest.

Other references

Johnson, Kathleen A. 2000. *Rhus glabra*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: https://www.fs.fed.us/database/feis/plants/shrub/rhugla/all.html [2021, December 21].

Contributors

Andrew Neary - Further concept development for 2020 PES initiative
Jennifer Moffitt - Original concept developed for 2020 PES initiative

Approval

Kirt Walstad, 9/08/2023

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	05/19/2024
Approved by	Kirt Walstad
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:**
