USDA Natural Resources Conservation Service

# Ecological site F030XC279NV
# Pinus ponderosa var. scopulorum-Juniperus scopulorum/Cercocarpus ledifolius var. intermontanus/Bouteloua gracilis

Last updated: 4/26/2024
Accessed: 06/30/2024

## 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.

## Classification relationships

Nachlinger, J. and G. Reese. 1996. Plant Community Classification of the Spring Mountains National Recreation Area, Clark and Nye Counties, Nevada. The Nature Conservancy. Reno, Nevada. High Conifer forest and woodland zone - 8b. Abies concolor-Pinus ponderosa var. scopulorum-Cercocarpus ledifolius var. intermontanus (White fir-ponderosa pine-curlleaf mountain mahogany) Association. Page I-51.

## Ecological site concept

The soils associated with this site are moderately deep to a hardpan, well drained soils that formed in alluvium from limestone rock sources.

This is a group concept and provisional STM that also covers F030XC280NV.

## Associated sites

| | |
|---|---|
| F030XC240NV | **Pinus monophylla/Cercocarpus ledifolius-Quercus gambelii/Poa fendleriana**<br>Occurs at lower elevation, pinyon site. |
| F030XC247NV | **Pinus monophylla-Juniperus osteosperma/Cercocarpus ledifolius-Artemisia nova/Bouteloua gracilis**<br>Occurs at lower elevation, same landform, pinyon site. |

## Similar sites

| | |
|---|---|
| F030XC280NV | **Pinus ponderosa ssp. scopulorum/Ribes cereum/Pseudoroegneria spicata ssp. spicata**<br>Occurs in drainages and on slopes. Higher site index. |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | (1) *Pinus ponderosa var. scopulorum*<br>(2) *Juniperus scopulorum* |
| Shrub | (1) *Cercocarpus ledifolius var. intermontanus* |
| Herbaceous | (1) *Bouteloua gracilis* |

## Physiographic features

This forest site occurs on fan remnants. Slopes range from 4 to 15 percent. Elevations range from 8000 to 8500 feet.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Fan remnant |
| Elevation | 2,438–2,591 m |
| Slope | 4–15% |
| Water table depth | 0 cm |
| Aspect | Aspect is not a significant factor |

## Climatic features

The primary air masses affecting the Spring Mountains are cold maritime polar air from the Gulf of Alaska and warmer, moist maritime subtropical air from lower latitudes. Occasionally there are invasions of cold continental polar air from northern Canada or the Rocky Mountains. Precipitation in the area results primarily from the passage of cyclones with associated fronts during fall, winter and spring; from closed cyclones in late winter and spring; and from the flow of moist tropical air from the southeast to the southwest quadrant in the summer.

The mean annual precipitation is about 16 to 20 inches. Mean annual air temperature is 41 to 45 degrees F. The average growing season is about 90 to 130 days.

**Table 3. Representative climatic features**

| | |
|---|---|
| Frost-free period (average) | 130 days |
| Freeze-free period (average) | |
| Precipitation total (average) | 508 mm |

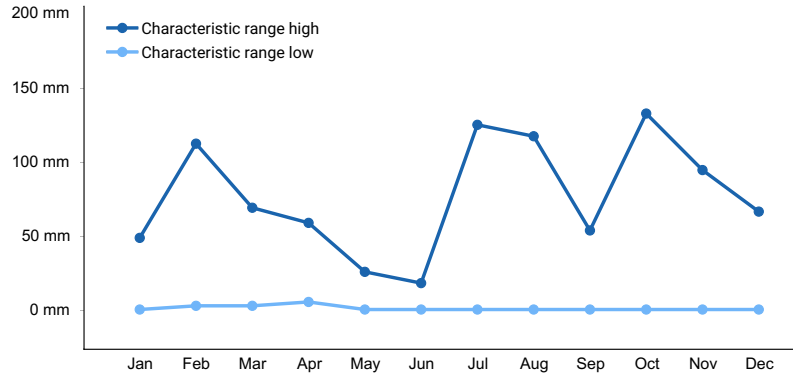



**Figure 1. Monthly precipitation range**

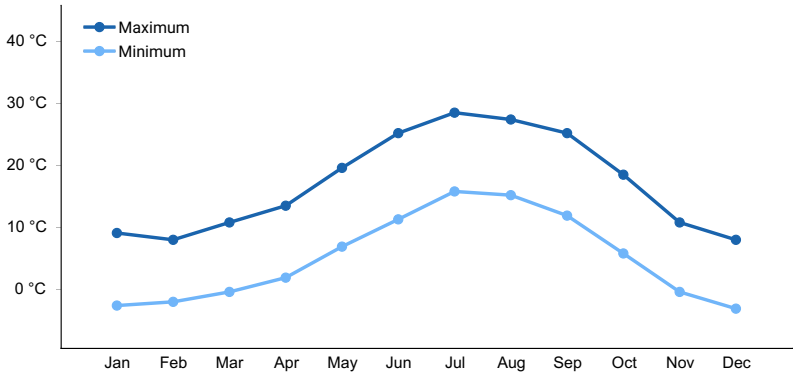



**Figure 2. Monthly average minimum and maximum temperature**

## Influencing water features

There are no influencing water features associated with this site.

## Soil features

The soils associated with this site are moderately deep to a hardpan, well drained soils that formed in alluvium from limestone rock sources. The soil surface is typically covered with a thin (+1 inch), slightly decomposed, organic layer. The surface is covered by approximately 50 duff, 40 percent gravel, 5 percent cobbles and 2 percent stones. The soil moisture usually moist in late winter and spring, and periodically moist in the upper part following summer thunderstorms. The soil moisture regime is utic bordring on aridic. Soil series associated with this site include Troughspring.

**Table 4. Representative soil features**

| | |
|---|---|
| Surface texture | (1) Very gravelly loam |
| Family particle size | (1) Loamy |
| Drainage class | Well drained |
| Permeability class | Moderate |
| Soil depth | 53–79 cm |
| Surface fragment cover <=3" | 30–60% |
| Surface fragment cover >3" | 1–10% |
| Available water capacity (0-101.6cm) | 5.08–5.33 cm |
| Calcium carbonate equivalent (0-101.6cm) | 10–60% |
| Electrical conductivity (0-101.6cm) | 0–2 mmhos/cm |
| Sodium adsorption ratio (0-101.6cm) | 0–5 |
| Subsurface fragment volume <=3" (Depth not specified) | 40–55% |
| Subsurface fragment volume >3" (Depth not specified) | 0–10% |

## Ecological dynamics

The amount and nature of the understory vegetation in a forestland is highly responsive of the amount and duration of shade provided by the overstory canopy. Significant changes in kinds and abundance of plants occur as the canopy changes. Some changes occur slowly and gradually as a result of normal changes in tree size and spacing. Other changes occur dramatically and quickly, following intensive harvesting, thinning, or fire.

Fire Ecology:
Wildfire is recognized as a natural disturbance that strongly influenced the structure and composition of the climax vegetation of this forest site. Rocky Mountain ponderosa pine evolved under a regime of frequent surface fires and infrequent mixed-severity and stand-replacement fires. Prior to the 1900s, Rocky Mountain ponderosa pine was perpetuated by surface fires that recurred every 5 to 30 years. Fire return intervals tended to be shorter in the warm, dry forests of the Southwest than in the cool, dry forests of the central Rocky Mountains. Presettlement fires in lower-elevation ponderosa pine communities were mostly low- to moderate-severity surface fires that maintained open, parklike stands. These frequent fires created openings for pine seedling establishment, thus maintaining its persistence. Ponderosa pine trees are relatively resistant to cool, slow burning, wildfires through the understory because of their thick, insulating bark. Ground fires in these woodlands affect understory vegetal structure and composition leaving a more open grass-forb community with scattered, dense patches of chaparral species.

Fire suppression, however, has allowed for the unnatural buildup of forest fuels, increasing the occurrence of stand-

replacing fires. Over the last 60 to 80 years of fire suppression, seral ponderosa pine stands have been replaced by shade-tolerant species such as white fir. White fir is very shade tolerant and will regenerate under shade as where ponderosa pine will not. Fire exclusion has also created closed-canopy stands with dense understories and ladder fuels. As a result, severe, stand-replacing fires, which were uncommon in the past, are now common.

Major Successional Stages of Forest Development:

HERBACEOUS: Vegetation is dominated by grasses and forbs under full sunlight. This stage is experienced after a major disturbance such as a crown fire. Skeleton forest (dead trees) remaining after fire have little to no affect on the composition and production of the herbaceous vegetation.

SHRUB-HERBACEOUS: Herbaceous vegetation and woody shrubs dominate the site. This stage is experienced within two or three years after fire or harvest. The majority of shrub species in the understory are crown-sprouters and can dominate the plant community following disturbance. With abnormally frequent wildfire, the understory vegetation reflects a chaparral community. Many chaparral communities are retarded from progressing towards ecologically higher stages by an unnaturally, short fire cycle. Various amounts of tree seedlings (less than 20 inches in height) may be present up to the point where they are obviously a major component of the vegetal structure.

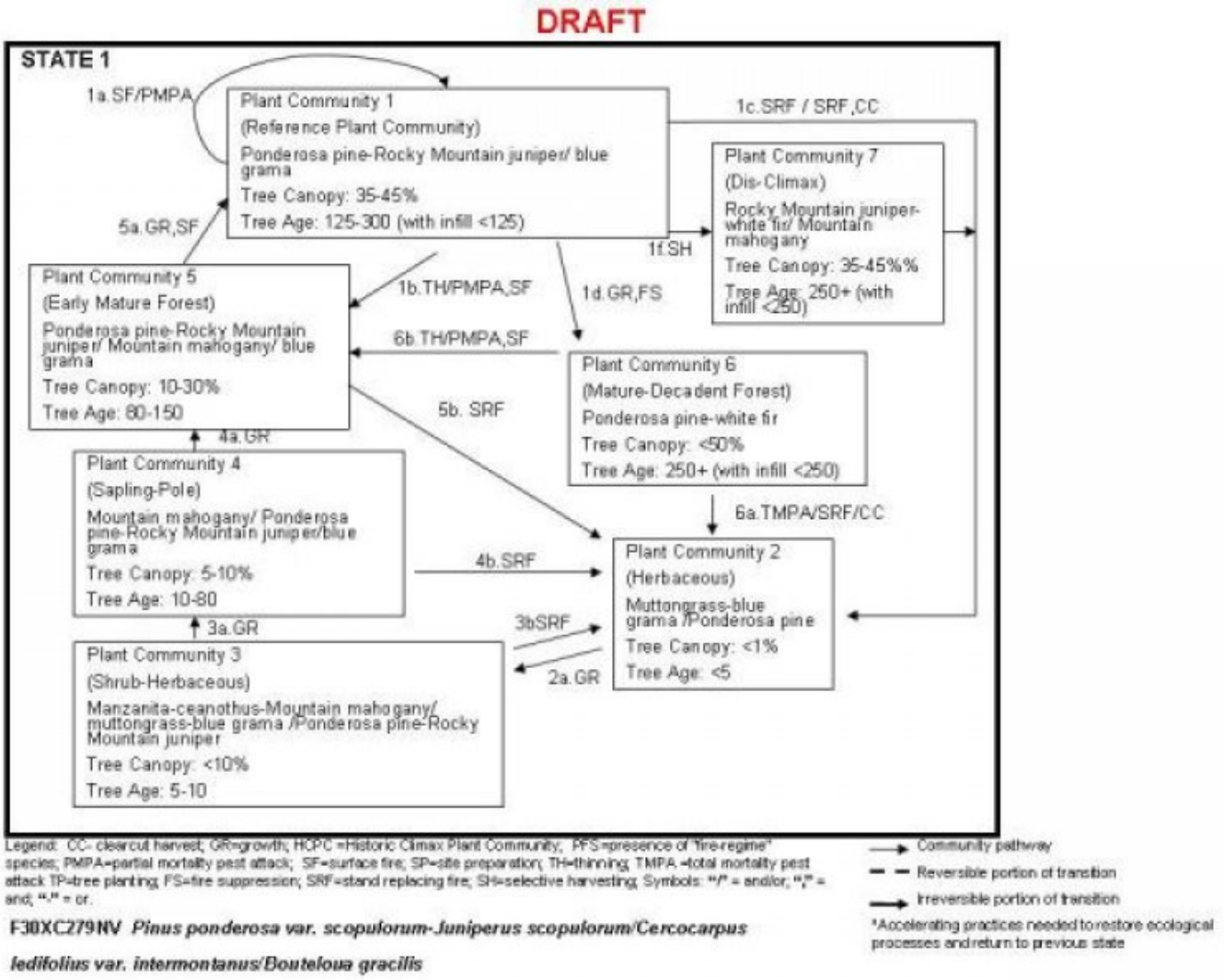
SAPLING: In the absence of disturbance the tree seedlings develop into saplings (20 inches to 4.5 feet in height) with a range in canopy cover of about 5 to 10 percent. Understory shrubs dominate the plant community.

IMMATURE FOREST: The visual aspect and vegetal structure are dominated by ponderosa pine greater than 4.5 feet in height. At this stage of woodland development, the tree canopy has successfully broken through the suppression of a chaparral community. The young ponderosa pine are common in the understory. Dominants are the tallest trees on the site; co-dominants are 65 to 85 percent the highest of dominant trees. Understory vegetation is moderately influenced by a tree overstory canopy of about 10 to 20 percent.

MATURE FOREST: The stage is dominated by ponderosa pine that have reached or are near maximal heights for the site. Tree canopy cover ranges from 35 to 45 percent. Understory vegetation is strongly influenced by tree competition, overstory shading, duff accumulation, etc. Infrequent, yet periodic, wildfire is presumed to be a natural factor influencing the understory of mature ponderosa pine forests. Ponderosa pine trees, at this stage of growth, are relatively resistant to cool, slow burning, wildfires through the understory because of their thick, insulating bark. Ground fires affect understory vegetal structure and composition leaving a more open grass-forb community with scattered, dense patches of chaparral species. This stage of community development is assumed to be representative of this forest site in the pristine environment.

OVER-MATURE FOREST: This stage is dominated by ponderosa pine that have reached maximal heights for the site. Understory vegetation is much reduce due to tree competition, overstory shading, duff accumulation, etc. Few seedlings or saplings of ponderosa pine are found in the understory. Tree canopy cover is commonly greater that 50 percent.

## State and transition model




## State 1
## Reference Plant Community

## Community 1.1
## Reference Plant Community

The reference plant community is characterized as an open park-like appearance with an overstory of Rocky Mountain ponderosa pine and relatively few understory trees. The overstory canopy cover is about 35 to 45 percent. Tree heights average approximately 40 feet (30 to 50) feet. Where this site is associated with singleleaf pinyon communities, curlleaf mountain mahogany may compose up to 25 percent of the overstory. On cooler, moist sites, Rocky Mountain juniper may compose up to 15 to 25 percent of the overstory. Other overstory species include Rocky Mountain white fir and singleleaf pinyon pine. Curlleaf mountain mahogany, wax currant, and snowberry are the most prevalent understory shrubs. Bluebunch wheatgrass, muttongrass and blue grama are the most prevalent grasses.

**Table 5. Ground cover**

| | |
|---|---|
| Tree foliar cover | 35-45% |
| Shrub/vine/liana foliar cover | 10-20% |
| Grass/grasslike foliar cover | 1-5% |
| Forb foliar cover | 1-5% |
| Non-vascular plants | 0% |
| Biological crusts | 0% |

| | |
|---|---|
| Litter | 25-50% |
| Surface fragments >0.25" and <=3" | 30-60% |
| Surface fragments >3" | 1-5% |
| Bedrock | 0% |
| Water | 0% |
| Bare ground | 10-15% |

**Table 6. Canopy structure (% cover)**

| Height Above Ground (M) | Tree | Shrub/Vine | Grass/ Grasslike | Forb |
|---|---|---|---|---|
| <0.15 | 1-5% | 1-5% | 1-5% | 1-5% |
| >0.15 <= 0.3 | 1-5% | 1-5% | 1-5% | 1-5% |
| >0.3 <= 0.6 | 5-7% | 5-10% | 1-2% | 1-2% |
| >0.6 <= 1.4 | 5-7% | 10-15% | – | – |
| >1.4 <= 4 | 10-20% | – | – | – |
| >4 <= 12 | 20-40% | – | – | – |
| >12 <= 24 | – | – | – | – |
| >24 <= 37 | – | – | – | – |
| >37 | – | – | – | – |

## State 2
## Altered

### Community 2.1
### Altered

This plant community develops after selective harvesting of Rocky Mountain ponderosa pine. The plant community is characterized by an overstory of Rocky Mountain white fir and Rocky Mountain juniper with relatively few understory trees for white fir. The plant community has an overstory canopy cover of about 35 to 45 percent. Tree heights average approximately 40 feet (30 to 50) feet. Where this site is associated with singleleaf pinyon woodland communities, curlleaf mountain mahogany may compose up to 25 percent of the overstory. On cooler, moist sites, Rocky Mountain juniper may compose up to 15 to 25 percent of the overstory. Other overstory species include an occasional Rocky Mountain ponderosa pine and singleleaf pinyon pine. Curlleaf mountain mahogany, wax currant and snowberry are the most prevalent understory shrubs. Bluebunch wheatgrass, mutton grass and blue grama are the most prevalent grasses.

## Additional community tables

## Animal community

Livestock Interpretations:
This site is suited to cattle and sheep grazing during the summer and fall. Wild horses may use this site if water is available. Grazing management should be keyed to bluebunch and muttongrass production. Livestock will often concentrate on this site taking advantage of the shade and shelter offered by the tree overstory. Many areas are not used because of steep slopes or lack of adequate water. Harvesting trees under a sound management program can open up the tree canopy to allow increased production of understory species desirable for grazing.

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:

This site has moderate value for mule deer, especially during the summer and fall. Various songbirds, rodents, reptiles and associated predators native to the area can be found. Interior ponderosa pine snags also provide sites for cavity-nesting birds and mammals. Ponderosa pine provides habitat for many rodent species, and the seeds are an important food source for some rodents and shrews.

## Hydrological functions

Potential for sheet and rill erosion is moderate to severe depending on slope. The runoff on this site is high.

## Recreational uses

This site is used primarily for recreational activities, such as hiking, cross-country skiing, and camping.

## Wood products

This forest community is of low site quality for tree production. Site Index ranges from <30 to 40. (Table 21, SCS, 190-V-NFM Amend. 3; from Meyer, 1938. USDA Tech. Bull. 630).

Fuel wood production: Less than 50 cords per acre of stands averaging 50 feet in height and 150 years of age with a medium canopy cover. There is about 213,750 gross British Thermal Units (BTUs) heat content per cubic foot of ponderosa pine wood. Solid wood volume in a cord varies but usually ranges from 65 to 90 cubic feet. Assuming an average of 75 cubic feet of solid wood per cord, there are about 16 million BTU's of heat value in a cord of ponderosa pine wood.

Posts (7 foot): 25 to 50 per acre in stands of medium canopy.

Tree volume per Acre: For stands averaging 50 feet in height and 150 years old.
Site Index 40 = 3,700 cu ft

Limitations and Considerations
a. Potential for sheet and rill erosion is moderate to severe depending on slope.
b. Moderate to severe equipment limitations on steeper slopes and moderate to safer equipment limitations on sites having extreme surface stoniness.
c. Proper spacing is the key to a well managed, multiple use and multi-product forest.

Essential Requirements
a. Adequately protect from wildfire.
b. Protect soils from accelerated erosion.
c. Apply proper grazing management.

Silvicultural Practices
a. Harvest cut selectively or in small patch size dependent upon site conditions to enhance forage production.
1) Thinning and improvement cutting – Removal of poorly formed, diseased and low vigor trees for fuel wood.
2) Harvest cutting. Selectively harvest surplus trees to achieve desired spacing. Save large, healthy, full crowned trees for cone (fruit) producers. Do not select only "high grade" trees during harvest.
3) Slash Disposal – broadcasting slash improves reestablishment of native understory herbaceous species and establishment of seeded grasses and forbs after tree harvest.
4) Spacing Guide – D+9

b. Prescription burning program to maintain desired canopy cover and manage site reproduction.
c. Pest control – Porcupines can cause extensive damaged and populations should be controlled.
d. Fire hazard – Fire usually not a problem in well-managed, mature stands.

## Other products

Native Americans ate ponderosa pine seeds and the sweet, edible phloem in the inner bark.

Ponderosa pine and Rocky Mountain juniper are widely used as a drought tolerant ornamental for landscaping.

## Other information

Rocky Mountain ponderosa pine (Pinus ponderosa var. scopulorum) has migrated into the Great Basin following the ice ages by way of the Southern Rocky Mountains. Rocky Mountain ponderosa pines never attain the size of the typical variety (P. ponderosa var. ponderosa). The fascicles of this tree tend to have only two needles and the needle are shorter than the typical variety. The cones of Rocky Mountain ponderosa pine are also smaller then the typical variety. The wood of ponderosa pine is valuable for lumber. Although no longer harvested, the oleoresin, or pitch, or ponderosa pine has been a source of turpentine in the past (Lanner, 1984).

There are 6 plant species of concern associated with this ecological site in the Spring Mountain National Recreational Area (SMNRA). One species, Astragalus aequalis, is an endemic to the SMNRA. There is one butterfly species of concern.

**Table 7. Representative site productivity**

| Common Name | Symbol | Site Index Low | Site Index High | CMAI Low | CMAI High | Age Of CMAI | Site Index Curve Code | Site Index Curve Basis | Citation |
|---|---|---|---|---|---|---|---|---|---|
| ponderosa pine | *PIPOS* | 30 | 40 | 20 | 40 | – | – | – | |

## Type locality

| Location 1: Clark County, NV | |
|---|---|
| Township/Range/Section | T19 S R57 E S6 NE |
| UTM zone | N |
| UTM northing | 4020271n |
| UTM easting | 0623988e |
| General legal description | Along Deer Creek road, south of Desert Viewpoint, Spring Mountains, Clark County, NV. |

## Other references

Clokey, I. 1951. Flora of the Charleston Mountains Clark County, Nevada. University of California Press, Berkeley and Los Angeles.

Fire Effects Information System [Online]http://www.fs.fed.us/feis

Glenne, G. and Johnson, D. 2002. Guide to Species of Concern in the Spring Mountains National Recreation Area, Clark and Nye Counties, Nevada. USFS, Las Vegas, NV.

Lanner, R.M. 1984. Trees of the Great Basin. University of Nevada Press, Reno NV.

Meyer, W.H. 1938. Even-aged stands of Ponderosa Pine. USDA Tech Bull 630.

USDA. NRCS National Forestry Handbook, Exhibit 637-32. 190-V-NFH, Feb. 2001.

USDA. SCS National Forestry Manual, Table 21 190-V-NFN, Amend. 3, 1983.

## Contributors

TJ Wolfe

## Approval

Kendra Moseley, 4/26/2024

## 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 | 06/30/2024 |
| 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):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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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:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth ( in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**

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17. **Perennial plant reproductive capability:**

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