

## **Ecological site R048AY255CO**

### **Pine Grasslands**

Last updated: 3/05/2024  
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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): 048A–Southern Rocky Mountains

MLRA 48A makes up about 45,920 square miles (119,000 square kilometers) and is the southern part of the Rocky Mountains. The Southern Rocky Mountains lies east of the Colorado Plateau, south of the Wyoming Basin, west of the Great Plains, and north of the Rio Grande Rift. It is in western and central Colorado, southeastern Wyoming, eastern Utah, and northern New Mexico. The headwaters of major rivers such as the Colorado, Yampa, Arkansas, Rio Grande, North Platte and South Plate rivers are located here. This MLRA has numerous national forests, including the Medicine Bow National Forest in Wyoming; the Routt, Arapaho, Roosevelt, Pike, San Isabel, White River, Gunnison, Grand Mesa, Uncompahgre, Rio Grande, and San Juan National Forests in Colorado; the Carson National Forest and part of the Santa Fe National Forest in New Mexico. Rocky Mountain National Park also is in this MLRA.

MLRA 48A is the southern Rocky Mountains physiographic region. The Southern Rocky Mountains consist primarily of two belts of strongly sloping to precipitous mountain ranges trending north to south. Several basins, or parks, are between the belts. Some high mesas and plateaus are included. It is characterized by mountain ranges that were uplifted during the Laramide Orogeny and then had periods of glaciation. The ranges include the Sangre de Cristo Mountains, the Laramie Mountains, and the Front Range in the east and the San Juan Mountains and the Sawatch and Park Ranges in the west. The ranges are dissected by many narrow stream valleys having steep gradients. In some areas the upper mountain slopes and broad crests are covered by snowfields and glaciers. Elevation typically ranges from 6,500 to 14,400 feet (1,980 to 4,390 meters) in this area. The part of this MLRA in central Colorado includes the highest point in the Rockies, Mount Elbert, which reaches an elevation of 14,433 feet (4,400 meters). More than 50 peaks in the part of the MLRA in Colorado are at an elevation of more than 14,000 feet (4,270 meters). Many small glacial lakes are in the high mountains.

The mountains in this area were formed mainly by crustal uplifts during the late Cretaceous and early Tertiary periods. This large MLRA can be subdivided into at least 4 large general divisions. First is the Rockies on the east side of this area are called the "Front Range," which is a fault block that has been tilted up on edge and uplifted and is largely igneous and metamorphic geology. It was tilted up on the east edge, so there is a steep front on the east and the west side is more gently sloping and in the south east there are rocks exposed in the mountains are mostly Precambrian igneous and metamorphic rocks. Second is the tertiary rocks, primarily basalt and andesitic lava flows, tuffs, breccias, and conglomerates, are throughout this area (San Juan Mountains Area). The third division is Northwest part of the MLRA is dominantly sedimentary rock from the cretaceous/tertiary and Permian/Pennsylvanian periods. The fourth subset is the long and narrow Sangre de Cristos mountains uplifted in the Cenozoic are between the Rio Grande rift and the great plains. Many of the highest mountain ranges were reshaped by glaciation during the Pleistocene. Alluvial fans at the base of the mountains are recharge zones for local basin and valley fill aquifers. They also are important sources of sand and gravel.

The average annual precipitation ranges predominantly from 12 to 63 inches. Summer rainfall commonly occurs as high-intensity, convective thunderstorms. About half of the annual precipitation occurs as snow in winter; this proportion increases with elevation. In the mountains, deep snowpacks accumulate throughout the winter and

generally persist into spring or early summer, depending on elevation. Some permanent snowfields and small glaciers are on the highest mountain peaks. In the valleys at the lower elevations, snowfall is lighter and snowpacks can be intermittent. The average annual temperature is 26 to 54 degrees F (-3 to 12 degrees C). The freeze-free period averages 135 days and ranges from 45 to 230 days, decreasing in length with elevation. The climate of this area is strongly dependent upon elevation; precipitation is greater, and temperatures are cooler at the higher elevations. The plant communities vary with elevation, aspect and change in latitudes due to changing in precipitation kind and timing and temperature.

The dominant soil orders in this MLRA are Mollisols, Alfisols, Inceptisols, and Entisols. The soils in the area dominantly have a frigid or cryic soil temperature regime and an ustic or udic soil moisture regime. Mineralogy is typically mixed, smectitic, or paramicaceous. In areas with granite, gneiss, and schist bedrock, Glossocryalfs (Seitz, Granile, and Leadville series) and Haplocryolls (Rogert series) formed in colluvium on mountain slopes. Dystrocryepts (Leighcan and Mummy series) formed on mountain slopes and summits at the higher elevations. In areas of andesite and rhyolite bedrock, Dystrocryepts (Endlich and Whitecross series) formed in colluvium on mountain slopes. In areas of sedimentary bedrock, Haplustolls (Towave series) formed on mountain slopes at low elevations and with low precipitation. Haplocryolls (Lamphier and Razorba series), Argicryolls (Cochetopa series), and Haplocryalfs (Needleton series) formed in colluvium on mountain slopes at high elevations.

## **Classification relationships**

NRCS:

Major Land Resource Area 48A, Southern Rocky Mountains (United States Department of Agriculture, Natural Resources Conservation Service, 2006).

USFS:

M331F- Southern Parks and Rocky Mountain Range Section Southern Rocky Mountain Steppe - Open Woodland - Coniferous Forest - Alpine Meadow

M331G – South Central Highlands Section Southern Rocky Mountain Steppe - Open Woodland - Coniferous Forest - Alpine Meadow

M331H – North Central Highlands and Rocky Mountains Section Southern Rocky Mountain Steppe - Open Woodland - Coniferous Forest - Alpine Meadow

M331I – North Parks and Ranges Section Southern Rocky Mountain Steppe - Open Woodland - Coniferous Forest - Alpine Meadow

M341B – Tavaputs Plateau Section M341 Nevada-Utah Mountains Semi-Desert - Coniferous Forest - Alpine Meadow (Cleland, et al., 2007).

EPA:

21a – Alpine Zone, 21b – Crystalline Subalpine Forests, 21c – Crystalline Mid-Elevations Forests, 21d -Foothill Shrublands, 21e – Sedimentary Subalpine Forests, 21f – Sedimentary Mid-Elevation Forests, 21g – Volcanic Subalpine Forests, and 21h – Volcanic Mid-Elevation Forests < 21 Southern Rockies < 6.2 Western Cordillera < 6 Northwestern Forested Mountains North American Deserts (Griffith, 2006).

20c – Semiarid Benchlands and Canyonlands and 20e - Escarpements < 20 Colorado Plateau < 10.1 Cold Deserts < 10 North American Deserts (Griffith, 2006).

USGS: Southern Rocky Mountain Province and the southern part of Unita Basin Section Colorado Plateaus Province

## **Ecological site concept**

R048AY255CO Pine Grassland occurs on structural benches, dip slopes, hills, mesas and canyon benches. Slopes is between 0 to 30 percent. This site has more than one soil concept correlated to it. The concepts are shallow soils (<20 " deep) and soils that are greater than 20" deep. Soils are derived from eolian deposits from sandstone;

alluvium, colluvium or slope alluvium from sandstone and shale; or residuum from igneous and metamorphic rock. Soil surface texture is loam, sandy loam or gravelly loam with fine-loamy or fine-silty textured subsurface for the deep soils and loamy and loamy-skeletal for the shallow soils. It is a Ponderosa Pine – Arizona Fescue community. It has a typic ustic moisture regime and frigid temperature regime. The effective precipitation ranges from 16 to 20 inches.

### Associated sites

R048AY222CO	<b>Loamy Park</b> R048AY222CO Loamy Park occurs on alluvial and colluvial fans, hillsides, plains, sideslopes, terraces, valley sideslopes, and valley bottoms Slopes are from 0 to 30%. Soils are moderately deep to deep (20-60 inches) loamy soils derived from residuum from igneous and metamorphic rocks; alluvium from granite, gneiss, schist, or sandstone and shale. Soil surface texture are sandy loam to loam with loam subsurface. It is an Arizona Fescue – Mountain Muhly community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.
R048AY230CO	<b>Shallow Loam</b> R048AY230CO – Shallow Loam occurs on mountain, hills, ridges, mountain sides and mountain slopes. Soils are very shallow to shallow (less than 20 inches) loamy-skeletal soils derived from slope alluvium from trachyte, volcanic breccia, gneiss, granite and/or sandstone; residuum from weathered volcanic breccia, tuff, igneous rock, sandstone or sandstone and shale. Soils surface textures are gravelly to very gravelly loam, gravelly to very gravelly sandy loam, cobbly loam, or very cobbly sandy loam. It is an Arizona Fescue-Mountain Muhly community with scattered mountain mahogany, snowberry and current. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.
R048AY247CO	<b>Deep Clay Loam</b> R048AY247CO Deep Clay Loam occurs on hills, hillsides, mountain-slope, complex landslides, alluvial fans, and structural benches. Slopes is between 0 to 35%. Soils are deep (60+ inches). Soils are derived from colluvium and slide deposits from igneous, metamorphic and sedimentary rocks, and/or alluvium, residuum or complex landslide deposits from shale. Soil surface texture is loam, clay loam or silty clay loam with fine-textured subsurface. It is a mountain big sagebrush – western wheatgrass community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.
R048AY248CO	<b>Mountain Clay Loam</b> R048AY248CO Mountain Clay Loam occurs on alluvial fans, mesas, hills, dip slopes, and mountain slopes. Slopes is between 1 to 40%. Soils are deep to very deep (40 to 60+ inches). Soils are derived from alluvium and slope alluvium from shale; or alluvium, slope alluvium, colluvium and/or residuum from sandstone and shale. Soil surface texture is loam, silty clay loam, gravelly loam or a clay loam with fine-textured subsurface. It is Arizona Fescue – western wheatgrass – Gambel's Oak community. It has a typic ustic moisture regime and frigid temperature regime. The effective precipitation ranges from 16 to 20 inches.

### Similar sites

R048AY240CO	<b>Shallow Pine</b> R048AY240CO Shallow Pine occurs on mountains and mountainsides. Slopes are 5 to 40%. Soils are shallow (10 to 20 inches). Soils are derived from slope alluvium from volcanic breccia, gneiss, granite, or sandstone and/or residuum from granite, granodiorite and/or gneiss. Soil surface texture is a gravelly to very gravelly sandy loam or very gravelly loam with loamy-skeletal subsurface. It is a Ponderosa Pine - Arizona Fescue – Mountain Muhly community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.
R048AY248CO	<b>Mountain Clay Loam</b> R048AY248CO Mountain Clay Loam occurs on alluvial fans, mesas, hills, dip slopes, and mountain slopes. Slopes is between 1 to 40%. Soils are deep to very deep (40 to 60+ inches). Soils are derived from alluvium and slope alluvium from shale; or alluvium, slope alluvium, colluvium and/or residuum from sandstone and shale. Soil surface texture is loam, silty clay loam, gravelly loam or a clay loam with fine-textured subsurface. It is Arizona Fescue – western wheatgrass – Gambel's Oak community. It has a typic ustic moisture regime and frigid temperature regime. The effective precipitation ranges from 16 to 20 inches.

R048AY257CO	<b>Clayey Valley</b> R048AY257CO Clayey Valley occurs on hillslopes, and old high terraces. Slopes is between 1 to 12%. Soils are moderately deep to very deep (20 to 60+ inches). Soils are derived from slope alluvium from shale or alluvium from sandstone and shale. Soil surface texture is loam or clay loam with fine textured subsurface. It is Western wheatgrass – Arizona Fescue with scattered Ponderosa Pine. It has a Typic ustic moisture regime and frigid temperature regime. The effective precipitation ranges from 16 to 20 inches.
F048AY925CO	<b>Ponderosa Pine Forest</b> F048AY925CO occurs on hillsides, mountain-slopes, mesas, structural benches and cuestas. Slopes are 3 to 30%. Soils are moderately deep to very deep (20 to 60+ inches). Soils are derived from slope alluvium from sandstone and/or shale, colluvium from sandstone and/or shale, or residuum from sandstone and shale. Soil surface texture is a loam, clay loam, sandy loam, fine sandy loam, very stony loam, cobbly sandy loam, or very boulder sandy loam with fine textured subsurface. It is a Ponderosa Pine - Muttongrass – squirreltail community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.

**Table 1. Dominant plant species**

Tree	(1) <i>Pinus ponderosa</i>
Shrub	Not specified
Herbaceous	(1) <i>Festuca arizonica</i> (2) <i>Danthonia parryi</i>

## Physiographic features

This site occupies relatively flat to gently sloping soils. Elevation ranges from 7,000 to 9,500 feet. Typical appearances of this site are on the plateaus and benches of Southwestern and West-central Colorado. Slopes are from 0 to 30% with most sites less than 15%. The direction of slope is of no great importance.

**Table 2. Representative physiographic features**

Landforms	(1) Mesa (2) Dip slope (3) Mountain slope (4) Hillslope (5) Hill (6) Canyon bench (7) Structural bench
Runoff class	Medium to very high
Flooding frequency	None
Ponding frequency	None
Elevation	7,000–9,500 ft
Slope	0–30%
Aspect	Aspect is not a significant factor

## Climatic features

Average annual precipitation is about 16 to 20 inches. Of this, approximately 45-55% falls as snow, and 45-55% falls as rain between middle of May to and the end of September. Summer moisture is mostly from thundershowers in July, August and September. December to February is the driest period of the year with the driest month being January. July thru September is the wettest period and the wettest month is usually August. The average annual total snowfall is 84.9 inches. The snow depth usually ranges from 1 to 5 inches during November thru March. The highest winter snowfall record in this area is 127 inches which occurred in 2007-2008. The lowest snowfall record is 46.5 inches during the 2017-2018 winter. The frost-free period typically ranges from 80 to 120 days. The last spring frost is typically the middle of June to the end of June. The first fall frost is usually the end of August to the middle of September. Mean daily annual air temperature ranges from about 25.5°F to 60.3°F, averaging about 24°F for the

winter and 61.8°F in the summer. Summer high temperatures of mid-70°F to low 80°F are not unusual. The coldest winter temperature recorded was -36°F on February 2, 1985 and the warmest winter temperature recorded was 65°F on December 5, 1995. The coldest summer temperature recorded was 19°F on June 2, 1990 and the warmest was 98°F on July 31, 2002. Wide yearly and seasonal fluctuations are common for this climatic zone. Data taken from Western Regional Climate Center (2018) for Ridgway, Colorado Climate Station.

This zone in MLRA 48 will need to be broken up into at multiple land resources zones in future projects based on current knowledge of precipitation and temperature patterns.

West Central Zone Stations: Alterbern, Aspen, Avon, Glenwood Springs #2, Shoshone, Placerville and Ridgway. This LRU zone is use in write up above. Driest month is usually January, February and June and wettest months are July, August and September.

Northwest Zone Climate Stations: Meeker and Yampa are at the low end of this LRU zone. Driest months usually are January and February. Wettest months usually are April and August.

Southwest Zone Climate Stations (Precambrian sedimentary and igneous): There are no climate stations in this LRU zone.

Southwest Volcanics: There are no climate stations in this LRU zone.

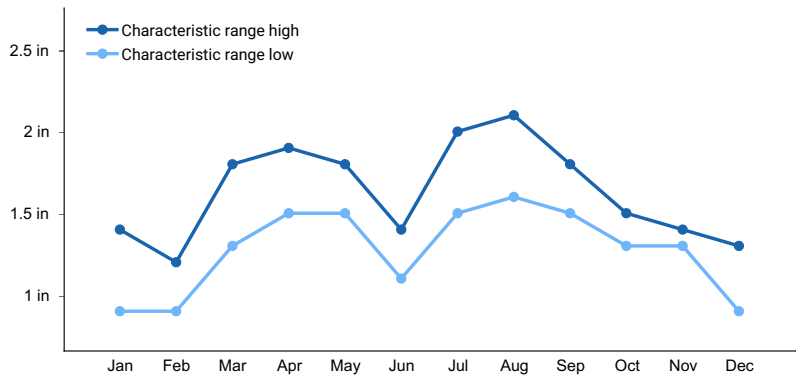
Northeast (Front Range Igneous and Metamorphic): Cabin Creek, Caribou Ranch, Dillion 1 R, Fraser, Georgetown, Grand lake 1 NW, Hourglass Reservoir, Nederland 2 NNE, Red Feathers Lakes, Red Feather Lakes 2 SE and Victor. April, May, July and August are the wettest months. February, December, November and October are the driest. The climate stations is this zone are cryic. These areas have shorter growing seasons by 20 to 40 days over the frigid stations.

Southeast (Sangre de Cristo Mtns): There are no climate stations in this zone in MLRA 48A. Closest ones are in MLRA 49. The growing season appears to be longer on the Sangre de Cristos. Driest months are December to February and the wettest are July & August.

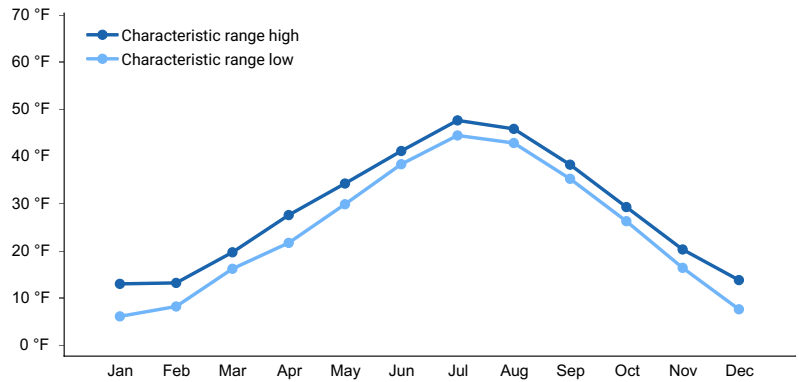
Crylic High elevation valleys: Pitkin, Taylor River and Meredith. These areas have shorter growing seasons by 20 to 40 days over the frigid stations.

**Table 3. Representative climatic features**

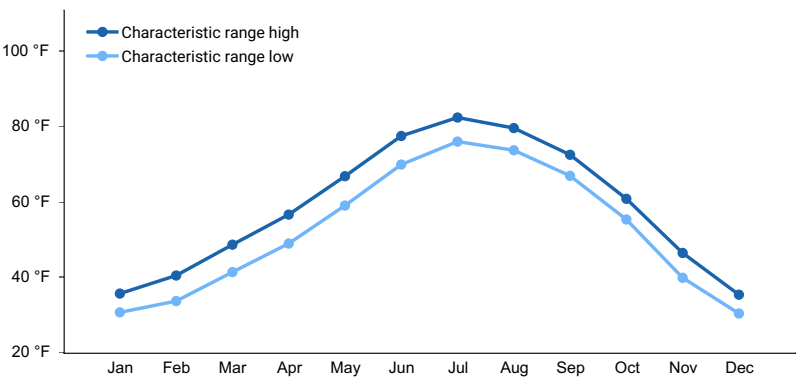
Frost-free period (characteristic range)	23-78 days
Freeze-free period (characteristic range)	75-111 days
Precipitation total (characteristic range)	17-18 in
Frost-free period (actual range)	5-101 days
Freeze-free period (actual range)	43-134 days
Precipitation total (actual range)	17-19 in
Frost-free period (average)	54 days
Freeze-free period (average)	92 days
Precipitation total (average)	18 in



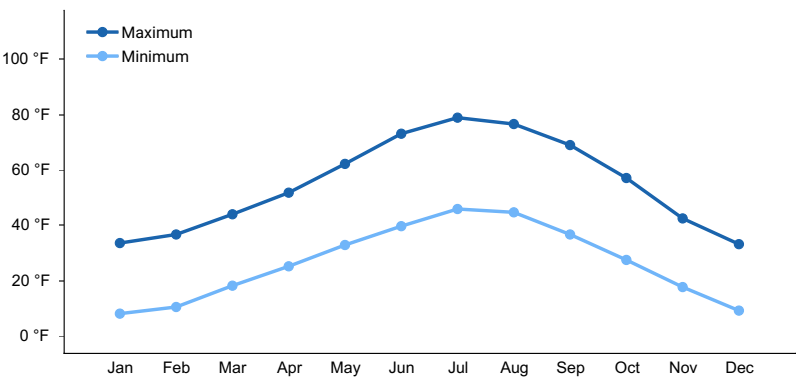
**Figure 1. Monthly precipitation range**



**Figure 2. Monthly minimum temperature range**



**Figure 3. Monthly maximum temperature range**



**Figure 4. Monthly average minimum and maximum temperature**

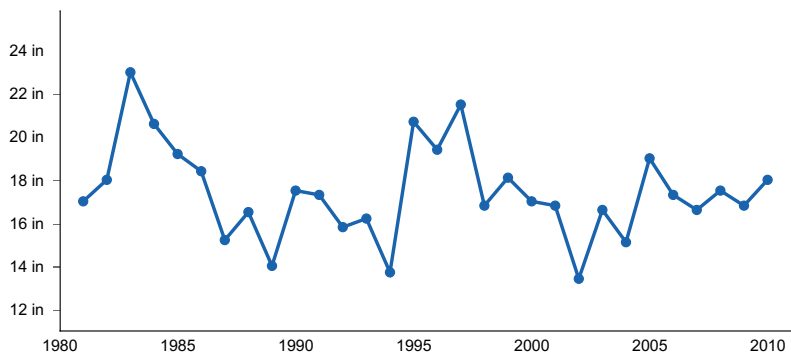


Figure 5. Annual precipitation pattern

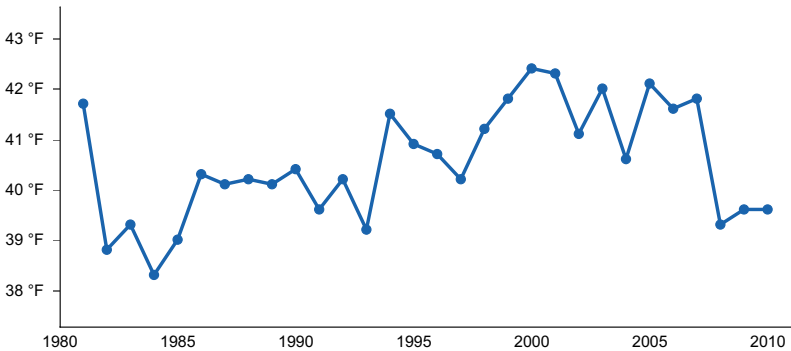


Figure 6. Annual average temperature pattern

### Climate stations used

- (1) ASPEN PITKIN CO AP [USW00093073], Aspen, CO
- (2) GEORGETOWN [USC00053261], Idaho Springs, CO
- (3) GLENWOOD SPGS #2 [USC00053359], Glenwood Springs, CO
- (4) HOURGLASS RSVR [USC00054135], Bellvue, CO
- (5) RIDGWAY [USC00057020], Ridgway, CO
- (6) YAMPA [USC00059265], Toponas, CO
- (7) FRASER [USC00053116], Fraser, CO

### Influencing water features

None

### Soil features

This site has more than one soil concept correlated to it. The concepts are shallow soils (<20 " deep) and soils that are greater than 20" deep. Surface textures are loam, sandy loam or fine sandy loam. The surface can have up to 15-20% gravels, channers, stones or cobbles.

Soils associated with this site:

Shallow Soils:

Loamy: Beje. Falconry and Splitro

Loamy-Skeletal: Bushvalley and Valtro

Moderately deep to very deep soils:

Fine-Loamy: Lininger, Moento and Nordicol variant

Fine-silty: Granath

Table 4. Representative soil features

Parent material	(1) Eolian deposits—sandstone (2) Residuum—sandstone (3) Colluvium—sandstone and shale (4) Colluvium—sandstone (5) Slope alluvium—sandstone (6) Slope alluvium—sandstone and siltstone (7) Residuum—igneous and metamorphic rock
Surface texture	(1) Loam (2) Gravelly, cobbly, stony loam (3) Channery sandy loam (4) Gravelly fine sandy loam (5) Sandy loam (6) Fine sandy loam
Family particle size	(1) Loamy (2) Fine-loamy (3) Fine-silty (4) Loamy-skeletal
Drainage class	Moderately well drained to well drained
Permeability class	Moderate to rapid
Soil depth	10–100 in
Surface fragment cover ≤3"	0–20%
Surface fragment cover >3"	0–10%
Soil reaction (1:1 water) (Depth not specified)	6.6–7.8
Subsurface fragment volume ≤3" (Depth not specified)	0–20%
Subsurface fragment volume >3" (Depth not specified)	0–15%

## Ecological dynamics

A scattered canopy of ponderosa pine and an understory made up of perennial bunchgrass is the typical look of this site. Grasses and forbs make up the majority of the annual production, grasses contributing 45 to 70 percent, forbs 10 to 20 percent. Shrubs will total 15 to 20 percent, trees will total 5 to 15 percent. Grasses that contribute most to the annual production are Arizona fescue, parry oatgrass, mountain muhly, and pine dropseed, which total 50 to 70 percent. Major forbs of the climax community are western yarrow, northwest cinquefoil, hairy goldaster, and fendler sandwort. Shrubby cinquefoil, western snowberry, and fringed sagebrush are the main shrubs. Black sagebrush and mountain big sagebrush are found mainly on the western slope of Colorado. Grasses such as Letterman needlegrass, bottlebrush, squirreltail, prairie junegrass, elk sedge and forbs such as western yarrow, northwest cinquefoil and shrubs such as shrubby cinquefoil, western snowberry are secondary in the community. Small amounts of slender wheatgrass, nodding brome, blue grama, sheep fescue, muttongrass, bearded wheatgrass, fendler sandwort, rose pussytoes, aspen peavine, hairy goldaster, spreading thermopsis, threadleaf groundsel, mulesear wyethia, onion silvery lupine, porter lingusticum, arrowleaf balsamroot, redroot eriogonum, daisy fleabane, orange sneezeweed, Saskatoon serviceberry, true mountain mahogany, antelope bitterbrush, fringed sagebrush, kinnikinnick, gambel oak, oregon grape, pingue hymenoxys, mountain big sagebrush, and black sagebrush grow in smaller amounts in scattered stands. Scattered ponderosa pine with an occasional rocky mountain juniper and quaking aspen are typical of this site.

Ponderosa pine is the major tree species for this site, however, aspen will show up on the higher edge of this site.

The state and transition model was added to fill the provisional ecological site instruction. It is a very general model.

## State and transition model



## R048AY255CO Pine Grassland

### State 1: Reference State

#### 1.1 Light Overstory Ponderosa

Patchy mature Ponderosa with less cover in the understory trees. Dense grass and forb cover consisting mainly of Parry's Oatgrass, Arizona Fescue, and mountain muhly.

1.2A

#### 1.2 Light Ponderosa with Shrub cover

Mature scattered Ponderosa canopy with mountain big sagebrush, Fendler's ceanthus, and wax currant

Understory species are Arizona Fescue and Mountain Muhly

1.1A

1.2B

1.3A

#### 1.3 Mature Ponderosa Pine

Mature scattered Ponderosa canopy with mountain big sagebrush, Fendler's ceanthus, and wax currant

Understory species are Arizona Fescue and Mountain Muhly

1.3B

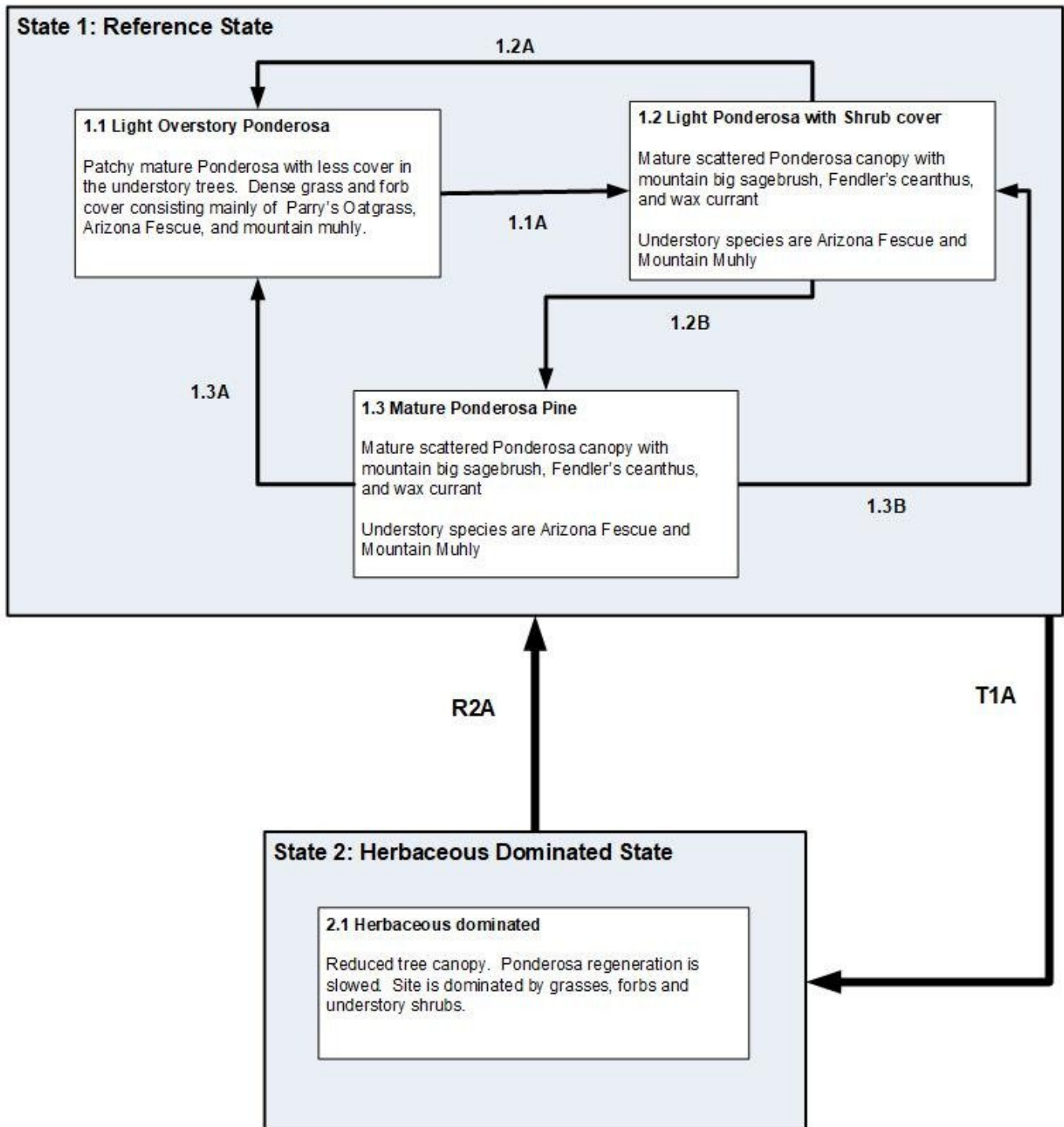
R2A

T1A

### State 2: Herbaceous Dominated State

#### 2.1 Herbaceous dominated

Reduced tree canopy. Ponderosa regeneration is slowed. Site is dominated by grasses, forbs and understory shrubs.



## Legend

1.1A, 1.2B – time without disturbance, wetter cycles, tree establishment, lack of fire

1.2A, 1.3A – disturbance, large scale fire, insect and diseases of trees, prolonged drought

1.3B – small scale fire and disturbances, insect and diseases of trees, prolonged drought

T1A – catastrophic wildfire

R2A – Seedling plantings, time without disturbance

### State 1

#### Reference State

### Community 1.1

#### Reference State

If ecological retrogression is cattle-induced, grasses such as Parry oatgrass, Arizona fescue, mountain muhly, slender wheatgrass, and nodding brome grass will disappear from the plant community. If retrogression of this site is caused by sheep, desirable grasses, forbs and shrubs will decrease. This includes mountain muhly, nodding brome grass, northwest cinquefoil, aspen peavine, black sagebrush, and western snowberry. With further deterioration of this site, elk sedge, letterman needlegrass, and snowberry will disappear and will be replaced by bottlebrush squirreltail, rose pussytoes, mountain big sagebrush, and silver lupine. Plants that are likely to invade this site once it has completely degenerated are cheatgrass, pinque hymenoxys, black henbane, cluster tarweed, broom snakeweed, and Canada thistle. Vegetation density is approximately 25 to 30 percent. If the range is in excellent condition, the approximate total annual production ranges area: Favorable years 1200 lb/ac; Normal years 900 lb/ac; Unfavorable years 750 lb/ac

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	630	650	800
Forb	40	90	150
Tree	40	90	150
Shrub/Vine	40	70	100
<b>Total</b>	<b>750</b>	<b>900</b>	<b>1200</b>

### Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1				550–800	
	Parry's oatgrass	DAPA2	<i>Danthonia parryi</i>	180–225	–
	Arizona fescue	FEAR2	<i>Festuca arizonica</i>	180–225	–
	mountain muhly	MUMO	<i>Muhlenbergia montana</i>	90–135	–

	pine dropseed	BLTR	<i>Blepharoneuron tricholepis</i>	45–90	–
	Geyer's sedge	CAGE2	<i>Carex geyeri</i>	45–90	–
	Letterman's needlegrass	ACLE9	<i>Achnatherum lettermanii</i>	0–45	–
	squirreldtail	ELELE	<i>Elymus elymoides</i> ssp. <i>elymoides</i>	0–45	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	0–27	–
	bearded wheatgrass	ELCA11	<i>Elymus caninus</i>	0–27	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0–27	–
	nodding brome	BRAN	<i>Bromus anomalus</i>	0–27	–
	mountain brome	BRMA4	<i>Bromus marginatus</i>	0–27	–
	sheep fescue	FEOV	<i>Festuca ovina</i>	0–27	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–27	–
	muttongrass	POFE	<i>Poa fendleriana</i>	0–18	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–9	–

#### Forb

2				45–135	
	prairie thermopsis	THRH	<i>Thermopsis rhombifolia</i>	9–18	–
	prairie fleabane	ERST3	<i>Erigeron strigosus</i>	9–18	–
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	9–18	–
	aspen pea	LALA6	<i>Lathyrus laetivirens</i>	9–18	–
	silvery lupine	LUAR3	<i>Lupinus argenteus</i>	9–18	–
	slender cinquefoil	POGR9	<i>Potentilla gracilis</i>	9–18	–
	threadleaf ragwort	SEFLF	<i>Senecio flaccidus</i> var. <i>flaccidus</i>	0–9	–
	Torrey's penstemon	PEBAT	<i>Penstemon barbatus</i> ssp. <i>torreyi</i>	0–9	–
	Porter's licorice-root	LIPO	<i>Ligusticum porteri</i>	0–9	–
	redroot buckwheat	ERRA3	<i>Eriogonum racemosum</i>	0–9	–
	western goldentop	EUOC4	<i>Euthamia occidentalis</i>	0–9	–
	Ross' avens	GEROT	<i>Geum rossii</i> var. <i>turbinatum</i>	0–9	–
	hairy false goldenaster	HEVI4	<i>Heterotheca villosa</i>	0–9	–
	owl's-claws	HYHO	<i>Hymenoxys hoopesii</i>	0–9	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0–9	–
	nodding onion	ALCE2	<i>Allium cernuum</i>	0–9	–
	rosy pussytoes	ANRO2	<i>Antennaria rosea</i>	0–9	–
	Fendler's sandwort	ARFE3	<i>Arenaria fendleri</i>	0–9	–
	mule-ears	WYAM	<i>Wyethia amplexicaulis</i>	0–9	–

#### Shrub/Vine

3				45–135	
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	9–45	–
	Gambel oak	QUGA	<i>Quercus gambelii</i>	0–45	–
	Fendler's ceanothus	CEFE	<i>Ceanothus fendleri</i>	9–27	–
	alderleaf mountain mahogany	CEMO2	<i>Cercocarpus montanus</i>	0–27	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	0–27	–
	shrubby cinquefoil	DAFRF	<i>Dasiphora fruticosa</i> ssp.	0–18	–

			<i>floribunda</i>		
	wax currant	RICE	<i>Ribes cereum</i>	9–18	–
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	0–18	–
	Saskatoon serviceberry	AMAL2	<i>Amelanchier alnifolia</i>	0–18	–
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	0–18	–
	black sagebrush	ARNO4	<i>Artemisia nova</i>	9–18	–
	kinnikinnick	ARUV	<i>Arctostaphylos uva-ursi</i>	0–9	–
<b>Tree</b>					
4				40–125	
	ponderosa pine	PIPO	<i>Pinus ponderosa</i>	90–135	–
	quaking aspen	POTR5	<i>Populus tremuloides</i>	45–90	–
	Rocky Mountain juniper	JUSC2	<i>Juniperus scopulorum</i>	0–18	–

## Animal community

### INTERPRETATIONS FOR GRAZING ANIMALS:

This site provides excellent forage for livestock during the summer months. Major wildlife use is also high at this time, but may lap over to some spring and fall use as well. The dominant grasses, Arizona fescue, parry oatgrass, and mountain muhly provide excellent grazing in the summer. The many forbs that occupy this site enhance the grazing value. Shrubs provide some fall grazing after everything else has dried up.

The vegetative palatability of each species will influence proper use considerations. Type of grazing animal, season, past grazing use, and associated plant species will directly influence the variation in animal preference for forages under various climatic conditions.

Guide to initial stocking rates 3/

Condition Percent Climax

Class Vegetation Ac/AUM AUM/Ac Ha/AUM AUM/Ha

Excellent 76-100 3.3-4.7 .3-.29 .8-1.8 1.02-.4

Good 51-75 4.8-7.9 .2-.11 1.9-3.1 .5-.2

Fair 26-50 8.0-23 .12-.03 3.2-9.4 .3-.1

Poor 0-25 24.0+ .04- 9.5+ .1-

3/ Stocking rates are based on an average growing season, based on 1,200 pounds (540kg) of forage (air-dry) per animal unit month. (This figure takes into account the vegetation that disappears through trampling, small herbivores, etc., which amounts to approximately 7.9 pounds (3.6kg) per day under normal conditions.)

### INTERPRETATIONS FOR WILDLIFE:

This site produces a wide variety of grasses, forbs and shrubs for use by many species of wildlife. Large herbivores such as mule deer and elk make extensive use of this site. Small mammals, cottontail rabbits, fox porcupines, coyotes, bobcats, field mice, squirrels, and occasional mountain lions, occupy the site at some time during the year. Blue grouse, merrian turkeys, and numerous songbirds make up the remainder of the wildlife using this site.

## Hydrological functions

Soils in this site are grouped into "B" hydrologic group except Dunton which is "C" according to the "Soils of Colorado Loss Factor and Erodibility Hydrologic Groupings 1979", handbook. Field investigations are needed to determine hydrologic curve numbers. For group "B" soils the hydrologic curve numbers are about 61 and group "C" is 74 when the hydrologic conditions are good, as shown in "Peak Flows in Colorado" handbook.

Refer to SCS National Engineering Handbook, Section 4 to determine runoff quantities from the curves.

## Recreational uses

Many species of forbs that bloom in spring and early summer enhance the aesthetic value of this site. Excellent

recreation opportunities for this site include hunting and picnicking.

## Wood products

Ponderosa pine can have a site index as high as 60 on this soil, but most often it falls below 50.

## Other information

This site occurs in the Canyon City, Castle Rock, Colorado Springs, Cortez, Cripple Creek, Delta, Durango, Golden, Fort Collins, Montrose, Norwood, Pagosa Springs, Salida, Trinidad, Walsenburg, and Westcliffe field offices.

### MAJOR PLANTS POISONOUS TO LIVESTOCK:

Silvery lupine can be poisonous to all livestock. It is most dangerous when other forage is scarce and if hay contains immature lupine pods (especially dangerous during seed stage).

#### Effect and symptoms

Lupine seeds are toxic to sheep when 0.25 to 1.5 percent of the animals body weight is consumed in one feeding. 150 to 175 gm (.33-.38 pounds) per day has been lethal to sheep. The toxic substance is a non-cumulative alkaloid. Small amounts ingested over a period of time create no difficulties.

Lupinus sericeus will cause crooked leg disease in calves during the 40th to 70th day of gestation and will cause other congenital deformities. The most characteristic symptom is labored breathing. Animals may vary from depression and coma to extreme activity. Animals may butt objects and other animals or may stand with lowered head pressing against a solid object. Death from respiratory paralysis follows a short period of convulsions.

Poisoning of cattle show dry nose, stilted walk, lethargy, depression, hard dry feces, rough dry hair, coat, quivering, extreme body weakness, irregular heat beat, prostration, coma, and convulsions. Moving the animal exaggerates these symptoms.

Orange sneezeweed mainly affects sheep but cattle and horses may be poisoned. The plant is toxic at all stages of growth, but is not relished if better forage is available, it will???

#### Effect and symptoms

The poison is cumulative and animals are poisoned by eating 2 pounds of green leaves daily for 10 days. Some animals die when a few days after symptoms show up and others may live 2 to 3 weeks. Complete recovery is possible if animals are removed from area at the first signs of poisoning. Animals are emaciated, lips become stained green from vomitus, depression, weakness with irregular gait, frothing at the mouth, coughing, chronic vomiting or spewing and bloating. The poisoning principle is a toxic glucoside called dugalin.

Gambel oak can be poisonous to cattle and sheep in early spring during budding and leafing and after a frost. As leaves mature, toxicity decreases.

#### Effect and symptoms

Cattle may graze up to 50 percent of their diet without showing signs of sickness but more than 75% of their diet will cause death. Oak tannins are suspected of causing death. Symptoms of oak poisoning include constipation, feces are dry and appear in small pellets. They are often surrounded with mucous, and even blood, and may become watery later but are always scanty and always dark in color. The animal loses its appetite, appears gaunt, the coat becomes rough, nose is dry and cracked, and the animal may die in 2 weeks to a month.

Pingue hymenoxys is mainly poisonous to sheep but occasionally cattle. The plant is poisonous throughout the growing season. Hungry animals are very susceptible in the spring and fall.

#### Effects and symptoms

All above ground parts of pingue hymenoxys are poisonous. Grazing the plant may cause a gradual build-up of the toxin to a lethal level, or if large amounts are eaten poisoning may occur immediately. The first sign of poisoning is green froth around the nose and mouth from salivation and vomiting. Other signs are loss of appetite, weakness, and depression, irregular gait and trembling, followed by emaciation and death unless animals are removed from the area.

## Inventory data references

Field Offices: Canon City, Castle Rock, Colorado Springs, Cortez, Cripple Creek, Delta, Durango, Golden, Fort Collins, Montrose, Norwood, Pagosa Springs, Salida, Trinidad, Walsenburg, Westcliff

## Type locality

Location 1: Archuleta County, CO	
General legal description	2.5 miles south of intersection between Sanborn Park Road and Dave Wood Road. T. 46N., R. 10W., Sec 7 1 mile north of Turkey Spring USFS Guard Station, T. 35N., R. 3W, Sec 12.

## Other references

### References

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United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Western Regional Climate Center. Retrieved from <http://www.wrcc.dri.edu/summary/Climsmco.html> on December 10, 2018

## Contributors

Suzanne Mayne-Kinney

## Approval

Kirt Walstad, 3/05/2024

## Acknowledgments

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--Site Development and Testing Plan--:

Future work to validate and further refine the information in this Provisional Ecological Site Description is necessary. This will include field activities to collect low-, medium-, and high-intensity sampling, soil correlations, and analysis of that data.

Additional information and data is required to refine the Plant Production and Annual Production tables for this ecological site. The extent of MLRA 48A must be further investigated.

Field testing of the information contained in this Provisional ESD is required. As this ESD is moved to the Approved ESD level, reviews from the technical team, quality control, quality assurance, and peers will be conducted.

**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	05/03/2024
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

**Indicators**

1. **Number and extent of rills:**  

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2. **Presence of water flow patterns:**  

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3. **Number and height of erosional pedestals or terracettes:**  

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**  

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5. **Number of gullies and erosion associated with gullies:**  

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6. **Extent of wind scoured, blowouts and/or depositional areas:**  

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7. **Amount of litter movement (describe size and distance expected to travel):**  

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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:**
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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):**
- 
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:**
-