

## Ecological site R048AY218CO Dry Shallow Pine

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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**

Shallow Pine occurs on mountains, hills, and mountainside. Slopes is between 5 to 35%. Soils are shallow (10 to 20 inches) in depth. Soils are derived from slope alluvium from monzonite or gneiss or from residuum from granite, gneiss or granodiorite. Soil surface texture is very gravelly sandy loam with a loamy skeletal subsurface. It is a

Gambel's oak – Mountain muhly community. It has an typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.

### Associated sites

R048AY222CO	<p><b>Loamy Park</b></p> <p>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 a Arizona Fescue – Mountain Muhly community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.</p>
R048AY230CO	<p><b>Shallow Loam</b></p> <p>Shallow Loam occurs on mountains, and hills. 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.</p>

### Similar sites

R048AY240CO	<p><b>Shallow Pine</b></p> <p>This site differs from the Shallow Pine #240 site due to lower annual productivity and a small shift in the plant composition toward more warm season vegetation.</p>
R048AY230CO	<p><b>Shallow Loam</b></p> <p>Shallow Loam occurs on mountains, and hills. 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.</p>
F048AY448CO	<p><b>Mountain Pinyon</b></p> <p>Mountain Pinyon occurs on mountains, ridges, hills, hillslopes and structural benches. Slopes is between 3 to 30%. Soils are very shallow to shallow (5 to 20 inches) in depth. Soils are derived from colluvium, residuum, slope alluvium from sandstone and/or siltstone. Soil surface texture is loam, gravelly to gravelly loam, channery loam or sandy loam with a loamy or loamy skeletal subsurface. It is a Two-needle pinyon – Gambel's oak – western wheatgrass community. It has an aridic ustic moisture regime and a frigid temperature regime. The effective precipitation ranges from 12 to 16 inches.</p>
R048AY229CO	<p><b>Rocky Loam</b></p> <p>Rocky Loam occurs on ridges, mountainside, mountain slopes and mountains. Soils are very shallow to shallow (less than 20 inches) loamy-skeletal soils derived from residuum from granite, gneiss, phyllite, schist, sandstone and/or limestone. Soil surface texture are generally coarse sandy loams to light clay loams. 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.</p>

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Quercus gambelii</i> (2) <i>Cercocarpus montanus</i>
Herbaceous	(1) <i>Muhlenbergia montana</i> (2) <i>Festuca arizonica</i>

### Physiographic features

The topography of this site is nearly level ridge tops to sloping hill and mountains. The general terrain can be

described as mountain sides, hills and mountains.

**Table 2. Representative physiographic features**

Landforms	(1) Mountain (2) Hill (3) Mountainside
Runoff class	High to very high
Flooding frequency	None
Ponding frequency	None
Elevation	2,286–2,804 m
Slope	5–35%

## **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.

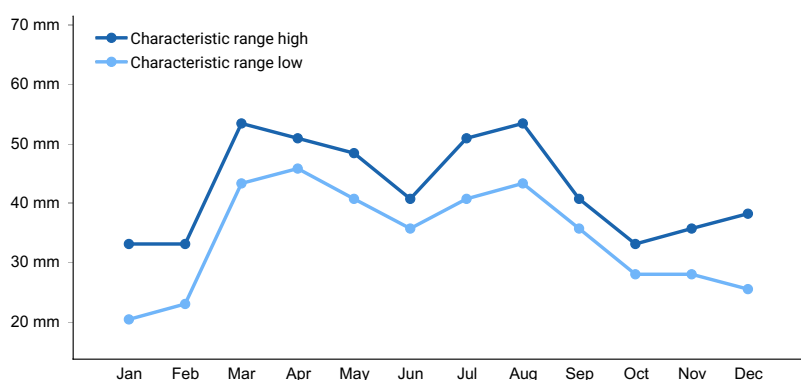
Southeast (Sangre de Cristo Mtns): There are no climate stations in this zone in MLRA 48A. Closest ones are in MLRA 49. The growing season appears to be longer on the Sangre de Cristos. Driest months are December to February and the wettest are July & August.

Crylic High elevation valleys: Pitkin, Taylor River and Meredith. These areas have shorter growing seasons by 20 to

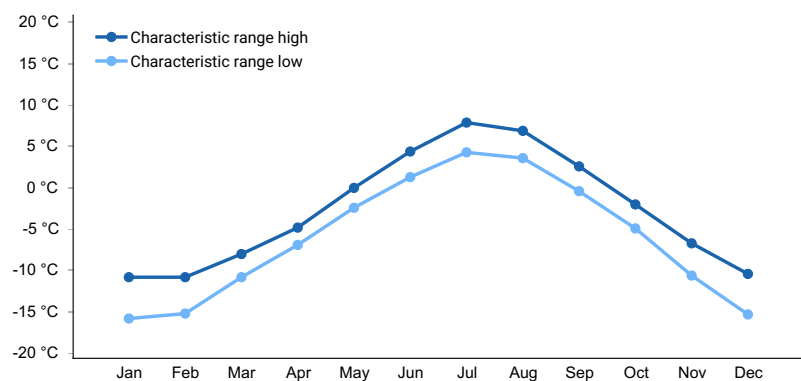
40 days over the frigid stations.

**Table 3. Representative climatic features**

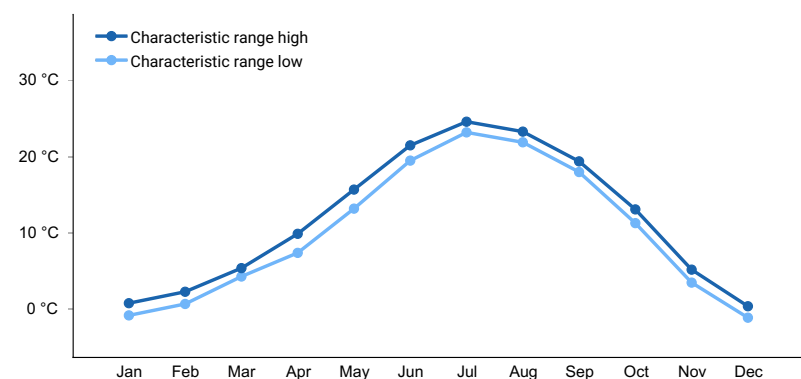
Frost-free period (characteristic range)	7-52 days
Freeze-free period (characteristic range)	47-97 days
Precipitation total (characteristic range)	432-483 mm
Frost-free period (actual range)	2-68 days
Freeze-free period (actual range)	35-109 days
Precipitation total (actual range)	432-483 mm
Frost-free period (average)	31 days
Freeze-free period (average)	72 days
Precipitation total (average)	457 mm



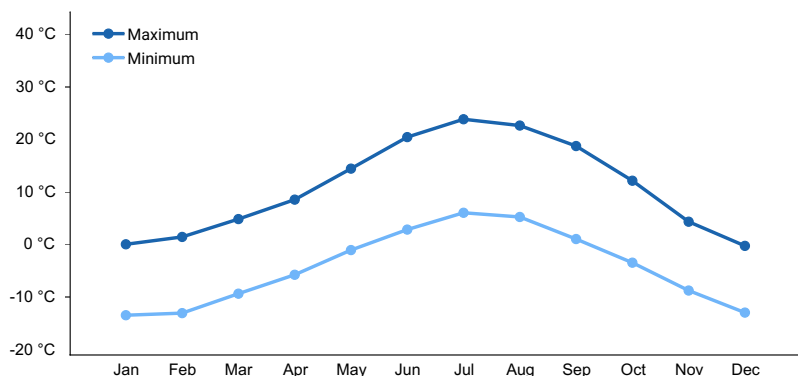
**Figure 1. Monthly precipitation range**



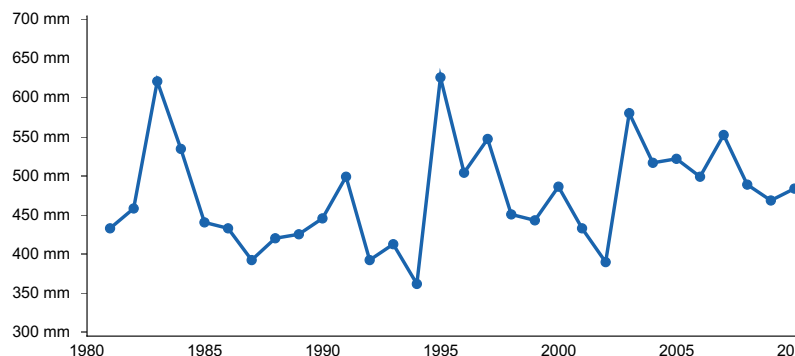
**Figure 2. Monthly minimum temperature range**



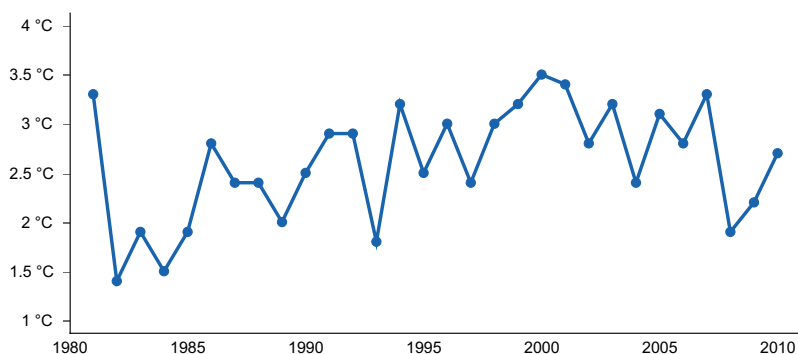
**Figure 3. Monthly maximum temperature range**



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



**Figure 5. Annual precipitation pattern**



**Figure 6. Annual average temperature pattern**

## Climate stations used

- (1) HOURGLASS RSVR [USC00054135], Bellvue, CO
- (2) FRASER [USC00053116], Fraser, CO
- (3) GEORGETOWN [USC00053261], Idaho Springs, CO

## Influencing water features

None

## Soil features

Soils are shallow and well drained. They formed on mountainsides, ridges, hills, and undulating to hilly intermontane plateaus in residuum from monzonite, granite, granodiorite, and gneiss. Typically, the surface layer is very gravelly or extremely gravelly sandy loam. The subsoil of the Teaspoon soils is mainly very gravelly or extremely gravelly sandy clay loam. The substratum of all of these soils is mainly very gravelly or extremely gravelly sandy loam.

Permeability is moderate to rapid, and the hazard of erosion by water on bare soil is slight to very high. Effective rooting depth is 6 to 20 inches. And available water capacity is very low.

Soil series surface texture slope range phase

Cathedral grv-sl 3-15%

Rogert grv-sl 5-15% warm

Rogert grv-sl 10-40%

Teaspoon grv-sl 5-45%

Mean annual soil temperature 43 to 47°F

**Table 4. Representative soil features**

Parent material	(1) Slope alluvium–monzonite (2) Slope alluvium–gneiss (3) Residuum–granite and gneiss (4) Residuum–granite (5) Residuum–granodiorite
Surface texture	(1) Very gravelly sandy loam
Family particle size	(1) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Soil depth	25–51 cm
Surface fragment cover ≤3"	35–50%
Surface fragment cover >3"	2–20%
Available water capacity (Depth not specified)	0.76–3.56 cm
Soil reaction (1:1 water) (Depth not specified)	6.1–7.8
Subsurface fragment volume ≤3" (Depth not specified)	40–50%
Subsurface fragment volume >3" (Depth not specified)	2–5%

## Ecological dynamics

There are two canopy cover communities for this site.

For both tree canopy classes, if site degradation is cattle induced the more palatable grasses and shrubs such as Arizona fescue, mountain muhly, Parry oatgrass, needlethread, and true mountain mahogany will decline in relative abundance while initially forbs and shrubs increase. However, if degradation is sheep induced, desirable forbs and shrubs may be reduced. With the decrease of the above listed plants blue grama, bottlebrush squirreltail, and prairie Junegrass will increase initially. If degradation continues, shrubs such as fringed sagebrush, Howard rabbitbrush, and plains pricklypear, and trees such as Gable oak will start to increase. Plant species likely to invade and increase in density, when the site is in a low ecological condition class, are sleepy grass, cheatgrass, red threawn, curlycup gumweed, and broom snakeweed.

The State and Transition Model is a basic model used to meet the Provisional Ecological Site Instruction.

## State and transition model

## R048AY218CO – Dry Shallow Pine

### State 1: Reference State

#### 1.1 Pinyon-Pine Woodland

Pinyon with scattered Ponderosa Pine, grasses, forbs and shrubs.

#### 1.2 Mature Pinyon-Ponderosa Woodland

Pinyon & Ponderosa Pine are dominant, Understory of grasses, forbs and shrubs.

#### 1.3 Oak with Scattered Trees

Other grasses, shrubs and forbs. Pinyon and Ponderosa pine scattered and starting to re-establish.

1.3A

1.1B

1.2A

1.1A

1.2B

T1A

### State 2: Seeded State

#### 2.1 Seeded Grassland/Shrubland

Seeded grass species, oak, other grasses, shrubs and forbs.

2.2A

2.1A

#### 2.2 Seeded with Pinyon-Ponderosa

Seeded grass species, with scattered Pinyon and Ponderosa Pine, other grasses, shrubs and forbs.

## Legend

1.1A,1.3A – time without disturbance, lack of fire, lack of insect/pathogen outbreaks, drought

1.1B,1.2B – Fire, wet climatic cycles, vegetation treatments, and/or insect or pathogen outbreaks

1.2A – small scale Insect and pathogen outbreaks, drought, small scale fires

T1A – Vegetation treatments and seedings

2.1A – time without disturbance, lack of fire, lack of insect/pathogen outbreaks, drought

2.2A – Vegetation treatments and seedings, insect or pathogen outbreaks, and/or wet climatic cycles

### State 1

Reference State 0-15% Canopy Cover

### Community 1.1

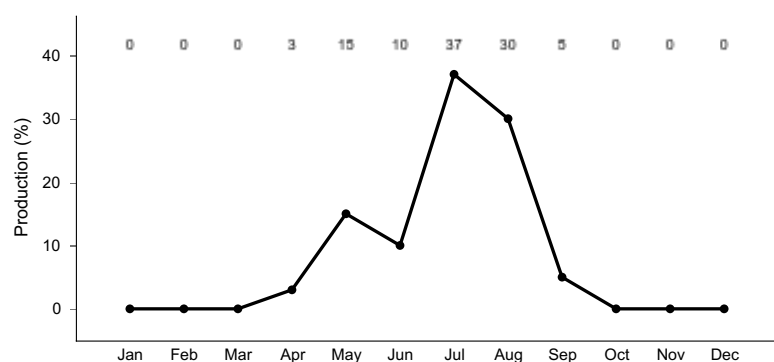
Reference State 0-15% Canopy Cover



The plant community has an open stand Gamble oak, pinyon pine, and ponderosa pine aspect mixed with a mountain bunchgrass community. Some open park areas occur throughout the site. The plant community (based on air-dry weight) is about 70-85% grass and grasslike plants, 5-10% forbs, 5-10% shrubs, and 0-10% trees. This site differs from the Shallow Pine #240 site due to the lower annual productivity and a small shift in the plant composition toward more warm season vegetation. Plants common to the site include mountain muhly, Arizona fescue, needleandthread, pine dropseed, Gamble Oak, pinyon pine, and ponderosa pine. Type plant %canopy cover average ht %basal area Grass/grasslike 55% 1.3% 30% Forbs 5% .5% 1% Shrubs 15% 4% 2% Trees 7% 22% 1% Stocking rates given below are based on continuous use for the entire growing season and are intended only as an initial guide. About 5-15% of the total production (by air-dry weight) will likely be unpalatable our out of reach by grazing animals. Forage needs are calculated on the basis of 900 pounds of air-dry forage per animal unit mouth (AUM). To maintain proper use and allow for forage that disappears through trampling, small herbivore use, weathering, etc., about 35% of the palatable forage produced is considered available for grazing by large herbivores. Tree canopy class 0-15% Condition %climax vegetation AUM/AC AC/AUM AC/AU Excellent 76-100% .19-.23 AUM/AC 4.3-5.5 AC/AUM 52-66 AC/AU Good 51-75% .13-.18 AUM/AC 5.6-8.2 AC/AUM 67-99 AC/AU Fair 26-50% .08-.12 AUM/AC 8.3-14.2 AC/AUM 100-171 AC/AU Poor 0-25% -.07 AUM/AC 14.3+ AC/AUM 172+ AC/AU Adjustments to the initial stocking rates should be made as needed to obtain proper use. With specialized grazing systems, large livestock breeds, uncontrolled big game, inaccessibility, dormant season use, presence of introduced forage species, seeded rangeland etc., will require stocking rate adjustments.

**Table 5. Annual production by plant type**

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	347	566	717
Forb	34	56	78
Tree	34	56	78
Shrub/Vine	34	56	78
<b>Total</b>	<b>449</b>	<b>734</b>	<b>951</b>



**Figure 8. Plant community growth curve (percent production by month). CO9998, Mountain Zone by CB. \*\*\*dont know the growth curve or curve id...just made this up so I could save the data\*\*\* CB.**

## State 2

### Undisturbed 16-35% Canopy Cover

#### Community 2.1

##### Undisturbed Community 16-35% Canopy Cover

The plant community expressed by the higher tree canopy cover class has the appearance of a scattered overstory of Gamble oak, pinyon pine and ponderosa pine mixed with mountain bunchgrasses community. This community differs from that of the lower tree cover class by having an over all decrease in the relative abundance of grasses and shrubs with a corresponding increase in the amount of trees. This plant community (based on air-dry weight) is about 65-85 percent grass and grasslike plants, 5-10 percent forbs, 3-7 percent shrubs, and 5-15 percent trees. Plants common to this higher tree canopy class community include mountain muhly, Arizona fescue needleandthread, pine dropseed, Gamble oak, pinyon pine and ponderosa pine. Ground cover structure Plant name

%canopy cover vertical view/ average ht/ %basal area Grasses/grasslikes 45% 1.3% 20% Forbs 5% .5% 1% Shrubs 15% 4% 2% Trees 25% 20% 2% Stocking rates given below are based on continuous use for the entire growing season and are intended only as an initial guide. About 5-15% of the total production (by air-dry weight) will likely be unpalatable or out of reach to grazing animals. Forage needs are calculated on the basis of 900 pounds of air-dry forage per animal unit mouth (AUM). To maintain proper use and allow for forage that disappears through trampling, small herbivore use, weathering, etc., about 35% of the palatable forage produced is considered available for grazing by large herbivores. Tree canopy class 15-35+% Condition %climax vegetation AUM/AC AC/AUM AC/AU Excellent 76-100% .11-.14 AUM/AC 7.1-9.9 AC/AUM 85-119 AC/AU Good 51-75% .08-.10 AUM/AC 10.0-14.2 AC/AUM 120-170 AC/AU Fair 26-50% .04-.07 AUM/AC 14.3-33.2 AC/AUM 171-399 AC/AU Poor 0-25% -.03 AUM/AC 33.3+ AC/AUM 400+ AC/AU Adjustments to the initial stocking rates should be made as needed to obtain proper use. With specialized grazing systems, large livestock breeds, uncontrolled big game, inaccessibility, dormant season use, presence of introduced forage species, seeded rangeland etc., will require stocking rate adjustments.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	230	336	499
Tree	17	45	73
Shrub/Vine	17	34	50
Forb	17	34	50
<b>Total</b>	<b>281</b>	<b>449</b>	<b>672</b>

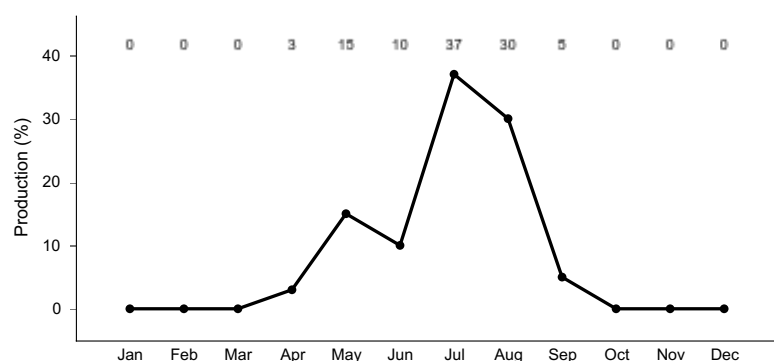


Figure 10. Plant community growth curve (percent production by month). CO9999, Mountain Zone by CB. \*\*\*dont know the growth curve or curve id...just made this up so I could save the data\*\*\*CB.

## Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>grasses</b>			510–622	
	mountain muhly	MUMO	<i>Muhlenbergia montana</i>	146–219	–
	Arizona fescue	FEAR2	<i>Festuca arizonica</i>	39–90	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	39–90	–
	pine dropseed	BLTR	<i>Blepharoneuron tricholepis</i>	39–73	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	22–56	–
	Geyer's sedge	CAGE2	<i>Carex geyeri</i>	17–39	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	22–39	–
	Parry's oatgrass	DAPA2	<i>Danthonia parryi</i>	22–39	–
	muttongrass	POFF	<i>Poa fendleriana</i>	6–22	–

	mountain grass	SCSC	<i>Schizachyrium scoparium</i>	0–22	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	0–22	–
	Scribner needlegrass	ACSC11	<i>Achnatherum scribneri</i>	6–22	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	0–17	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0–17	–
	sun sedge	CAINH2	<i>Carex inops ssp. heliophila</i>	0–17	–
	common wolfstail	LYPH	<i>Lycurus phleoides</i>	0–6	–
<b>Forb</b>					
2	<b>forbs</b>			39–73	
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	0–17	–
	Richardson's geranium	GERI	<i>Geranium richardsonii</i>	0–17	–
	hairy false goldenaster	HEVI4	<i>Heterotheca villosa</i>	0–6	–
	pingue rubberweed	HYRI	<i>Hymenoxys richardsonii</i>	0–6	–
	silvery lupine	LUAR3	<i>Lupinus argenteus</i>	0–6	–
	Front Range beardtongue	PEVI3	<i>Penstemon virens</i>	0–6	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0–6	–
	nodding onion	ALCE2	<i>Allium cernuum</i>	0–6	–
	rosy pussytoes	ANRO2	<i>Antennaria rosea</i>	0–6	–
<b>Shrub/Vine</b>					
3	<b>shrubs</b>			39–73	
	Gambel oak	QUGA	<i>Quercus gambelii</i>	22–50	–
	alderleaf mountain mahogany	CEMO2	<i>Cercocarpus montanus</i>	17–39	–
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	0–17	–
	wax currant	RICE	<i>Ribes cereum</i>	0–6	–
	gooseberry currant	RIMO2	<i>Ribes montigenum</i>	0–6	–
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	0–6	–
	Parry's rabbitbrush	ERPAH	<i>Ericameria parryi var. howardii</i>	0–6	–
	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	0–6	–
<b>Tree</b>					
4	<b>trees</b>			39–73	
	twoneedle pinyon	PIED	<i>Pinus edulis</i>	0–22	–
	ponderosa pine	PIPO	<i>Pinus ponderosa</i>	0–6	–
	Rocky Mountain juniper	JUSC2	<i>Juniperus scopulorum</i>	0–6	–

Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>grasses</b>			291–381	
	mountain muhly	MUMO	<i>Muhlenbergia montana</i>	56–78	–
	Arizona fescue	FEAR2	<i>Festuca arizonica</i>	34–67	–
	pine dropseed	BLTR	<i>Blepharoneuron tricholepis</i>	22–67	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	22–45	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	11–34	–

	Parry's oatgrass	DAPA2	<i>Danthonia parryi</i>	22–34	–
	Geyer's sedge	CAGE2	<i>Carex geyeri</i>	11–28	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	11–22	–
	Scribner needlegrass	ACSC11	<i>Achnatherum scribneri</i>	11–22	–
	sun sedge	CAINH2	<i>Carex inops ssp. heliophila</i>	6–11	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	6–11	–
	muttongrass	POFE	<i>Poa fendleriana</i>	6–11	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	0–6	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	0–6	–
	common wolfstail	LYPH	<i>Lycurus phleoides</i>	0–6	–
<b>Forb</b>					
2	<b>forbs</b>			22–45	
	rosy pussytoes	ANRO2	<i>Antennaria rosea</i>	0–11	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	0–6	–
	Richardson's geranium	GERI	<i>Geranium richardsonii</i>	0–6	–
	hairy false goldenaster	HEVI4	<i>Heterotheca villosa</i>	0–6	–
	pingue rubberweed	HYRI	<i>Hymenoxys richardsonii</i>	0–6	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0–6	–
	nodding onion	ALCE2	<i>Allium cernuum</i>	0–6	–
	silvery lupine	LUAR3	<i>Lupinus argenteus</i>	0–6	–
	Front Range beardtongue	PEVI3	<i>Penstemon virens</i>	0–6	–
<b>Shrub/Vine</b>					
3	<b>shrubs</b>			22–45	
	alderleaf mountain mahogany	CEMO2	<i>Cercocarpus montanus</i>	11–34	–
	Gambel oak	QUGA	<i>Quercus gambelii</i>	11–34	–
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	0–11	–
	wax currant	RICE	<i>Ribes cereum</i>	0–6	–
	gooseberry currant	RIMO2	<i>Ribes montigenum</i>	0–6	–
	Parry's rabbitbrush	ERPAH	<i>Ericameria parryi var. howardii</i>	0–6	–
	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	0–6	–
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	0–6	–
<b>Tree</b>					
4	<b>trees</b>			22–67	
	twoneedle pinyon	PIED	<i>Pinus edulis</i>	11–22	–
	ponderosa pine	PIPO	<i>Pinus ponderosa</i>	6–11	–
	Rocky Mountain juniper	JUSC2	<i>Juniperus scopulorum</i>	0–6	–

## Animal community

### INTERPRETATIONS FOR GRAZING:

The grazing value of this site when in excellent condition is fair due to the relatively low productivity and the steep slopes. Therefore, grazing on this site requires careful management to prevent degradation and accelerated erosion.

## INTERPRETATIONS FOR WILDLIFE:

Habitat value, when the site is in excellent condition, is high for elk, small mammals, and blue grouse, while the value is medium for mule deer and pronghorn. As the ecological condition begins to deteriorate the value for elk will decrease while the value for all other species will not change significantly. Continued regression of the site will decrease habitat value for all species of wildlife. A decline to poor ecological condition will initiate severe erosion on steeper slopes and result in extremely low wildlife value for the site.

Species that use this site include black squirrel, blue grouse, cottontail, coyote, elk, gray jay, mountain lion, mule deer, pinyon jay, pronghorn, red-tailed hawk, and Richardson's ground squirrel.

## Hydrological functions

Soils in this site are grouped into the "D" hydrologic group, as outlined in the Soils of Colorado Loss Factors and Erodibility Hydrologic groupings. Field investigations are needed to determine hydrologic conditions and hydrologic curve numbers. The hydrologic curve number for Group D soils is about 89 when hydrologic conditions are fair as shown in the NRCS Engineering Field Manual, Chapter 2.

## Recreational uses

This site has many forbs and shrubs that bloom from spring to early summer which are aesthetically pleasing. The park-like aspect created by the scattered evergreen trees adds to the aesthetics of the site and increase the recreational values associated with camping and hiking. Hunting for mule deer and elk is generally good to excellent on this site.

## Wood products

Under climax conditions, this site has limited value for producing wood products such as Christmas trees, fire wood, fence posts, and fence stays. The site has a low value potential for lumber.

## Other information

### ENDANGERED PLANTS AND ANIMALS:

None have been indemnified at this time.

This site occurs in Fremont, Park, and Teller counties in Colorado.

### POISONOUS PLANTS:

Silvery lupine can be poisonous to all livestock. Symptoms include dry nose, stilted walk, lethargy, depression, hard dry feces, rough dry hair, quivering, extreme weakness, irregular heart beat, coma, and convulsions. The season of most serious problems is when forage is scarce and if hay contains immature lupine seed.

Pingue hymenoxys is poisonous to sheep and occasionally cattle. Symptoms include salivation, nausea, vomiting, loss of appetite, irregular gait, and trembling. It can be poisonous in spring and summer.

Gamble oak can be poisonous to cattle. Symptoms include gaunt and tucked-up appearance, constipation, weakness, emaciation, mucus in feces, dark colored urine, and collapse. This can happen in the spring of the year.

Ponderosa pine can be poisonous to cattle. It causes abortion characterized by weak parturition contractions, weak calves, persistently retained placentas. This can happen when forage is scarce.

## Type locality

Location 1: Fremont County, CO	
Township/Range/Section	TT16S RR71W S5
General legal description	About 500 feet south and 1500 feet east of the northwest corner of the section.
Location 2: Teller County, CO	
Township/Range/Section	TT15S RR70W S19
General legal description	Four miles south of Wrights Reservoir, 2300 feet south and 1800 feet west of the north east corner of the section.
Location 3: Park County, CO	
Township/Range/Section	TT15S RR71W S32
General legal description	About 600 feet north of Fremont and Park county line, about 600 feet north and 1700 feet east of the south west corner of the section.
Location 4: Teller County, CO	
Township/Range/Section	TT15S RR70W S17
General legal description	About 2600 feet north and 600 feet east of the southwest corner of the section.

## Other references

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## Contributors

Suzanne Mayne-Kinney

## Approval

Kirt Walstad, 5/06/2024

## 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	04/29/2024
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:**

- 
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:**

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**17. Perennial plant reproductive capability:**

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