USDA Natural Resources
Conservation Service

# Ecological site R048AY228CO
# Mountain Loam

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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

Mountain Loam occurs mainly alluvial fans, mountain slopes, benches, terraces, or hills. Slopes average between 5 and 10% but can range from 0 to 30%. Soils are moderately deep to deep (20-60 inches) loamy soils derived from residuum from igneous and metamorphic rocks or sandstone and shale; slope alluvium from sandstone and shale, or igneous and metamorphic rocks; colluvium from igneous and metamorphic rocks or sandstone and shale, and/or alluvium from igneous and metamorphic rocks. Soil surface texture are loam, sandy loam or silt loam with loamy subsurface. It is a Mountain Big

Sagebrush -Arizona Fescue community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.

## Associated sites

| | |
|---|---|
| R048AY234CO | **Mountain Clay**<br>Mountain Clay occurs on hills, mesas, and alluvial fans. Slopes is between 0 to 25%. Soils are moderately deep to deep (20 to 60+ inches). Soils are derived from colluvium, slope alluvium, residuum and/or eolian deposits from sandstone and shale. Soil surface texture is loam, clay loam or very cobbly loam with a fine textured subsurface. It is a black sagebrush – western wheatgrass community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches. |
| R048AY237CO | **Stony Loam**<br>Stony Loam occurs mainly alluvial fans, mountain slopes mountains and valley sides. Slopes is between 0 to 30%. Soils are deep (60 inches or more) loamy soils derived from outwash; till; colluvium from basalt, sandstone or granite and gneiss; and/or alluvium from igneous and metamorphic rocks; or basalt. Soil surface texture are stony to extremely stony loam, cobbly loam; or cobbly to very cobbly sandy loam with loamy-skeletal subsurface. It is a Mountain Big Sagebrush - Bluebunch wheatgrass community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches. |
| R048AY238CO | **Brushy Loam**<br>Brushy Loam occurs on hills, mountains, complex landslides, and benches. Slopes is between 3 to 35%. Soils are moderately deep to deep (20 to 60+ inches), soils derived from colluvium, residuum, slope alluvium and alluvium from sandstone and shale. Soil surface texture is loam or clay loam with fine-textured subsurface. It is a Gambel's oak – slender wheatgrass community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches. |
| R048AY247CO | **Deep Clay Loam**<br>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. |
| R048AY231CO | **Dry Mountain Loam**<br>Dry Mountain Loam occur on alluvial fans, valley sides, mountainsides, and terraces. Slopes are less than 30%. Soils are moderately deep to deep (20 to 60+ inches) soils derived from alluvium from sedimentary rock; colluvium from basalt; or colluvium sandstone. Soil surface texture is a loam with fine-loamy subsurface. It is a Wyoming Big Sagebrush – Needlegrass community. It has an aridic ustic moisture regime and a frigid temperature regime. The effective precipitation ranges from 12 to 16 inches. |

| | |
|---|---|
| R048AY303CO | **Loamy Slopes**<br>Loamy Slopes occurs on alluvial fans, terraces, hills mountains and mountainsides. Slopes is between 25 to 65%. Soils are moderately deep to deep (20 to 60+ inches). Soils are derived from alluvium from sandstone and siltstone or sandstone; residuum or colluvium from sandstone or outwash from basalt. Soil surface texture is cobbly sandy loam or cobbly, very flaggy or channery loam with loamy-skeletal textured subsurface. It is a mountain mahogany – Indian ricegrass community. It has an aridic ustic moisture regime and frigid temperature. The effective precipitation ranges from 12 to 18 inches. |
| R048AY222CO | **Loamy Park**<br>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. |
| R048AY311CO | **Mountain Outwash**<br>R048AY311CO Mountain Outwash occurs on fan terraces, alluvial fans, and glacial moraines. Slopes are between 3 to 45%. Soils are deep (60+ inches). Soils are derived from alluvium that is coarse-textured and stony or cobbly. Soil surface texture is gravelly sandy loam or cobbly sandy loam with sandy-skeletal textured subsurface. It is an Arizona Fescue – mountain muhly community. It has a typic ustic moisture regime and frigid temperature regime. The effective precipitation ranges from 16 to 20 inches. |
| R048AY230CO | **Shallow Loam**<br>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. |

## Similar sites

| | |
|---|---|
| R048AY292CO | **Deep Loam**<br>Deep Loam occurs alluvial fans, terraces, hills, fan remnants, valley sides, and structural benches. Slopes is between 0 to 25%. Soils are deep (60+ inches) in depth. Soils are derived from alluvium from basalt, or sandstone and shale; colluvium from sandstone and shale; slope alluvium from sandstone and shale or eolian deposits from sandstone and shale. Soil surface texture is loam, sandy clay loam or very channery loam, with a fine-loamy subsurface. It is a mountain big sagebrush – needle-and-thread community. It has an aridic ustic moisture regime and a frigid temperature regime. The effective precipitation ranges from 12 to 16 inches. |
| R048AY303CO | **Loamy Slopes**<br>Loamy Slopes occurs on alluvial fans, terraces, hills mountains and mountainsides. Slopes is between 25 to 65%. Soils are moderately deep to deep (20 to 60+ inches). Soils are derived from alluvium from sandstone and siltstone or sandstone; residuum or colluvium from sandstone or outwash from basalt. Soil surface texture is cobbly sandy loam or cobbly, very flaggy or channery loam with loamy-skeletal textured subsurface. It is a mountain mahogany – Indian ricegrass community. It has an aridic ustic moisture regime and frigid temperature. The effective precipitation ranges from 12 to 18 inches. |
| R048AY250CO | **Subalpine Loam**<br>Subalpine Loam occurs on hills, mountain-slopes, and mountains. Slopes is between 1 to 30%. Soils are deep to very deep (20 to 60+ inches). Soils are derived from colluvium and alluvium from volcanic rock; complex landslide deposits from igneous, metamorphic, and sedimentary rock; and slope alluvium, colluvium, residuum, alluvium or complex landslide deposits from sandstone and shale or shale. Soil surface texture is loam with loamy textured subsurface. It is a mountain big sagebrush – Thurber's Fescue community. It has an ustic udic/typic udic moisture regime and cryic temperature regime. The effective precipitation ranges from 20 to 30 inches. |
| R048AY231CO | **Dry Mountain Loam**<br>Dry Mountain Loam occur on alluvial fans, valley sides, mountainsides, and terraces. Slopes are less than 30%. Soils are moderately deep to deep (20 to 60+ inches) soils derived from alluvium from sedimentary rock; colluvium from basalt; or colluvium sandstone. Soil surface texture is a loam with fine-loamy subsurface. It is a Wyoming Big Sagebrush – Needlegrass community. It has an aridic ustic moisture regime and a frigid temperature regime. The effective precipitation ranges from 12 to 16 inches. |
| R048AY222CO | **Loamy Park**<br>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. |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | Not specified |
| Shrub | (1) *Artemisia tridentata ssp. vaseyana* |
| Herbaceous | (1) *Festuca arizonica*<br>(2) *Achnatherum lettermanii* |

## Physiographic features

Topography is mainly alluvial fans, mountain slopes, benches, terraces, or hills. Slopes average between 5 and 10 percent but can range from 0 to 30 percent. Elevation ranges from 7000 to 9500 feet.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Alluvial fan<br>(2) Terrace<br>(3) Valley<br>(4) Mountain slope<br>(5) Hill<br>(6) Structural bench |
| Runoff class | Medium to very high |
| Flooding frequency | None |
| Ponding frequency | None |
| Elevation | 2,134–2,896 m |
| 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 25.5ºF to 60.3ºF, averaging about 24ºF for the winter and 61.8ºF in the summer. Summer high temperatures of mid-70ºF to low 80ºF are not unusual. The coldest

winter temperature recorded was -36ºF on February 2, 1985 and the warmest winter temperature recorded was 65ºF on December 5, 1995. The coldest summer temperature recorded was 19ºF on June 2, 1990 and the warmest was 98ºF 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.

Cryic 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) | 432-457 mm |
| Frost-free period (actual range) | 5-101 days |

| | |
|---|---|
| Freeze-free period (actual range) | 43-134 days |
| Precipitation total (actual range) | 432-483 mm |
| Frost-free period (average) | 54 days |
| Freeze-free period (average) | 92 days |
| Precipitation total (average) | 457 mm |

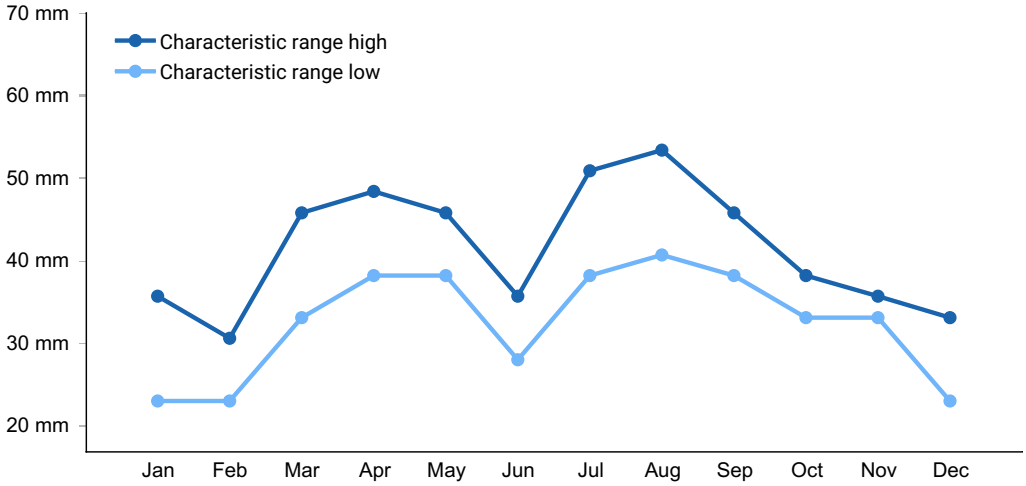



**Figure 1. Monthly precipitation range**

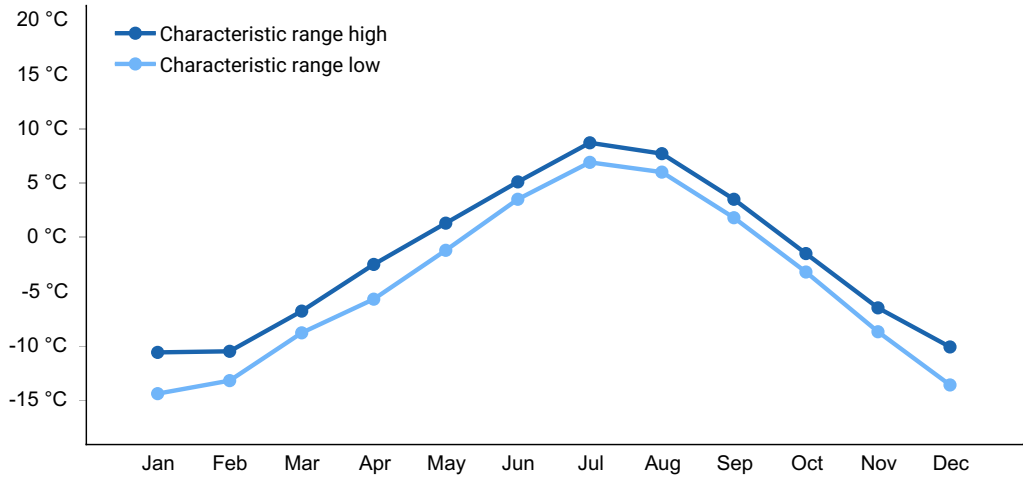



**Figure 2. Monthly minimum temperature range**

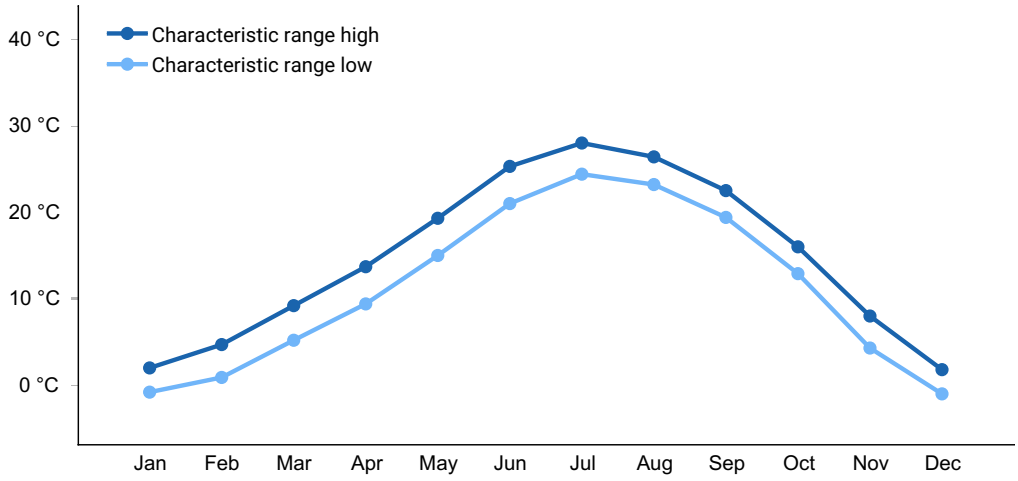



**Figure 3. Monthly maximum temperature range**

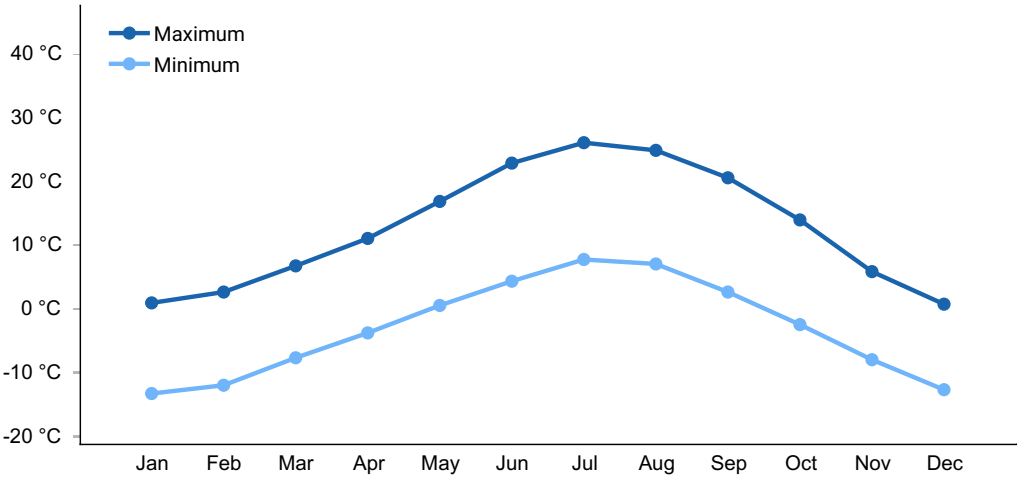



**Figure 4. Monthly average minimum and maximum temperature**

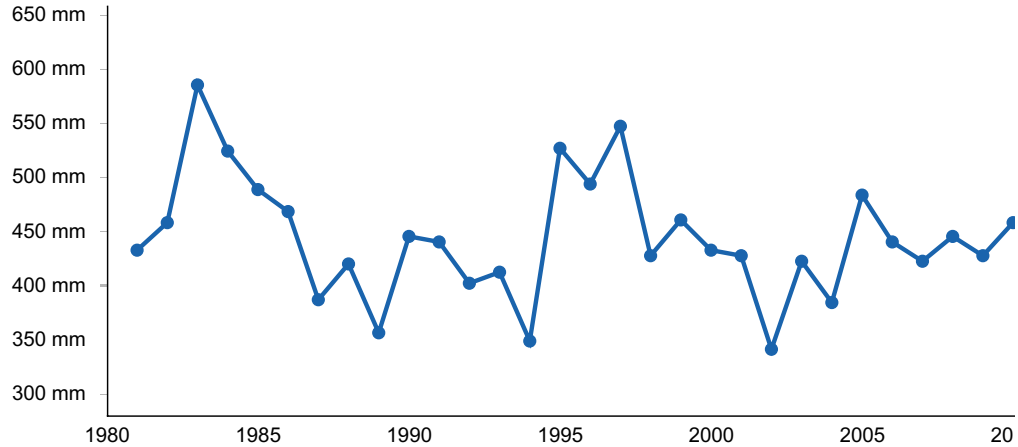



**Figure 5. Annual precipitation pattern**

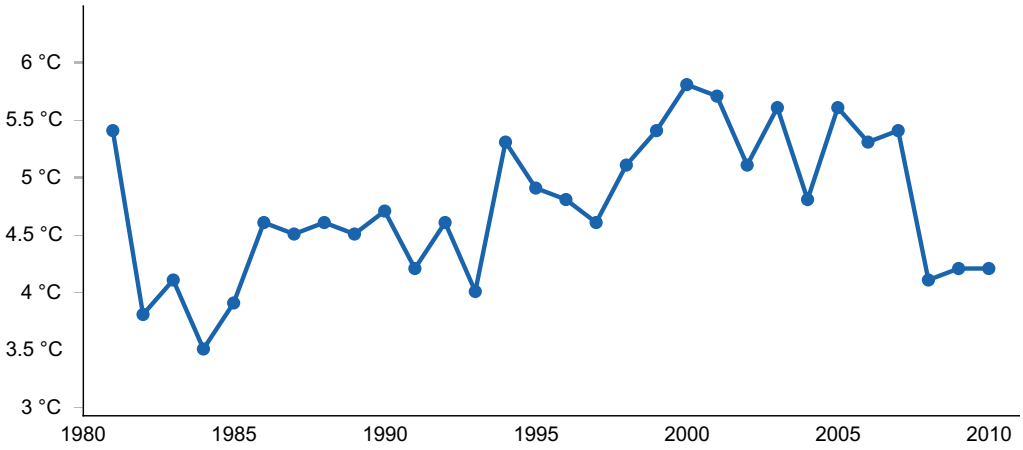



**Figure 6. Annual average temperature pattern**

## Climate stations used

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

## Influencing water features

None

## Soil features

Soils are fairly deep, have a good water holding capacity, are fine-loamy or fine-silty in texture. Many of them are somewhat gravelly to stony usually starting around 20 inches in depth. A large percent of the soil moisture is available for plant growth.

Clayburn, Duffson, Foidel, Granath, Kittredge, Leavitt, Lininger, Miracle, Rabbitears, Rhone, Shermap, Trag, Winevada, Yeljack, and Youga are soils assigned to this ecological site.

**Table 4. Representative soil features**

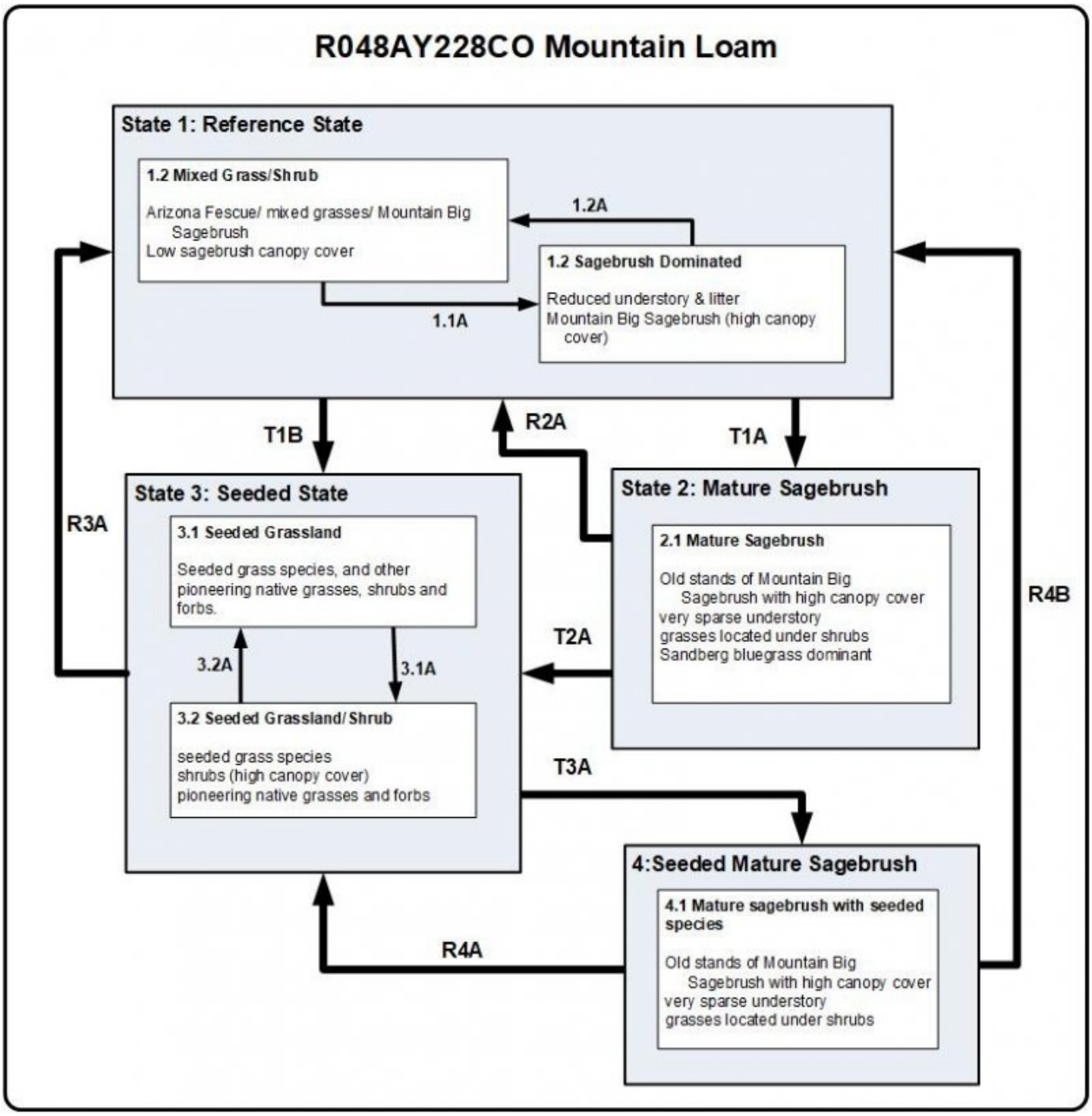
| | |
|---|---|
| Parent material | (1) Eolian deposits–sandstone and shale<br>(2) Slope alluvium–sandstone and shale<br>(3) Residuum–sandstone and shale<br>(4) Colluvium–sandstone and shale<br>(5) Alluvium–igneous and metamorphic rock<br>(6) Slope alluvium–igneous and metamorphic rock<br>(7) Colluvium–igneous and metamorphic rock<br>(8) Residuum–igneous and metamorphic rock<br>(9) Residuum–schist<br>(10) Eolian deposits–granite<br>(11) Alluvium–granite<br>(12) Slope alluvium–granite |
| Surface texture | (1) Loam<br>(2) Sandy loam<br>(3) Gravelly sandy loam<br>(4) Silt loam |
| Family particle size | (1) Loamy |
| Drainage class | Well drained |
| Permeability class | Moderately slow to moderately rapid |
| Soil depth | 51–152 cm |
| Surface fragment cover <=3" | 0–15% |
| Surface fragment cover >3" | 0–5% |
| Available water capacity (Depth not specified) | 8.89–18.03 cm |
| Calcium carbonate equivalent (Depth not specified) | 0–5% |
| Electrical conductivity (Depth not specified) | 0–2 mmhos/cm |
| Soil reaction (1:1 water) (Depth not specified) | 6.1–7.8 |
| Subsurface fragment volume <=3" (Depth not specified) | 0–30% |
| Subsurface fragment volume >3" (Depth not specified) | 0–15% |

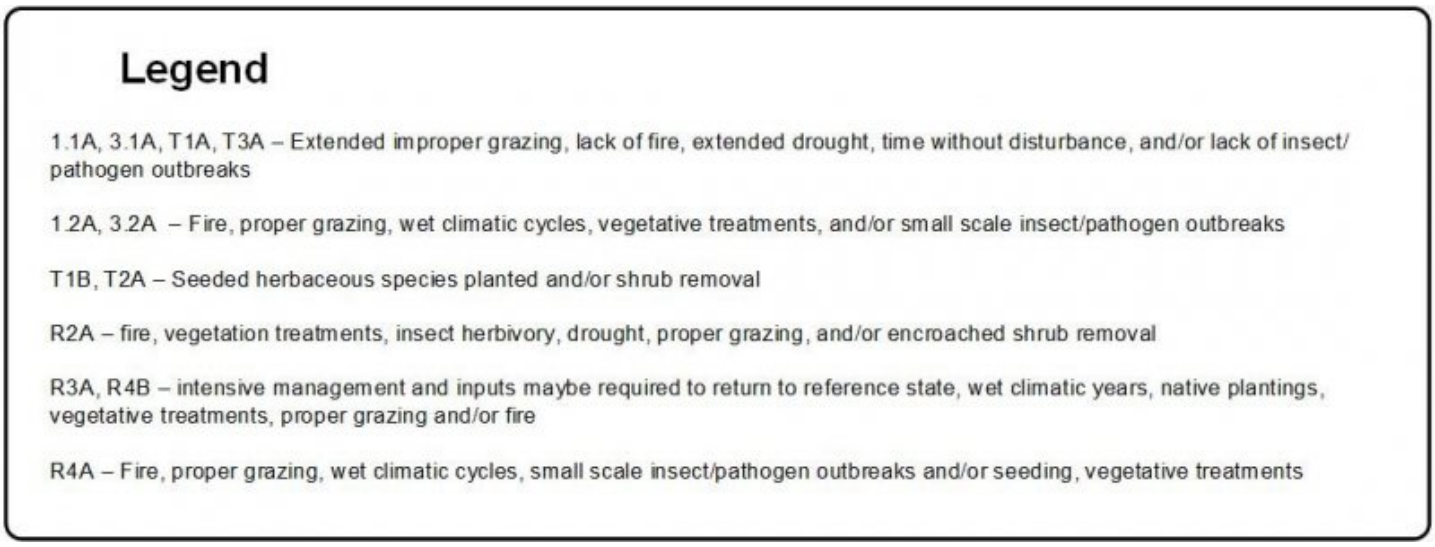
## Ecological dynamics

The interpretive plant community for this site is the Reference State. The appearance of ths site is grass in association with woody shrubs such as mountain big sagebrush, mountain snowberry, and several forbs. These species account for most of the vegetative cover. This site is treeless, however, trees are often in the general vicinity. Dominant grasses are Idaho or Arizona fescue, slender wheatgrass, bearded wheatgrass,

muttongrass, nodding brome, mountain brome, Lettermans needlegrass, and pine needlegrass. Mountain muhly and Parrys oatgrass are important in some locations. Silvery lupine, Richardson's geranium, butterweed groundsel, and mountain bluebells are the principal forbs. Mountain big sagebrush becomes dominant on this site if periodic burning (30 to 50 year intervals), or some other method of brush control, is not used. Invasive plants on the site include cheatgrass, slimstem muhly, red threeawn, Colorado rubberweed, broom snakeweed, tall rabbitbrush, Hoods phlox, and nailwort. Fluctuations in species composition and relative production may change from year to year depending upon precipitation and other climatic factors.

## State and transition model






## State 1
## Reference

## Community 1.1
## Reference State

Grass, in association with minor amounts of woody plants such as sagebrush and snowberry and several forbs, accounts for most of the vegetative cover. This site is treeless, however, trees are often in the general vicinity. Dominant grasses are Idaho and/or Arizona fescue, slender wheatgrass, bearded wheatgrass, native bluegrasses, nodding brome, mountain brome, Letterman's needlegrass, and pine needlegrass. Mountain muhly and Parry oatgrass are important in some locations. Lupine, geranium, groundsel, and bluebells are the principal forbs. With range depletion, sagebrush often becomes dominant. Optimum ground cover is 35%. The following species are most likely to invade this site are cheatgrass, slimstem muhly, threeawn, blue grams, rubberweed, broom snakeweed, tall rabbitbrush, phlox, and nailwort.

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

| Plant Type | Low (Kg/Hectare) | Representative Value (Kg/Hectare) | High (Kg/Hectare) |
|---|---|---|---|
| Grass/Grasslike | 779 | 841 | 925 |
| Shrub/Vine | 404 | 588 | 729 |
| Forb | 163 | 252 | 364 |
| **Total** | **1346** | **1681** | **2018** |

## Additional community tables

**Table 6. Community 1.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production (Kg/Hectare) | Foliar Cover (%) |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| **Grass/Grasslike** | | | | | |
| 1 | **Grasses** | | | 673–1009 | |
| | Arizona fescue | FEAR2 | *Festuca arizonica* | 420–673 | – |
| | Idaho fescue | FEID | *Festuca idahoensis* | 420–673 | – |
| | Letterman's needlegrass | ACLE9 | *Achnatherum lettermanii* | 252–504 | – |
| | Columbia needlegrass | ACNE9 | *Achnatherum nelsonii* | 252–504 | – |
| | slender wheatgrass | ELTRS | *Elymus trachycaulus ssp. subsecundus* | 252–504 | – |
| | muttongrass | POFE | *Poa fendleriana* | 168–336 | – |
| | mountain muhly | MUMO | *Muhlenbergia montana* | 84–252 | – |
| | western wheatgrass | PASM | *Pascopyrum smithii* | 168–252 | – |
| | Parry's oatgrass | DAPA2 | *Danthonia parryi* | 168–252 | – |
| | nodding brome | BRAN | *Bromus anomalus* | 84–168 | – |
| | mountain brome | BRMA4 | *Bromus marginatus* | 84–168 | – |
| | Sandberg bluegrass | POSE | *Poa secunda* | 84–168 | – |
| | sheep fescue | FEOV | *Festuca ovina* | 84–168 | – |
| | Thurber's fescue | FETH | *Festuca thurberi* | 50–118 | – |
| | squirreltail | ELEL5 | *Elymus elymoides* | 50–118 | – |
| **Forb** | | | | | |
| 2 | **Forbs** | | | 168–336 | |
| | balsamroot | BALSA | *Balsamorhiza* | 17–84 | – |
| | buckwheat | ERIOG | *Eriogonum* | 0–84 | – |
| **Shrub/Vine** | | | | | |
| 3 | **Shrubs** | | | 504–673 | |
| | mountain big sagebrush | ARTRV | *Artemisia tridentata ssp. vaseyana* | 84–168 | – |
| | yellow rabbitbrush | CHVI8 | *Chrysothamnus viscidiflorus* | 17–84 | – |
| | antelope bitterbrush | PUTR2 | *Purshia tridentata* | 17–84 | – |
| | mountain snowberry | SYOR2 | *Symphoricarpos oreophilus* | 17–84 | – |
| | Saskatoon serviceberry | AMAL2 | *Amelanchier alnifolia* | 17–84 | – |

| | | | | | |
|---|---|---|---|---|---|
| | prairie sagewort | ARFR4 | *Artemisia frigida* | 17–84 | – |

## Animal community

INTERPRETATIONS FOR GRAZING ANIMALS:
This site provides a high value rating for cattle and horses. It provides a medium value rating for sheep.

INTERPRETATIONS FOR WILDLIFE:
This site provides excellent forage and cover values for elk when the plant community is highly similar to HCPC. When the plant community is at a lower seral stage, values for mule deer are improved. Other species that depend on this site for all or part of their needs includes jackrabbits, sage grouse, songbirds, eagles, hawks, coyotes, and a variety of rodents and other small mammals.

## Hydrological functions

Soils in this site are grouped into the "B" or "C" hydrologic group, as outlined in the Soils of Colorado Loss Factors and Erodibility Hydrologic Groupings 1979 Handbook. Field investigations are needed to determine hydrologic cover conditions and hydrologic curve numbers.

## Recreational uses

This site has a cool summer climate that makes it very desirable for a wide range of outdoor activities such as picnicking, sightseeing, photography, wildlife watching, hiking, and camping. It generally offers good hunting during the late summer and early fall seasons.

## Wood products

There are no trees that are native to this site, however, windbreaks do quite well on this site when adapted species are planted.

## Other products

None

## Other information

RARE THREATENED OR ENDANGERED PLANTS AND ANIMALS:
To be added when known.

MAJOR POISONOUS PLANTS TO LIVESTOCK:
Nuttals larkspur affects cattle and horses (rarely sheep). Symptoms are loss of appetite, salivation, muscular twitching, general uneasiness, and a staggering gait. Spring and early summer are the primnary seasons of concern because other green forage may not be available.

Silvery lupine affects all livestock. Symptoms are dry nose, stilted walk, lethargy, depression, hard dry feces, rough dry hair, quivering, extrememem weakness, irrregular heartbeat, coma, and convulsions. It is of concern when forage is scarce and if hay contains immature lupine seed.

Orange sneezeweed primarily affects sheep, rarely cattle and horses. Symptoms are emaciation, lips stained green from vomitus, depression, weakness with irregular gait, frothing at mouth, coughing, chronic vomiting or spewing, and bloating. It is dangerous during all seasons when there is a shortness of palatable forage.

This site is in the Alamosa, Center, Cortez, Craig, Alamosa, Center, Cortez, Craig, Delta, Durango, Eagle, Fort Collins, Glenwood Springs, Grand Junction, Gunnison, Kremmling, Meeker, Montrose, Norwood, Pagosa Springs, Steamboat Springs, Walden, and San Luis field offices.

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## Contributors

Suzanne Mayne-Kinney

## Approval

Kirt Walstad, 4/03/2025

## 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 | 04/03/2025 |
| 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:**

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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