USDA Natural Resources Conservation Service

# Ecological site R048AY282CO
# Boulder Flats

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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).

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

## Ecological site concept

This site occurs as long narrow belts on fan terraces, alluvial fans and glacial outwash plains adjacent to the Arkansas River. Slopes is between 1 to 5 percent. Soils are deep (greater than 60+ inches). Soils are formed in alluvial parent materials or glacial outwash derived from a variety of rocks. Soil surface textures are stony sandy loam or very gravelly loamy sand with sandy-skeletal textured subsurface. It is an Indian ricegrass – Needle and thread community. This site is aridic bordering on ustic moisture regime and frigid temperature regime. The effective precipitation ranges from 11 to 16 inches.

## Associated sites

| | |
|---|---|
| R048AY272CO | **Sandy Bench**<br>Site occurs on alluvial fans, fan terrace and stream terrace. Slopes is between 0 to 10%. Soils are deep (60+ inches) in depth. Soils are derived from alluvium. Soil surface texture is sandy loam, gravelly sandy loam or gravelly loam with a coarse-loamy subsurface. It is a Wyoming big sagebrush – pine needlegrass community. It has an ustic aridic moisture regime and a frigid temperature regime. The effective precipitation ranges from 9 to 12 inches. |
| R048AY316CO | **Dry Mountain Outwash**<br>Site occurs on fan terraces and alluvial fans. Slopes is between 1 to 45%. Soils are deep (60+ inches). Soils are derived from alluvium or outwash. Soil surface texture is gravelly sandy loam with sandy-skeletal textured subsurface. It is a prairie junegrass – pine needlegrass community. It has an aridic ustic moisture regime and frigid temperature regime. The effective precipitation ranges from 12 to 16 inches. |

## Similar sites

| | |
|---|---|
| R048AY316CO | **Dry Mountain Outwash**<br>Site occurs on fan terraces and alluvial fans. Slopes is between 1 to 45%. Soils are deep (60+ inches). Soils are derived from alluvium or outwash. Soil surface texture is gravelly sandy loam with sandy-skeletal textured subsurface. It is a prairie junegrass – pine needlegrass community. It has an aridic ustic moisture regime and frigid temperature regime. The effective precipitation ranges from 12 to 16 inches. |
| R048AY237CO | **Stony Loam**<br>Site 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. |
| R048AY229CO | **Rocky Loam**<br>Site 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. |

| | |
|---|---|
| R048AY287CO | **Stony Foothills**<br>Site occurs on mountains, escarpments and hills. Slopes is between 3 to 30%. Soils are moderately deep to deep (20 to 60+ inches). Soils are derived from alluvium, residuum or colluvium from sandstone and shale or alluvium from basalt. Soil surface texture is gravelly, stony, or very stony sandy loam or very cobbly loam with loamy-skeletal textured subsurface. It is a Wyoming Big Sagebrush – western wheatgrass community. It has a aridic ustic moisture regime and frigid temperature regime. The effective precipitation ranges from 12 to 16 inches. |
| R048AY311CO | **Mountain Outwash**<br>Site 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. |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | Not specified |
| Shrub | Not specified |
| Herbaceous | (1) *Achnatherum hymenoides*<br>(2) *Hesperostipa comata* |

## Physiographic features

This site occurs as long narrow belts on fan terraces, alluvial fans and glacial outwash plains adjacent to the Arkansas River. The topography varies from nearly level to gentle slopes of 1 to 5 percent. This site is characterized by the presence pf large round boulders scattered and clustered at random throughout the site. The stones tend to concentrate moisture into soils between them and this increases the effective moisture for plant growth. Elevation of this site ranges from 7,200 to almost 8,800 feet.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Alluvial fan<br>(2) Fan terrace<br>(3) Outwash plain |
| Runoff class | Very low |
| Flooding frequency | None |
| Ponding frequency | None |
| Elevation | 2,195–2,682 m |
| Slope | 1–5% |

## Climatic features

Average annual precipitation ranges from 11 to 16 inches. May and September are the driest months, while July and August are months of highest precipitation. About 50% of the annual precipitation comes as snow during the winter months. The mean annual temperature is about 40 degrees, with a frost-free period of 75-100 days. The optimum growing season for native plants is April 15 through August 15.

**Table 3. Representative climatic features**

| | |
|---|---|
| Frost-free period (characteristic range) | 84 days |
| Freeze-free period (characteristic range) | 105 days |
| Precipitation total (characteristic range) | 279-406 mm |
| Frost-free period (actual range) | 84 days |
| Freeze-free period (actual range) | 105 days |
| Precipitation total (actual range) | 279-406 mm |
| Frost-free period (average) | 84 days |
| Freeze-free period (average) | 105 days |
| Precipitation total (average) | 356 mm |

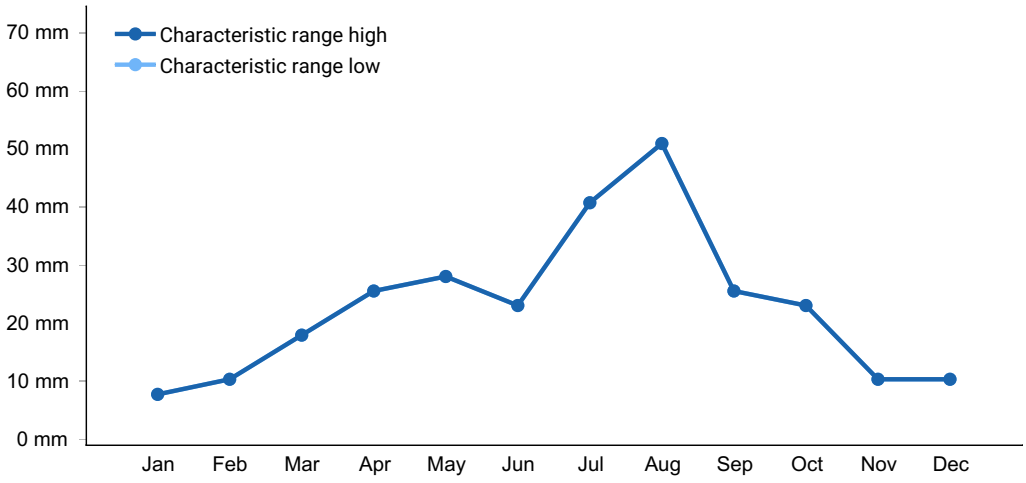



**Figure 1. Monthly precipitation range**

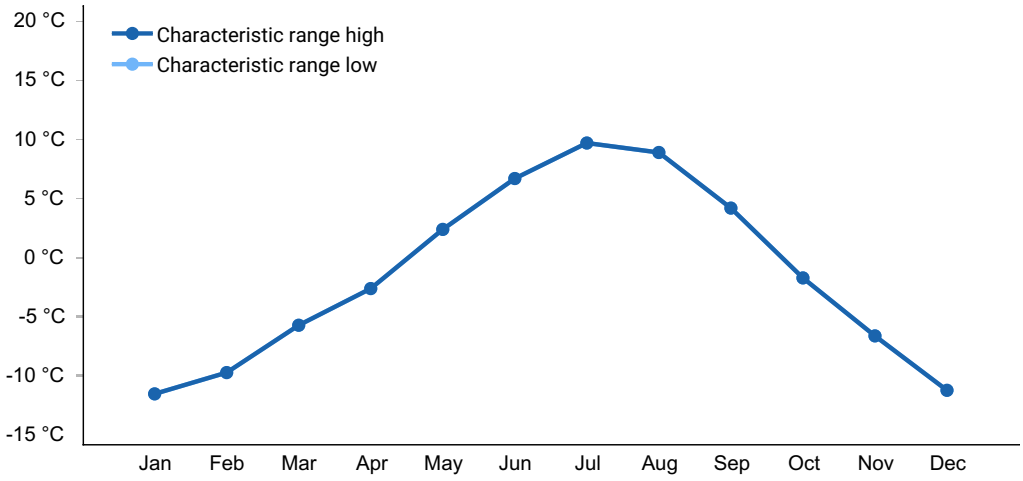



**Figure 2. Monthly minimum temperature range**

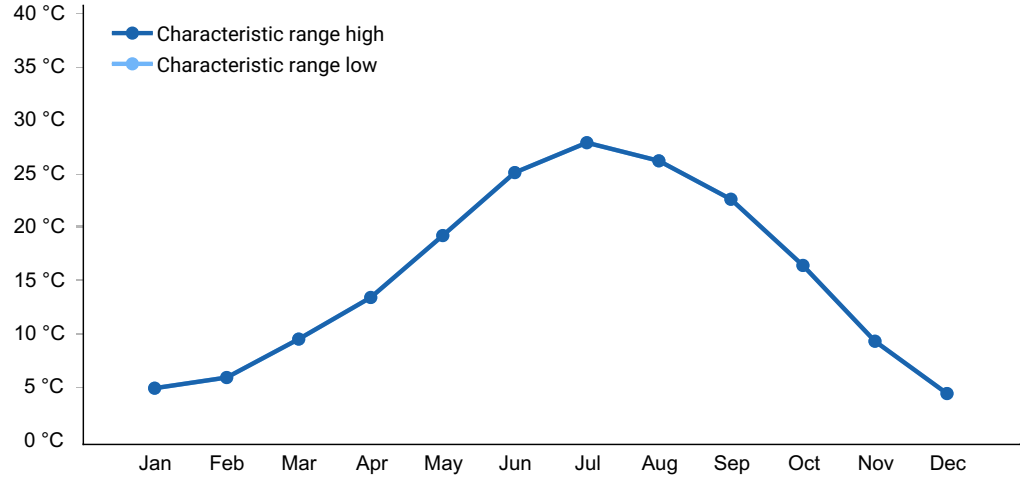



**Figure 3. Monthly maximum temperature range**

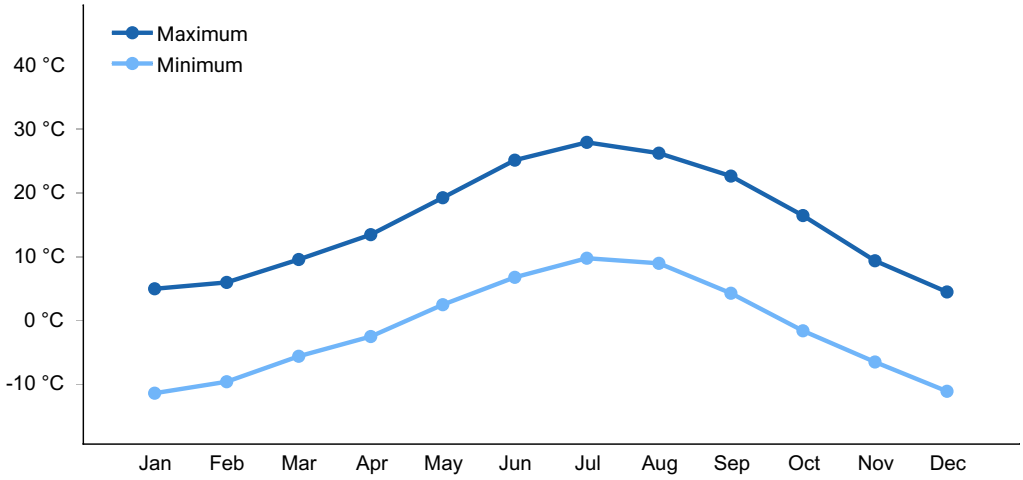



**Figure 4. Monthly average minimum and maximum temperature**

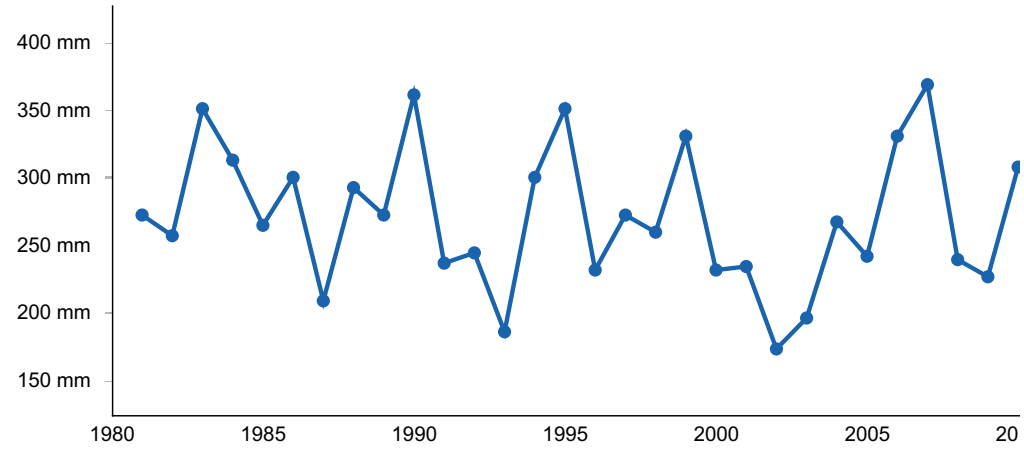



**Figure 5. Annual precipitation pattern**

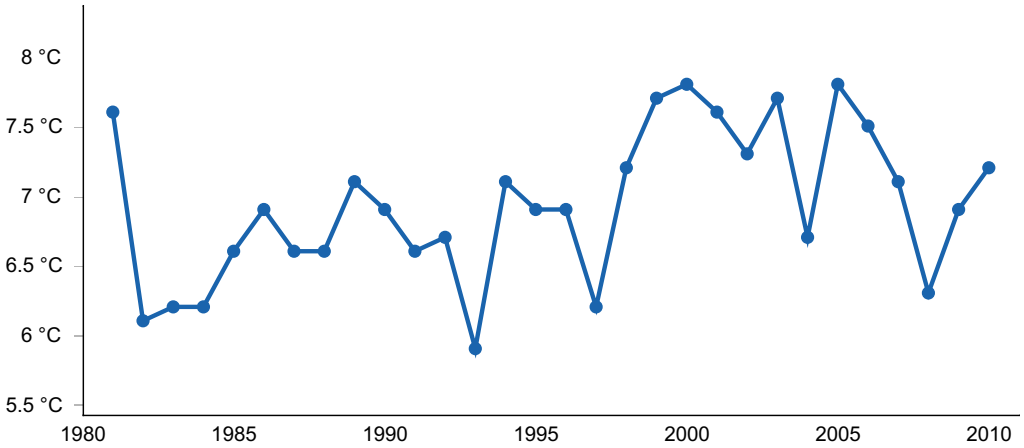



**Figure 6. Annual average temperature pattern**

## Climate stations used

- (1) BUENA VISTA 2S [USC00051071], Buena Vista, CO

## Influencing water features

None

## Soil features

The soil surface texture is stony sandy loam or very gravelly loamy sand. Soils typically are non-calcareous to depths of more than 60 inches but depth to uniformly calcareous material normally ranges from 40 to more than 60 inches. Depth to the sandy-skeletal IIC horizon ranges from 10 to 20 inches. Skeletal horizons are composed of gravels and cobbles with large round boulders which are numerous with many of the boulders nearly buried. Depth to the base of the argillic horizon ranges from 10 to 20 inches. Rock fragments range from 35 to 85 percent by volume in a major part of the solum and C horizon above depth of 40 inches and are mostly less than 3 inches in diameter. The soils above depth of 40 inches range from slightly acid to mildly alkaline. Permeability of the

soil is rapid, and the available water capacity is low. Nearly all of the soil moisture is readily available for use by the native plants. This site is aridic bordering on ustic moisture regime and frigid temperature regime.

Soils this site:
San Isabel stony sandy loam, 1-5% slopes

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Alluvium<br>(2) Outwash |
| Surface texture | (1) Stony sandy loam<br>(2) Very gravelly loamy sand |
| Family particle size | (1) Loamy-skeletal |
| Drainage class | Well drained to somewhat excessively drained |
| Permeability class | Moderately rapid |
| Soil depth | 152–254 cm |
| Surface fragment cover <=3" | 10–20% |
| Surface fragment cover >3" | 10–20% |
| Available water capacity (Depth not specified) | 4.32–5.84 cm |
| Calcium carbonate equivalent (Depth not specified) | 0% |
| Electrical conductivity (Depth not specified) | 0 mmhos/cm |
| Sodium adsorption ratio (Depth not specified) | 0 |
| Soil reaction (1:1 water) (Depth not specified) | 6.6–7.3 |
| Subsurface fragment volume <=3" (Depth not specified) | 30–40% |
| Subsurface fragment volume >3" (Depth not specified) | 10–20% |

## Ecological dynamics

The Boulder Flats ecological site is characterized by three states: Reference, Shortgrass Dominated and Increased Bareground States. The Reference State is characterized by perennial grassland comprised of mid-grasses (Reference Community) that is dominated by Indian ricegrass, needle and thread, and western wheatgrass. The Grassland with Blue Grama Community consists of blue grama, and native blue grasses and western

wheatgrass. The Shortgrass Dominated State is characterized by a warm-season short bunchgrass (blue grama, slimstem muhly). The Increased Bareground State is characterized by early successional warm-season bunchgrass (Fendler threeawn, sand dropseed), cool-season bunchgrass (sleepygrass, squirreltail), annual grasses, annual forbs, and shrubs (prairie sagewort [fringed sagebrush], broom snakeweed).

Stones and boulders are on the surface of the soil and mixed with the soils which reduce the volume of effective soil but have the beneficial effect of concentrating the moisture in a smaller volume of soil that a stone-free soil would have. Indian ricegrass, needle and thread, western wheatgrass, prairie junegrass, native bluegrasses, blue grama, and at the higher elevations Arizona fescue and mountain muhly, make up most of the plant community and production. Plants such as squirreltail, sand dropseed, purple threeawn, slimstem muhly, skunkbush sumac and wax currant are secondary in the plant community. Small amounts of native forbs and shrubs occur scattered throughout the plant community.

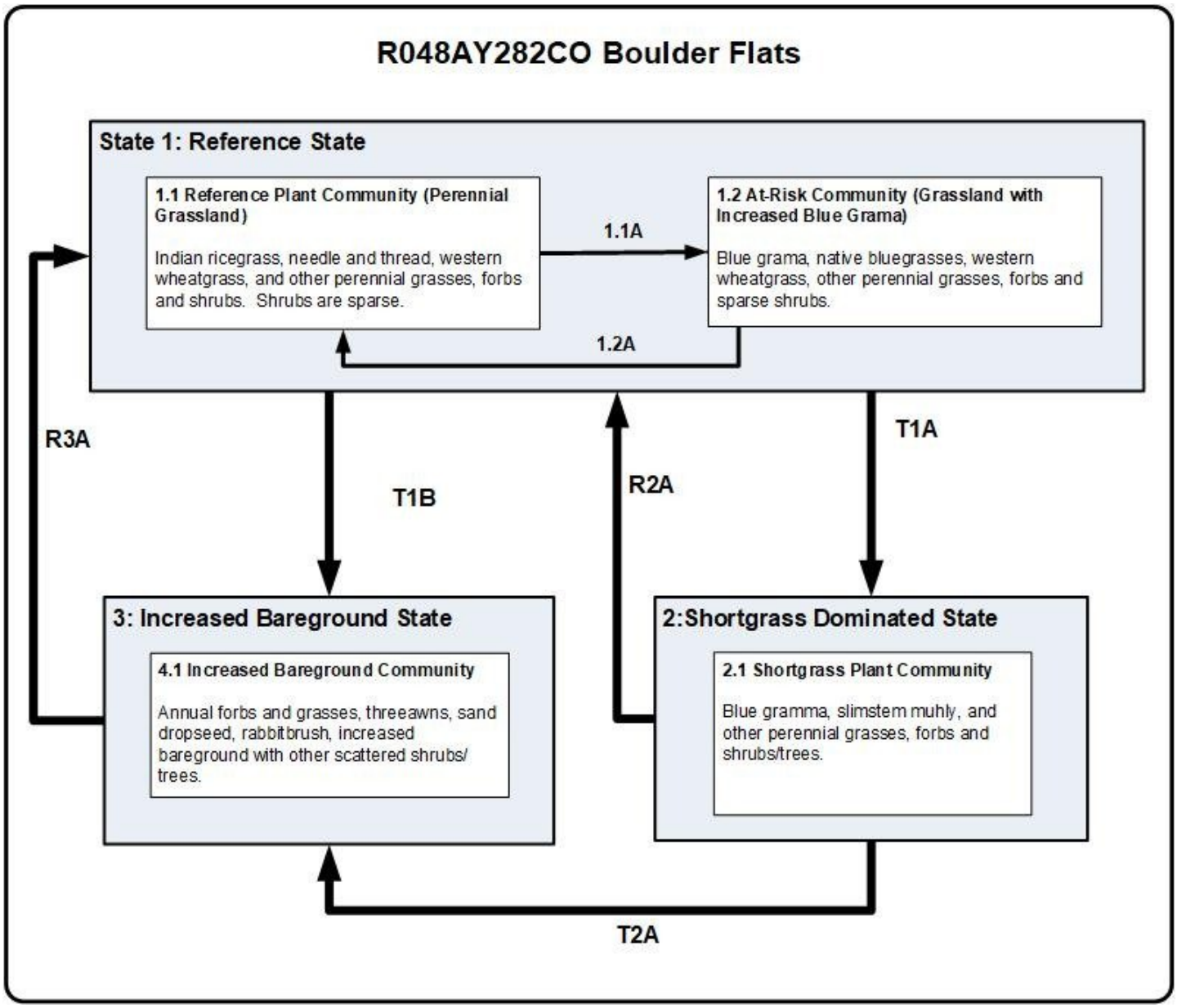
Deterioration of this site, due to continuous grazing without adequate recovery periods following each grazing occurrence and/or overstocking, will cause blue grama to increase. Cool-season grasses such as western wheatgrass and needle and thread will decrease. Fendler threeawn, annuals and bare ground increase under heavy continuous grazing. Lack of grazing and lack of fire initially causes increased herbaceous litter. Decadence of bunchgrasses, such as needle and thread and Indian ricegrass, and lower vigor vegetation is expected to occur with non-use and lack of fire. This also allows invasive species and annual grasses and forbs to establish. Grazing which allows adequate recovery periods following each grazing event and proper stocking will maintain the palatable plants.

Below is a State and Transition Model diagram to illustrate the “phases” (common plant communities), and “states” (aggregations of those plant communities) that can occur on the site. Differences between phases and states depend primarily upon observations of a range of disturbance histories in areas where this ESD is represented. These situations include grazing gradients to water sources, fence-line contrasts, patches with differing dates and intensities of fire, herbicide treatment, etc.. Reference State 1 illustrates the common plant communities that probably existed just prior to European settlement.

The major successional pathways within states, (“community pathways”) are indicated by arrows between phases. “Transitions” are indicated by arrows between states. The drivers of these changes are indicated in codes decipherable by referring to the legend at the bottom of the page and by reading the detailed narratives that follow the diagram.

The plant communities shown in this State and Transition Model may not represent every possibility but are probably the most prevalent and recurring plant communities. As more monitoring data are collected, some phases or states may be revised, removed, and/or new ones may be added. The state and transition model was added to comply with the provisional ecological site instruction. It is a very general model.

## State and transition model




## Legend

1.1A – lack of fire, time without disturbance, extended drought, over-stocking and/or continuous grazing that does not allow adequate recovery opportunity

1.2A – fire, wetter climatic cycles, and/or proper stocking with adequate recovery opportunity following each grazing event

T1A – over-stocking and/or continuous grazing that does not allow adequate recovery opportunity, fire suppression, time without disturbance, lack of insect/disease, extended drought

T1B, T2A – annual/invasive species establishment, heavy continuous grazing without adequate recovery opportunity, fire, surface disturbance and/or extended drought

R2A – proper stocking with adequate recovery opportunity, fire, insects/diseasse, and/or wetter climatic cycles

R3A – proper stocking with adequate recovery opportunity, treat invasive species, intensive energy & time investment, and/or wetter climatic cycles

## State 1

## Reference

**Characteristics and indicators.** The Reference State is characterized by two plant community phases; Reference Plant Community (Perennial Grassland), and At Risk Plant Community (Grassland with Blue Grama). These plant communities, and the various secessional stages between them, represent the natural range of variability due to the disturbance regimes applicable to this site. This site has a landscape appearance of terraces and benches adjacent to the Arkansas River with the presence of large boulders scatted on the surface.

## Community 1.1
## Reference Plant Community

The native plant community is predominantly grass with only sparse amounts of forbs and brush. The most abundant grasses are Indian ricegrass, needle and thread, western wheatgrass, prairie junegrass, and native bluegrasses. Arizona fescue and mountain muhly will be common at the higher elevations of the site. Grasses such as sand dropseed, squirreltail, slimstem muhly, blue grama, and threeawn will be present in smaller amounts. Forbs such as lupine, Indian paintbrush, penstemon and common yarrow, and shrubs such as prairie sagewort (fringed sagebrush), wax currant, skunkbush sumac, and snowberry will be scattered throughout the site. Tree species associated with this site are ponderosa pine, pinyon, and oneseed juniper. They will occur, however, only as scattered and isolated trees and will make up only a trace amount of the plant community. Approximate ground cover is 30%. Species most likely to invade this site or increase drastically from the amounts shown above are annual forbs, broom snakeweed, pingue rubberweed, prickly pear cactus, prairie sagewort (fringed sagebrush), rubber and yellow rabbitbrush, sleepygrass, sand dropseed, threeawn, slimstem muhly and blue grama.

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

| Plant Type | Low (Kg/Hectare) | Representative Value (Kg/Hectare) | High (Kg/Hectare) |
|---|---|---|---|
| Grass/Grasslike | 712 | 880 | 1054 |
| Forb | 90 | 112 | 135 |
| Shrub/Vine | 90 | 112 | 135 |
| Tree | 6 | 17 | 22 |
| **Total** | **898** | **1121** | **1346** |

## 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 and Grass-likes** | | | 729–1065 | |
| | Indian ricegrass | ACHY | *Achnatherum hymenoides* | 336–560 | – |
| | needle and thread | HECO26 | *Hesperostipa comata* | 56–168 | – |
| | western wheatgrass | PASM | *Pascopyrum smithii* | 56–168 | – |
| | prairie Junegrass | KOMA | *Koeleria macrantha* | 28–84 | – |
| | Sandberg bluegrass | POSE | *Poa secunda* | 28–84 | – |
| | blue grama | BOGR2 | *Bouteloua gracilis* | 28–84 | – |
| | Grass, perennial | 2GP | *Grass, perennial* | 28–84 | – |
| | Arizona fescue | FEAR2 | *Festuca arizonica* | 0–56 | – |
| | mountain muhly | MUMO | *Muhlenbergia montana* | 0–56 | – |
| | sand dropseed | SPCR | *Sporobolus cryptandrus* | 0–28 | – |
| | squirreltail | ELEL5 | *Elymus elymoides* | 0–28 | – |
| | slimstem muhly | MUFI | *Muhlenbergia filiculmis* | 0–28 | – |
| | purple threeawn | ARPU9 | *Aristida purpurea* | 0–28 | – |
| **Forb** | | | | | |
| 2 | **Forbs** | | | 56–168 | |
| | Forb, native | 2FN | *Forb, native* | 56–168 | – |
| | pingue rubberweed | HYRI | *Hymenoxys richardsonii* | 0–28 | – |
| | common yarrow | ACMI2 | *Achillea millefolium* | 0–28 | – |
| | lupine | LUPIN | *Lupinus* | 0–28 | – |
| | beardtongue | PENST | *Penstemon* | 0–28 | – |
| | castilla | CASTI | *Castilla* | 0–28 | – |
| **Shrub/Vine** | | | | | |
| 3 | **Shrubs** | | | 56–168 | |
| | wax currant | RICE | *Ribes cereum* | 28–84 | – |
| | skunkbush sumac | RHTR | *Rhus trilobata* | 28–84 | – |
| | Shrub (>.5m) | 2SHRUB | *Shrub (>.5m)* | 11–56 | – |

| | | | | | |
|---|---|---|---|---|---|
| | rubber rabbitbrush | ERNA10 | *Ericameria nauseosa* | 0–28 | – |
| | yellow rabbitbrush | CHVI8 | *Chrysothamnus viscidiflorus* | 0–28 | – |
| | prairie sagewort | ARFR4 | *Artemisia frigida* | 0–28 | – |
| | snowberry | SYMPH | *Symphoricarpos* | 0–28 | – |
| | plains pricklypear | OPPO | *Opuntia polyacantha* | 0–11 | – |
| | broom snakeweed | GUSA2 | *Gutierrezia sarothrae* | 0–11 | – |
| **Tree** | | | | | |
| 4 | **Trees** | | | 0–34 | |
| | ponderosa pine | PIPO | *Pinus ponderosa* | 0–17 | – |
| | twoneedle pinyon | PIED | *Pinus edulis* | 0–17 | – |
| | oneseed juniper | JUMO | *Juniperus monosperma* | 0–17 | – |

## Animal community

Livestock Grazing:

This site produces good to excellent forage for cattle and horses during years of average precipitation. It provides fair to good forage for sheep, pronghorn and deer.

The animal forage preference changes as the growing season progresses. Indian ricegrass, western wheatgrass, needle and thread and Sandberg bluegrass are very palatable during the spring. Therefore, it is necessary to periodically defer grazing in the spring and early summer so that these cool season plants are not overgrazed and replaced by less desirable species. Deferment of grazing through the late spring and summer months will benefit the warm season plants.

It is important that proper stocking and planned deferred rotation grazing be followed on this site. This level of grazing management will ensure maximum utilization of the available forage while maintaining the desirable plants.

Vegetation palatability will influence proper use considerations. The season of use, kind of grazing animal, past grazing use, and the plant composition will directly influence the animal preference and performance.

Guide to Initial Stocking Rates (Stocking rates recommendations from range site concept circa 1989 and based on estimated plant
community succession):

The stocking rate calculations are based on the total annual forage production in a normal year multiplied by 25% harvest efficiency divided
by 912.5 pounds of ingested air-dry vegetation for an animal unit per month.

Plant Community (PC)/ Production (lbs./acre)/Stocking Rate (AUM/acre)
Reference PC/ 1000/ 0.27
At Risk PC/ 800/ 0.22
Shortgrass PC/ 500/ 0.14
Increased Bareground PC/ */ *

* Highly variable; stocking rate needs to be determined on site.

Adjustments to the initial stocking rates should be made as needed to obtain proper use. With specialized grazing systems, large livestock
breeds, uncontrolled ungulates, inaccessibility, dormant season use, presence of introduced forage species, seeded rangeland etc.,
stocking rate adjustments will be required.

## Inventory data references

Type Location: Along Highway 24, one mile north of Buena Vista, Chaffee County

This site is found in the following counties:
Chaffee

## Other references

Chapman, S.S., G.E. Griffith, J.M. Omernik, A.B. Price, J. Freeouf, and D.L. Schrupp. 2006. Ecoregions of Colorado. (2-sided color poster with map, descriptive text, summary tables, and photographs). U.S. Geological Survey, Reston, VA. Scale 1:1,200,000.

Cleland, D.T.; Freeouf, J.A.; Keys, J.E.; Nowacki, G.J.; Carpenter, C.A.; and McNab, W.H. 2007. Ecological Subregions: Sections and Subsections for the conterminous United States. Gen. Tech. Report WO-76D [Map on CD-ROM] (A.M. Sloan, cartographer). Washington, DC: U.S. Department of Agriculture, Forest Service, presentation scale 1:3,500,000; colored.

Soil Conservation Service (SCS). February 1977. Forested Site Description for Boulder Flats #282. : USDA, Denver Colorado.

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

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## Approval

Kirt Walstad, 4/02/2025

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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 | 04/02/2025 |
| Approved by | Kirt Walstad |
| Approval date | |
| Composition (Indicators 10 and 12) based on | Annual Production |

## Indicators

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

   _____

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

   _____

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

   _____

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

   _____

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

   _____

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

   _____

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

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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

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

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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

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

15. **Expected annual annual-production (this is TOTAL above-ground annual-production,**

**not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

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17. **Perennial plant reproductive capability:**

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