USDA Natural Resources Conservation Service

# Ecological site R048AY272CO
# Sandy Bench

Last updated: 3/05/2024
Accessed: 05/10/2025

## 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

Sandy Bench occurs on alluvial fans, fan terrace and stream terrace. Slopes is between 0 to 10 percent. 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 aridic ustic moisture regime and a frigid temperature regime. The effective precipitation ranges from 12 to 16 inches.

## Associated sites

| | |
|---|---|
| R048AY270CO | **Valley Bench**<br>Valley Bench occurs on alluvial fans. Slopes is between 0 to 15%. Soils are deep (60+ inches) in depth. Soils are derived from colluvium from sandstone. Soil surface texture is sandy loam with a fine-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. |

## Similar sites

| | |
|---|---|
| R048AY270CO | **Valley Bench**<br>Valley Bench occurs on alluvial fans. Slopes is between 0 to 15%. Soils are deep (60+ inches) in depth. Soils are derived from colluvium from sandstone. Soil surface texture is sandy loam with a fine-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. |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | Not specified |
| Shrub | (1) *Artemisia tridentata* |
| Herbaceous | (1) *Pascopyrum smithii* |

## Physiographic features

The topography is gently sloping and undulating benches. Slopes range from 0 to 10 percent.

Elevation ranges from 7000 to 9000 feet about sea level.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Alluvial fan<br>(2) Fan terrace<br>(3) Stream terrace |
| Runoff class | Very low to low |
| Flooding frequency | None |
| Ponding frequency | None |
| Elevation | 7,000–9,000 ft |
| Slope | 0–10% |
| Aspect | Aspect is not a significant factor |

## Climatic features

Average annual precipitation is about 12 to 16 inches. Fifty percent or more of this precipitation comes as winter snows. Summer moisture is mostly from thundershowers in July thru October. December to February and June is the driest period of the year with the driest month being January. July to October wettest period and the wettest month is usually August. Average annual temperature is less than 40ºF, with a frost-free period of less than 60 days. The optimum growing season for native plants is June 1 to July 15. Frequent high winds cause high evaporation. Wide yearly and seasonal fluctuations are common for this climatic zone.

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: Collbran, Basalt, and Cedaredge. This LRU zone is use in write up above. November

to February and June is the driest period of the year with the driest month being June. August to October and March to April is the wettest period and the wettest month is usually April. Frigid

Northwest Zone Climate Stations: Meeker#2. Driest months usually are January and February. Wettest months usually are August and September. Frigid.

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

Southwest Volcanics: Lake City, Creede, and Hermit 7 ESE. These high elevation and low precipitation areas are cryic with shorter growing season days of 20 to 70 days per year. Wettest months are August and July. Driest months are December thru February.

Northeast (Front Range Igneous and Metamorphic): Grant, Estes park, Hohnholz Ranch, Leadville and Leadville 2 SW. July and August are the wettest months. January is the driest month. The climate stations is this zone are cryic. The growing seasons is 50 to 90 days.

Southeast (Sangre de Cristo Mtns): Westcliffe. Red Wing 1 WSW and Sheep Mountain. The growing season is 90 to 140 days. Driest months are December to February and the wettest are July & August. Frigid.

**Table 3. Representative climatic features**

| | |
|---|---|
| Frost-free period (characteristic range) | 5-62 days |
| Freeze-free period (characteristic range) | 59-84 days |
| Precipitation total (characteristic range) | 13-15 in |
| Frost-free period (actual range) | 2-71 days |
| Freeze-free period (actual range) | 54-90 days |
| Precipitation total (actual range) | 13-15 in |
| Frost-free period (average) | 34 days |
| Freeze-free period (average) | 71 days |
| Precipitation total (average) | 14 in |

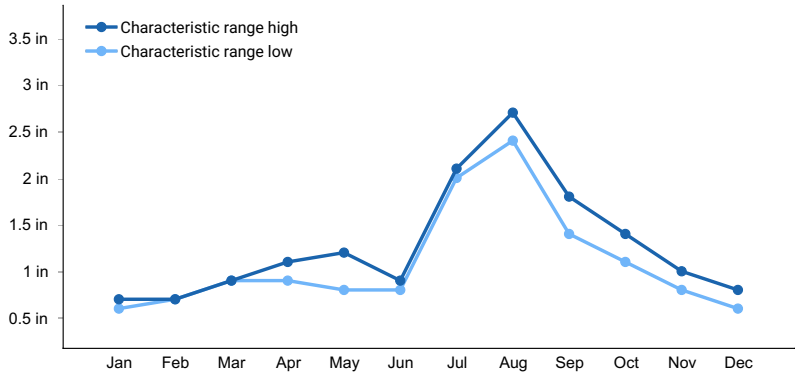



**Figure 1. Monthly precipitation range**

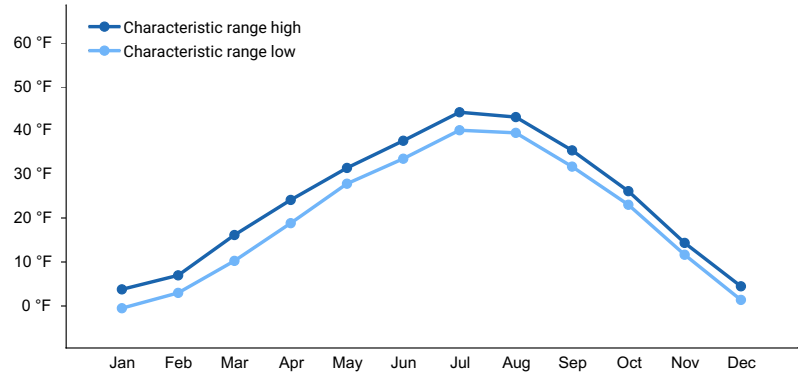



**Figure 2. Monthly minimum temperature range**

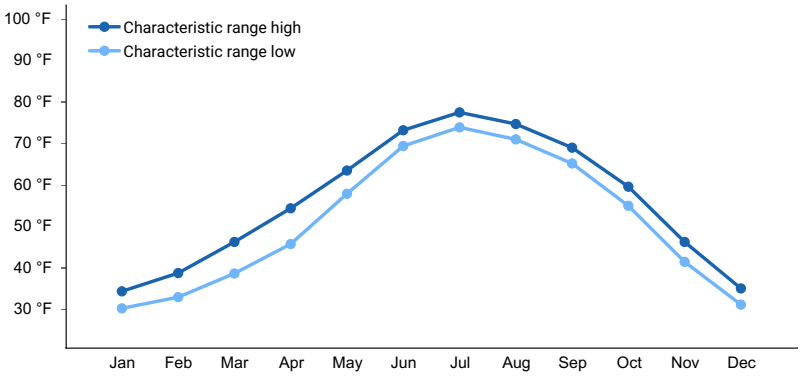



**Figure 3. Monthly maximum temperature range**

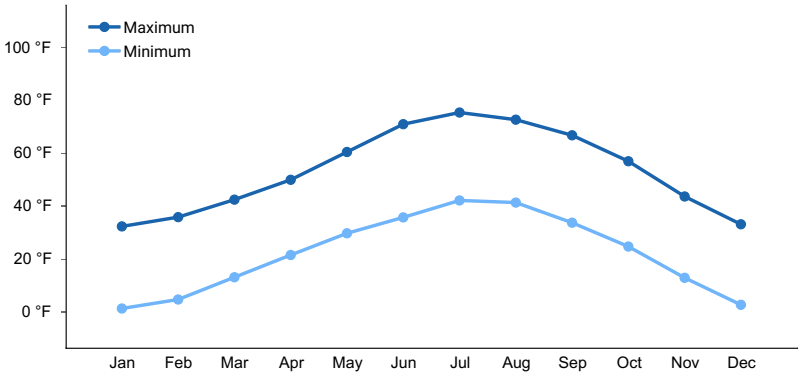



**Figure 4. Monthly average minimum and maximum temperature**

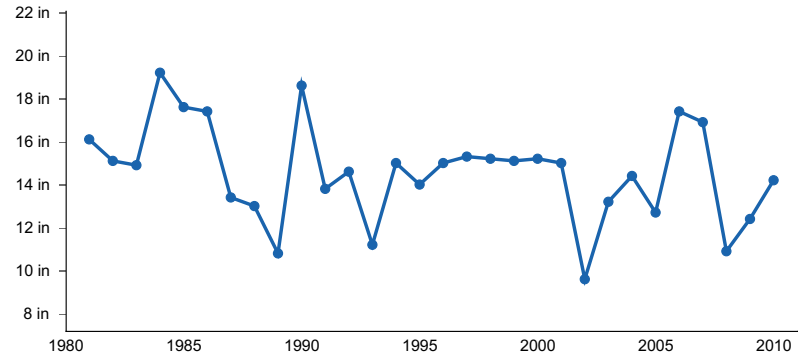



**Figure 5. Annual precipitation pattern**

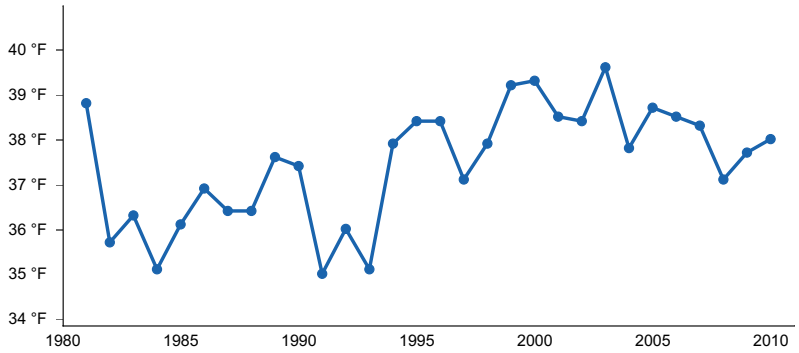



**Figure 6. Annual average temperature pattern**

## Climate stations used

- (1) HERMIT 7 ESE [USC00053951], Creede, CO
- (2) LAKE CITY [USC00054734], Lake City, CO
- (3) CREEDE [USC00051939], Creede, CO
- (4) LEADVILLE LAKE CO AP [USW00093009], Leadville, CO

## Influencing water features

None

## Soil features

Soils are deep (at least 60 inches). Surface textures are most commonly sandy loam or gravelly sandy loam. Subsurface textures are commonly sandy loam, loamy sand and occasionally fine sandy loam, very fine sand or loamy fine sandy. Water intake rate is rapid and water holding capacity is low. Plant growth is directly related to amount and pattern of precipitation. Some wind erosion may occur, especially in the dune areas. Blowouts develop quickly in overgrazed areas.

Soils of this site are:
Costilla, Hawksell, Keeldar, Manhattan and Ouray.

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Alluvium |
| Surface texture | (1) Sandy loam<br>(2) Gravelly sandy loam<br>(3) Gravelly loam |
| Family particle size | (1) Coarse-loamy |
| Drainage class | Well drained to somewhat excessively drained |
| Permeability class | Moderate to moderately rapid |
| Soil depth | 60 in |
| Surface fragment cover <=3" | 10–25% |
| Surface fragment cover >3" | 2–10% |
| Available water capacity (Depth not specified) | 1.8–5.3 in |
| Calcium carbonate equivalent (Depth not specified) | 0–20% |
| Soil reaction (1:1 water) (Depth not specified) | 6.6–8.4 |

| | |
|---|---|
| Subsurface fragment volume <=3" (Depth not specified) | 10–30% |
| Subsurface fragment volume >3" (Depth not specified) | 3–10% |

## Ecological dynamics

This site has a slightly stunted sagebrush-grassland aspect. Western and streambank wheatgrass are dominant on the site. Lesser amounts of sedges, prairie Junegrass, muttongrass, needleandthread, Indian ricegrass, pine needlegrass, bluebunch wheatgrass, Nevada bluegrass, Sandberg bluegrass, big bluegrass, nodding brome, plains reedgrass, bottlebrush squirreltail, blue grama, slimstem muhly, and wedescale occur. Forbs include buckwheat rose pussytoes, phlox, nailwort, pingue, groundsel, hairy goldaster, fringed sagebrush, bluebells, wallflower, aster, Indian paintbrush, penstemon, lupine, gillia, and low larkspur. Shrubs include big sagebrush, tall rabbitbrush, low and twistleaf rabbitbrush, chokecherry, Saskatoon serviceberry, and woods rose.

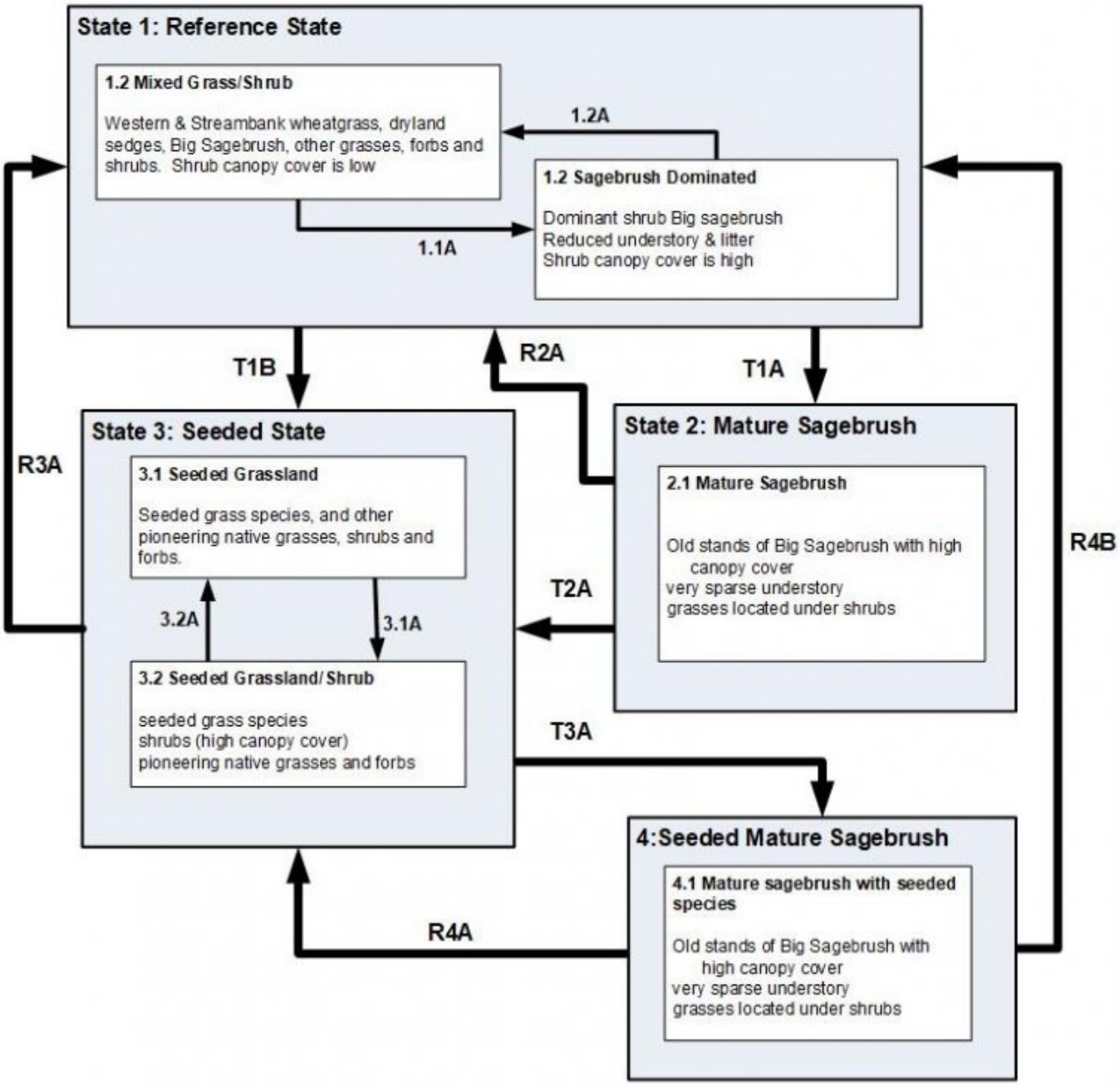
Trees do not grow naturally on this site.

Optimum ground cover is 25%.

Total Annual Production:
Favorable years 1200 lbs/ac air dry
Unfavorable years 500 lbs/ac air dry
Median years 850 lbs/ac air dry

## State and transition model

# R048AY272CO Sandy Bench




## Legend

1.1A, 3.1A, T1A, T3A – Extended improper grazing, lack of fire, extended drought, time without disturbance, and/or lack of insect/pathogen outbreaks

1.2A, 3.2A – Fire, proper grazing, wet climatic cycles, vegetative treatments, and/or small scale insect/pathogen outbreaks

T1B, T2A – Seeded herbaceous species planted and/or shrub removal

R2A – fire, vegetation treatments, insect herbivory, drought, proper grazing, and/or encroached shrub removal

R3A, R4B – intensive management and inputs maybe required to return to reference state, wet climatic years, native plantings, vegetative treatments, proper grazing and/or fire

R4A – Fire, proper grazing, wet climatic cycles, small scale insect/pathogen outbreaks and/or seeding, vegetative treatments

## State 1
## Reference State

## Community 1.1
## Reference State

Optimum ground cover is 20 percent. Total Annual Production: Favorable years 1200 pounds per Ac air-dry Normal years 850 pounds per Ac air-dry Unfavorable years 500 pounds per Ac air-dry

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

| Plant Type | Low (Lb/Acre) | Representative Value (Lb/Acre) | High (Lb/Acre) |
|---|---|---|---|
| Grass/Grasslike | 180 | 425 | 650 |
| Shrub/Vine | 240 | 300 | 375 |
| Forb | 80 | 130 | 175 |
| **Total** | **500** | **855** | **1200** |

## Additional community tables

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

| Group | Common Name | Symbol | Scientific Name | Annual Production (Lb/Acre) | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Grass/Grasslike** | | | | | |
| 1 | **Grasses** | | | 340–510 | |
| | wildrye | ELYMU | *Elymus* | 215–255 | – |
| | sedge | CAREX | *Carex* | 45–85 | – |
| | Indian ricegrass | ACHY | *Achnatherum hymenoides* | 40–80 | – |
| | thickspike wheatgrass | ELLA3 | *Elymus lanceolatus* | 40–80 | – |
| | western wheatgrass | PASM | *Pascopyrum smithii* | 40–80 | – |
| | muttongrass | POFE | *Poa fendleriana* | 25–45 | – |
| | prairie Junegrass | KOMA | *Koeleria macrantha* | 25–45 | – |
| | needle and thread | HECO26 | *Hesperostipa comata* | 15–40 | – |
| | bluebunch wheatgrass | PSSP6 | *Pseudoroegneria spicata* | 15–40 | – |
| | squirreltail | ELEL5 | *Elymus elymoides* | 15–40 | – |
| **Forb** | | | | | |
| 2 | **Forbs** | | | 85–170 | |
| | rosy pussytoes | ANRO2 | *Antennaria rosea* | 15–40 | – |
| | buckwheat | ERIOG | *Eriogonum* | 15–40 | – |
| | mat penstemon | PECA4 | *Penstemon caespitosus* | 20–35 | – |
| | phlox | PHLOX | *Phlox* | 20–35 | – |
| **Shrub/Vine** | | | | | |
| 3 | **Shrubs** | | | 255–340 | |
| | big sagebrush | ARTR2 | *Artemisia tridentata* | 85–170 | – |
| | yellow rabbitbrush | CHVI8 | *Chrysothamnus viscidiflorus* | 45–85 | – |
| | rubber rabbitbrush | ERNA10 | *Ericameria nauseosa* | 45–85 | – |

## Animal community

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

INTERPRETATIONS FOR WILDLIFE:
The site provides a high value rating for antelope and medium rating for deer, elk, cottontail, and upland game birds. It offers a low value rating for jackrabbit and is not used by waterfowl.

## Hydrological functions

The site offers a medium value rating for watershed.

## Recreational uses

RECREATION AND NATURAL BEAUTY:
The site offers a medium value rating for recreation and natural beauty.

## Wood products

No wood products are produced on this site.

## Other information

Rare, Threatened, or Endangered Plants and Animals:
(To be added when known)

Field offices where the site occurs:
Fort Collins and Walden

## Other references

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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.

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

## Contributors

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## Approval

Kirt Walstad, 3/05/2024

## Acknowledgments

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Those involved in developing earlier versions of this site description include: Bob Rayer, retired NRCS Soil Scientist; Herman Garcia, retired CO State RMS and NRCS MLRA Ecological Site Specialist-QA Phoenix, AZ.

--Site Development and Testing Plan--:

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

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

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

## Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

| | |
|---|---|
| Author(s)/participant(s) | |
| Contact for lead author | |
| Date | 05/10/2025 |
| 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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