

Ecological site R048AY270CO Valley Bench

Last updated: 3/05/2024
Accessed: 04/20/2024

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

Valley Bench occurs on alluvial fans. Slopes is between 0 to 15 percent. 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.

Associated sites

R048AY272CO	<p>Sandy Bench Sandy Bench 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.</p>
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Similar sites

R048AY272CO	<p>Sandy Bench Sandy Bench 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.</p>
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata</i>
Herbaceous	(1) <i>Achnatherum pinetorum</i> (2) <i>Koeleria macrantha</i>

Physiographic features

Broad-sweeping alluvial fans interspersed with low ridges and shallow swales are typical of this site. Slopes rarely exceed 15 percent, with these being mostly along the major drainages. Most of the site is within an elevation range of 7500 to 8500 feet.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan
Runoff class	Low to medium
Flooding frequency	None
Ponding frequency	None
Elevation	7,500–8,500 ft
Slope	2–15%
Aspect	Aspect is not a significant factor

Climatic features

Average annual precipitation is about 9 to 12 inches. Of this, approximately 50-60% falls as snow, and 40-50% falls as rain between June to and the end of September. Summer moisture is mostly from thundershowers in July thru October. November to March and June is the driest period of the year with the driest month being February. July to October is the wettest period and the wettest month is usually July. The average annual total snowfall is 48 inches. The snow depth usually ranges from 1 to 10.5 inches during October thru May. The highest winter snowfall record in this area is 109.8 inches which occurred in 1978-1979. The lowest snowfall record is 15.6 inches during the 1953-1954 winter. The frost-free period typically ranges from 65 to 95 days. The last spring frost is typically the first part 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 25.3°F to 60°F, averaging about 21°F for the winter and 63°F in the summer. Summer high temperatures of mid-80°F to low 80°F are not unusual. The coldest winter temperature recorded was -51°F on January 12, 1963 and the warmest winter temperature recorded was 65°F on February 25,

1986. The coldest summer temperature recorded was 5°F on June 27, 1909 and the warmest was 100°F on June 30, 1990. Wide yearly and seasonal fluctuations are common for this climatic zone. Data taken from Western Regional Climate Center (2018) for Eagle CO AP, 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: Eagle CO AP, and Blue Mesa Lake. This LRU zone is use in write up above. November to March and June is the driest period of the year with the driest month being February. July to October is the wettest period and the wettest month is usually July. Frigid

Gunnison Basin: Gunnison 2 SW and Cochetopa Creek. Driest months usually are November and March. Wettest months usually are July and August. The growing season is about 45-80 days. Cryic

Northwest Zone Climate Stations: Bond. Driest months are usually 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: Powderhorn. Driest months usually are March and April. Wettest months usually is August. Cryic. The growing season is about 20-50 days.

Northeast (Front Range Igneous and Metamorphic): There are no climate stations in this LRU zone.

Southeast (Sangre de Cristo Mtns): There are no climate stations in this LRU zone.

Table 3. Representative climatic features

Frost-free period (characteristic range)	66-74 days
Freeze-free period (characteristic range)	92-101 days
Precipitation total (characteristic range)	10-11 in
Frost-free period (actual range)	65-75 days
Freeze-free period (actual range)	90-103 days
Precipitation total (actual range)	10-11 in
Frost-free period (average)	70 days
Freeze-free period (average)	97 days
Precipitation total (average)	10 in

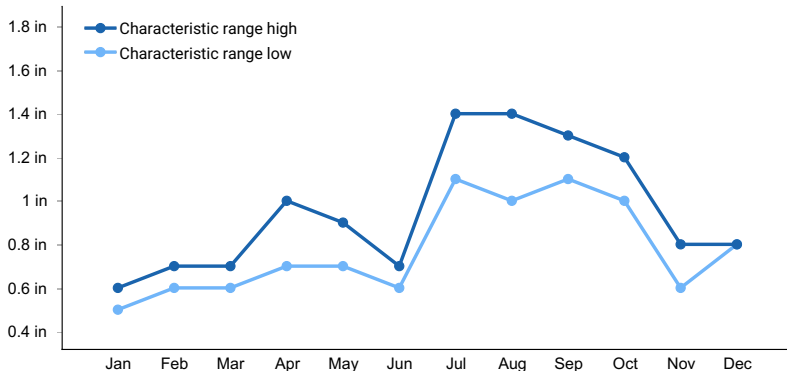


Figure 1. Monthly precipitation range

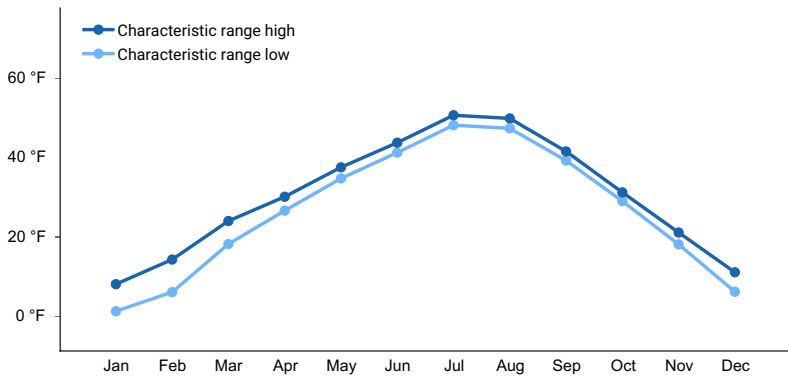


Figure 2. Monthly minimum temperature range

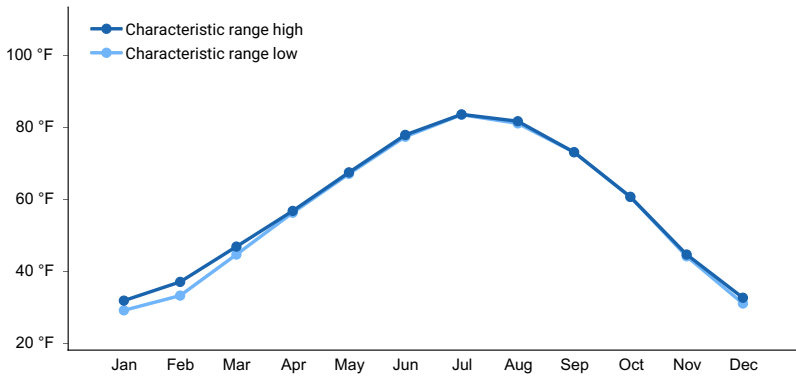


Figure 3. Monthly maximum temperature range

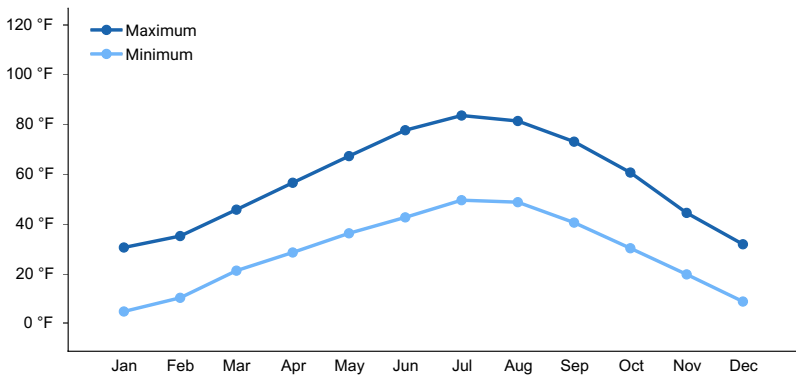


Figure 4. Monthly average minimum and maximum temperature

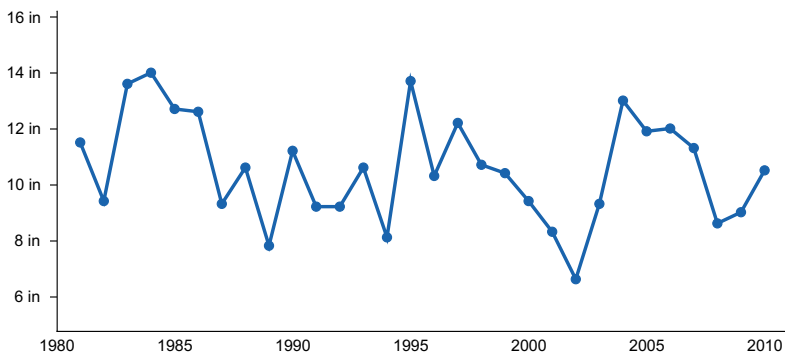


Figure 5. Annual precipitation pattern

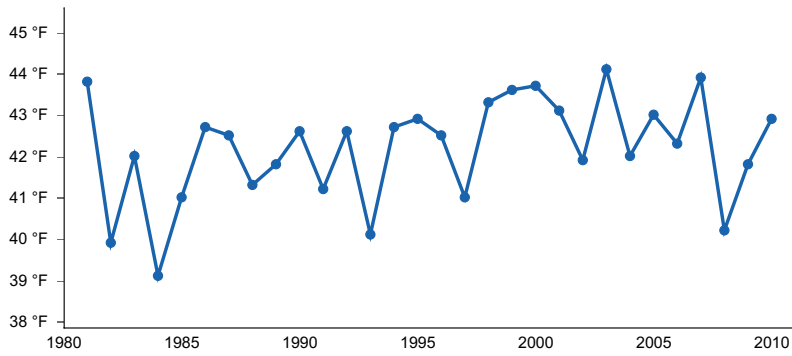


Figure 6. Annual average temperature pattern

Climate stations used

- (1) EAGLE FAA AP [USW00023063], Gypsum, CO
- (2) BLUE MESA LAKE [USC00050797], Gunnison, CO

Influencing water features

None

Soil features

Soils are moderately deep with fine-loamy textured profiles. Light colored sandy loam surface horizons range from 3 to 12 inches in thickness.

Table 4. Representative soil features

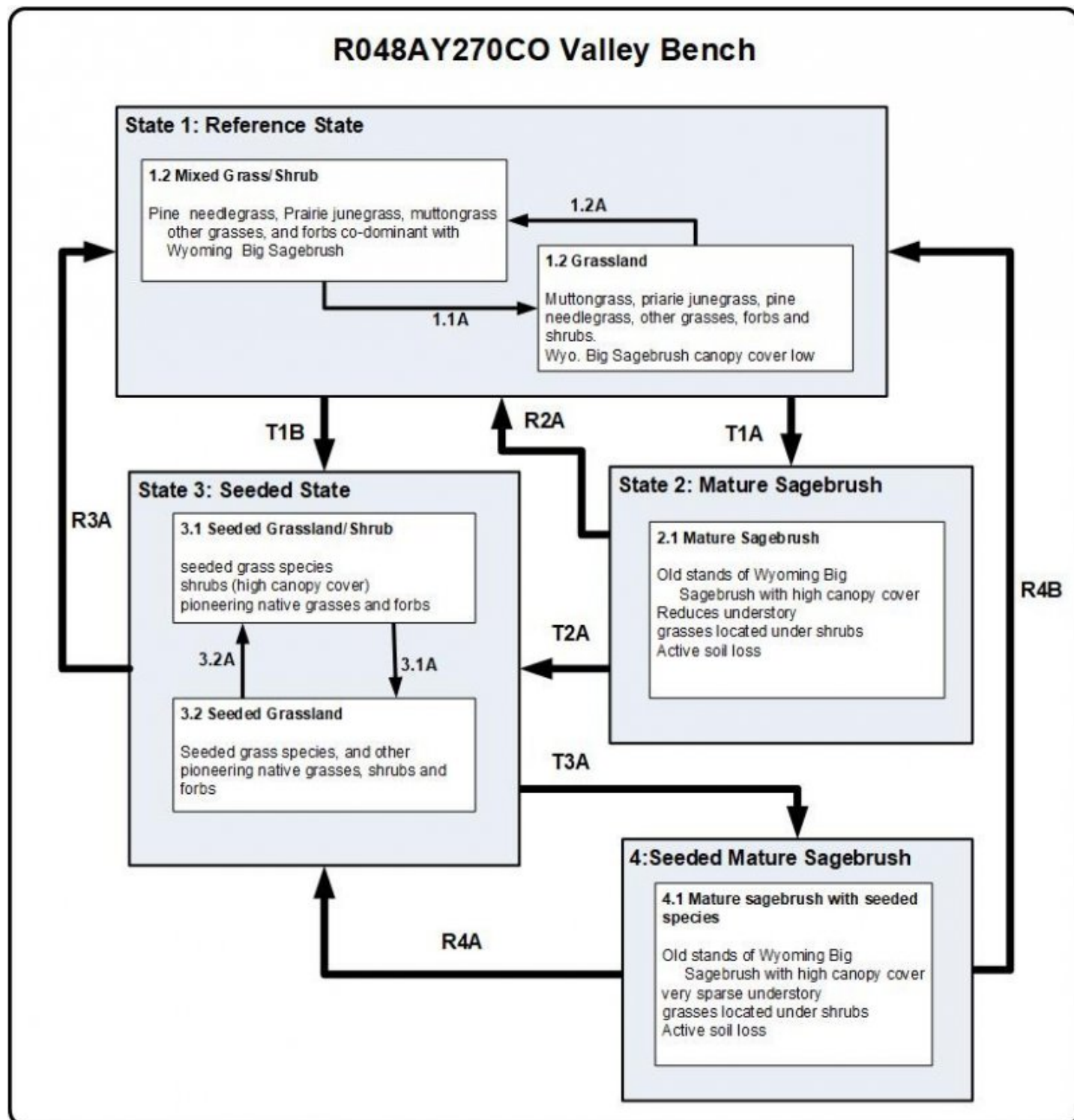
Parent material	(1) Colluvium–sandstone
Surface texture	(1) Sandy loam
Family particle size	(1) Fine-loamy
Drainage class	Well drained
Permeability class	Slow to moderately slow
Soil depth	20–40 in
Surface fragment cover ≤3"	0–10%
Surface fragment cover >3"	0–2%
Available water capacity (Depth not specified)	0.5–2 in
Calcium carbonate equivalent (Depth not specified)	0–2%
Soil reaction (1:1 water) (Depth not specified)	6.6–7.8
Subsurface fragment volume ≤3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0–2%

Ecological dynamics

This treeless grassland-sagebrush plant community contains several bunch grasses mixed with turf-forming wheatgrasses. Pine needlegrass, muttongrass, needleandthread, prairie Junegrass, bluebunch wheatgrass, and Sandberg bluegrass are the most frequently occurring bunchgrasses. Streambank wheatgrass, thickspike wheatgrass, and western wheatgrass appear to hybridize and make identification of these rhizomatous grasses

difficult. Big sagebrush and low rabbitbrush are the principal shrubs. Shrubs of only occasional occurrence are antelope bitterbrush and gray horsebrush. Cushion type forbs including rose pussytoes, phlox, sandwort, and buckwheat make up a rather significant part of the community.

State and transition model



Legend

1.2A, 3.2A, T1A, T3A – Extended improper grazing, lack of fire, extended drought, time without disturbance, and/or lack of insect/pathogen outbreaks

1.1A, 3.1A, R4A – 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, wet climatic cycles, and/or encroached shrub removal

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

State 1 Reference State

Community 1.1 Reference State

Ground cover for the Valley Bench range site is approximately 30%. Few species tend to invade this site. Some areas have invasions of tall rabbitbrush, broom snakeweed, greasewood, and introduced annuals. Total Annual Production Favorable years 1000 pounds per Ac air-dry Median years 800 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)
Shrub/Vine	295	360	425
Grass/Grasslike	130	320	410
Forb	75	120	165
Total	500	800	1000

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			240–400	
	pine needlegrass	ACPI2	<i>Achnatherum pinetorum</i>	40–80	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	40–80	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	40–80	–
	muttongrass	POFE	<i>Poa fendleriana</i>	40–80	–
	thickspike wheatgrass	ELLA3	<i>Elymus lanceolatus</i>	40–80	–
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	15–40	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	15–40	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	15–40	–
Forb					
2	Forbs			80–160	
	rosy pussytoes	ANRO2	<i>Antennaria rosea</i>	15–40	–
	buckwheat	ERIOG	<i>Eriogonum</i>	15–40	–
	phlox	PHLOX	<i>Phlox</i>	15–40	–
Shrub/Vine					
3	Shrubs			320–400	
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	80–240	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	15–50	–

Animal community

INTERPRETATIONS FOR GRAZING ANIMALS:

This site provides a medium value rating for cattle, sheep, and horses.

INTERPRETATIONS FOR WILDLIFE:

This site provides a high value rating for antelope and sage grouse and a medium value rating for deer and elk.

Hydrological functions

The site provides a medium value rating for watershed.

Recreational uses

RECREATION AND NATURAL BEAUTY:

This site provides a medium value rating for recreation and natural beauty.

Wood products

The site does not produce any wood products.

Other information

Rare, Threatened or Endangered Plants and Animals:

(To be added when known)

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

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

Contributors

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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	04/20/2024
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):**
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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:**
-