USDA Natural Resources Conservation Service

Ecological site R048BY270CO
Valley Bench

Last updated: 4/09/2025
Accessed: 05/21/2025

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): 048B–Southern Rocky Mountain Parks and Valleys

This area is in Colorado (96 percent) and Wyoming (4 percent). It makes up about 2,325 square miles (6,020 square kilometers). The town of Walden, in the northern part of this MLRA, is in a wide valley locally known as North Park. The town of Kremmling is in a valley locally known as Middle Park. The town of Hartsel, in the center of the southern part of the MLRA, is in a broad intermontane basin locally known as South Park. The northern part is bordered by the Medicine Bow, Routt, and Arapaho National Forests, and the southern part is bordered by the San Isabel and Pike National Forests. The Arapaho National Wildlife Refuge is directly south of the town of Walden.

This area is within the Southern Rocky Mountains Province of the Rocky Mountain System. It consists of nearly level to rolling mountain parks and valleys and a few narrow mountain ridges. It occurs as two separate parts in the center of the Southern Rockies. The southern half of the northern part is on the west side of the Continental Divide, and the rest of the MLRA is on the east side of the divide. Elevation ranges from 7,850 to 10,850 feet (2,395 to 3,310 meters). The head waters of North Platte River leaves Colorado and enters Wyoming in the northern half of the northern part of the MLRA (North Park). The headwaters of Colorado River is in the southern half of the northern part of the MLRA (Middle Park). The headwaters of South Platte River is in the southern part of the MLRA (South Park).

The mountain valleys and parks that are characteristic of this MLRA are surrounded by high mountain peaks of the adjacent Southern Rocky Mountains MLRA (48A). Steep slopes give rise to steep-gradient streams that can move cobbles and gravel from the mountain slopes down into the valleys. The coarse textured sediments on the surface of

this area were deposited by either glacial meltwater or present-day rivers. Buried deep beneath the sediments is a complex of sedimentary and igneous rocks. Residuum from sedimentary rocks is on the steeper slopes that were not covered by alluvium and glacial outwash.

The average annual precipitation is mainly 10 to 16 inches (255 to 405 millimeters), but it is as high as 28 inches (710 millimeters) at the higher elevations that border the Southern Rocky Mountains MLRA. Precipitation generally increases with elevation. Rainfall occurs as high-intensity, convective thunderstorms during the growing season. About half of the annual precipitation falls as snow. Soil moisture is unevenly distributed within short distances because of snowdrifts. The amount of precipitation is highly influenced by rain shadows. The surrounding peaks receive most of the precipitation as storm systems traverse the area. The average annual temperature is 35 to 42 degrees F (1 to 6 degrees C). The freeze-free period averages 95 days and ranges from 70 to 120 days, decreasing in length with elevation.

The dominant soil order in this MLRA is Mollisols. Alfisols are of lesser extent. The soils are very shallow to deep, generally well drained, and loamy or clayey and have mixed or smectitic mineralogy. The soil temperature regime is dominantly cryic, but it is frigid in some small areas, primarily on south- or west-facing slopes. The soil moisture regime is mainly ustic, but a marginal aridic regime has been identified in areas where the average annual precipitation is less than about 12 inches (305 millimeters). The most extensive great group is Argicryolls (Hodden, Lucky, Parlin, Tiagos, and Cabin series), which commonly formed in outwash and slope alluvium on outwash terraces, fan remnants, hills, and mountain slopes. Haplocryolls (Redcloud and Tealson series) formed in outwash and slope alluvium on outwash terraces, valley side slopes, hills, and ridges. Haplocryalfs (Gebson and Harsha series) formed in slope alluvium and outwash on outwash terraces, fan remnants, hills, ridges, and mountain slopes. Cryaquolls (Dobrow and Randman series) formed in alluvium on stream terraces and flood plains.

Classification relationships

NRCS:
Major Land Resource Area 48B, Southern Rocky Mountain Parks (United States Department of Agriculture, Natural Resources Conservation Service, 2006).

USFS:
M331I – North Parks and Ranges Section Southern Rocky Mountain Steppe - Open Woodland - Coniferous Forest - Alpine Meadow

EPA:
21i – Sagebrush Parks and 21j – Grassland Parks < 21 Southern Rockies < 6.2 Western Cordillera < 6 Northwestern Forested Mountains North American Deserts (Griffith, 2006).

USGS: Southern Rocky Mountain Province

Ecological site concept

R048BY270CO Valley Bench occurs on alluvial fans. Slopes is between 2 to 15%. Soils are moderately deep (20 to 40 inches). Soils are derived from colluvium from sandstone. Soil surface texture is usually sandy loam with fine-loamy textured subsurface. It is a Wyoming big sagebrush – pine needlegrass – prairie Junegrass community. It has an ustic aridic moisture regime. The effective precipitation ranges from 9 to 12 inches.

Associated sites

R048BY272CO	**Sandy Bench** R048BY272CO Sandy Bench occurs on ridges, hill, dune, terraces, and outwash plains. Slopes is between 10 to 50%. Soils are very deep (60+ inches). Soils are derived from alluvium and eolian sands. Soil surface texture is usually sandy loam or fine sand with sandy or sandy-skeletal textured subsurface. It is a Wyoming big sagebrush – western wheatgrass – upland sedges. It has an aridic ustic moisture regime. The effective precipitation ranges from 12 to 16 inches.
R048BY231CO	**Dry Mountain Loam** R048BY231CO Dry Mountain Loam occurs on alluvial fans, valley sides, mountainsides, fans, terraces, and outwash plains. Slopes is between 0 to 30%. Soils are moderately deep to very deep (20 to 60 inches). Soils are derived from alluvium from sedimentary rock; colluvium from basalt or sandstone; or outwash. Soil surface texture is usually loam or with fine-loamy textured subsurface. It is a Wyoming big sagebrush – needlegrass – bluebunch wheatgrass community. It has an aridic ustic moisture regime. The effective precipitation ranges from 12 to 16 inches.
R048BY241CO	**Mountain Meadow** R048BY241CO Mountain Meadow occurs on flood plains, stream terraces, drainageways and alluvial flats. Slopes is between 0 to 5%. Soils are moderately deep to very deep (25 to 100 inches). Soils are derived from alluvium from igneous and metamorphic rock. Soil surface texture is usually loam, fine sandy loam, silty clay loam or sandy clay loam with fine-loamy, fine-loamy over sandy-skeletal or coarse-loamy textured subsurface. It is a tufted hairgrass – Nebraska sedge community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.
R048AY244CO	**Mountain Shale** R048AY244CO Mountain Shale occurs on valley sides, mountain sides and fans. Slopes is between 2 to 35%. Soils are moderately deep to deep (20 to 60+ inches). Soils are derived from alluvium from shale and mudstone, and/or residuum from shale and mudstone. Soil surface texture is clay loam, clay or stony clay with a 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.

Similar sites

R048BY272CO	**Sandy Bench** R048BY272CO Sandy Bench occurs on ridges, hill, dune, terraces, and outwash plains. Slopes is between 10 to 50%. Soils are very deep (60+ inches). Soils are derived from alluvium and eolian sands. Soil surface texture is usually sandy loam or fine sand with sandy or sandy-skeletal textured subsurface. It is a Wyoming big sagebrush – western wheatgrass – upland sedges. It has an aridic ustic moisture regime. The effective precipitation ranges from 12 to 16 inches.
R048BY231CO	**Dry Mountain Loam** R048BY231CO Dry Mountain Loam occurs on alluvial fans, valley sides, mountainsides, fans, terraces, and outwash plains. Slopes is between 0 to 30%. Soils are moderately deep to very deep (20 to 60 inches). Soils are derived from alluvium from sedimentary rock; colluvium from basalt or sandstone; or outwash. Soil surface texture is usually loam or with fine-loamy textured subsurface. It is a Wyoming big sagebrush – needlegrass – bluebunch wheatgrass community. It has an aridic ustic moisture regime. The effective precipitation ranges from 12 to 16 inches.
R048BY225CO	**Mountain Loam 10-16 PZ South Park** R048BY225CO Mountain Loam 10-16” South Park occurs fan remnants, pediments and hills. Slopes is between 1 to 25%. Soils are deep to very deep (40 to 80 inches). Soils are derived from alluvium; slope alluvium from volcanic breccia, limestone, sandstone, and/or shale; and outwash from sedimentary rock or granite and gneiss. Soil surface texture is usually loam, sandy loam, gravelly loam or very gravelly sandy loam with either a fine-loamy or loamy-skeletal textured subsurface. It is an Arizona fescue – western wheatgrass community. It has an aridic ustic moisture regime. The effective precipitation ranges from 10 to 16 inches.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. wyomingensis*
Herbaceous	(1) *Achnatherum pinetorum* (2) *Koeleria macrantha*

Physiographic features

Broad-sweeping benchlands interspersed with low ridges and shallow depressions 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 elevational 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	2,286–2,591 m
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 to 60 percent falls as snow, and 40 to 50 percent falls as rain between middle of June to and the end of September. Summer moisture is mostly from thundershowers in June thru September. November thru March is the driest period of the year with the driest month being January and February. July and August are the wettest months.

The average annual total snowfall is 57.4 inches. The snow depth usually ranges from 1 to 8.5 inches during September thru May. The highest winter snowfall record in this area is 104.9 inches which occurred in 1985-1986. The lowest snowfall record is 23.5 inches during the 1962-1963 winter.

The frost-free period typically ranges from 13 to 60 days. The last spring frost is typically the third week of June to the middle of July. The first fall frost is usually the first part of August to the end of August.

Mean daily annual air temperature ranges from about 21.6 degrees F to 52.6 degrees F, averaging about 17.8 degrees F for the winter and 56.6 degrees F in the summer. Summer high temperatures of low-70 degrees F to high-70 degrees F are not unusual. The coldest winter temperature recorded was -49 degrees F on February 1, 1951 and the warmest winter temperature recorded was 58 degrees F on December 10, 1939. The coldest summer temperature recorded was 17 degrees F on June 4, 1898 and the warmest was 96 degrees F on August 4, 1973.

Wide yearly and seasonal fluctuations are common for this climatic zone. Data taken from Western Regional Climate Center (2018) for Walden, Colorado Climate Station.

This zone in MLRA 48B will need to be broken up into at least 2-3 land resources zones in future projects based on current knowledge of precipitation and temperature patterns based on North Park-Middle Park and South Park. All the parks are Cryic. Antero Reservoir is in South Park. Gore Pass Ranch and Kremmling are in Middle Park.

Walden is in North Park. North Park (Walden) is used in the write-up above. The graphic and tabular climatic data is a product of the full range of climate stations within this MLRA and so depict a more substantial range of variability than captured in the narrative.

Middle Park (Gore Pass Ranch and Kremmling) has growing season of 50-90 days; August is the wettest month; and the driest months is December thru February.

South Park (Antero Reservoir) has a growing season of 30 to 70 days with August being the wettest months and November thru January is the driest months.

Table 3. Representative climatic features

Frost-free period (characteristic range)	15-40 days
Freeze-free period (characteristic range)	62-79 days
Precipitation total (characteristic range)	279-305 mm
Frost-free period (actual range)	13-51 days
Freeze-free period (actual range)	60-85 days
Precipitation total (actual range)	229-305 mm
Frost-free period (average)	28 days
Freeze-free period (average)	71 days
Precipitation total (average)	305 mm

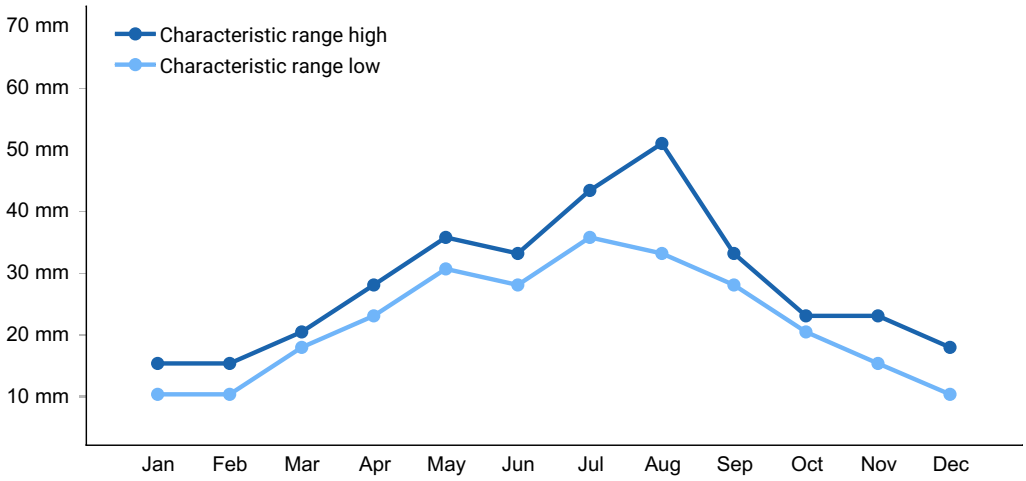


Figure 1. Monthly precipitation range

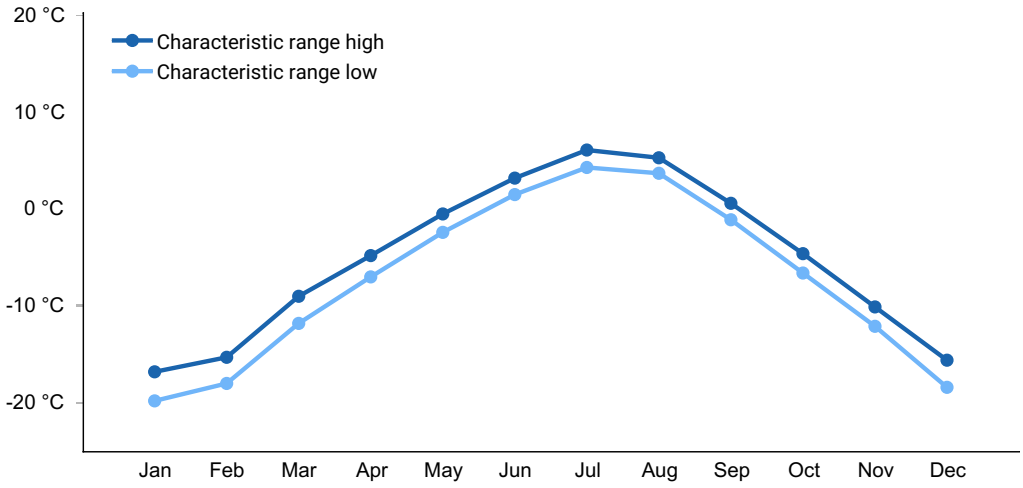


Figure 2. Monthly minimum temperature range

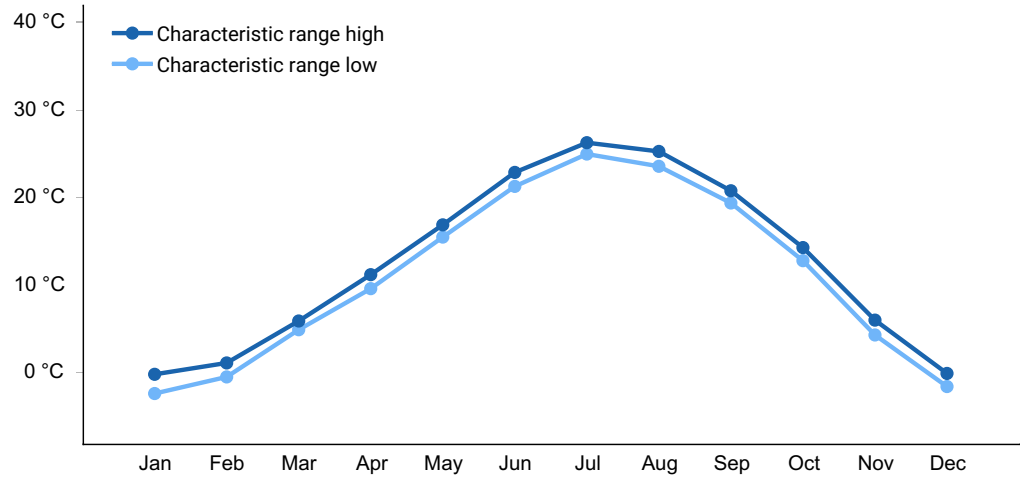


Figure 3. Monthly maximum temperature range

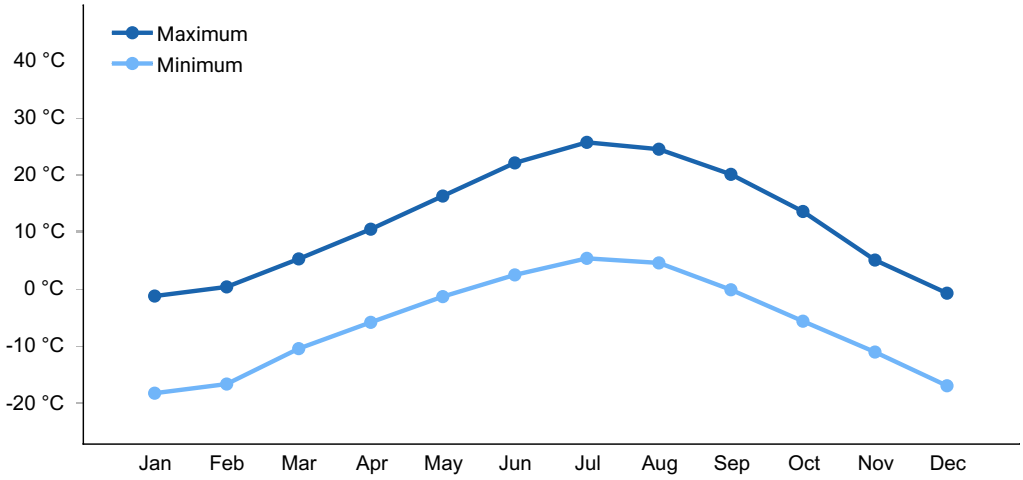


Figure 4. Monthly average minimum and maximum temperature

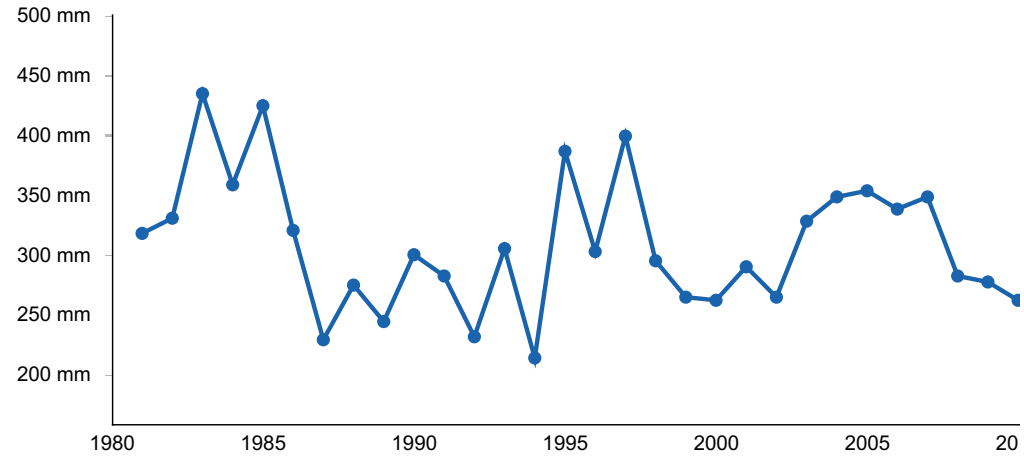


Figure 5. Annual precipitation pattern

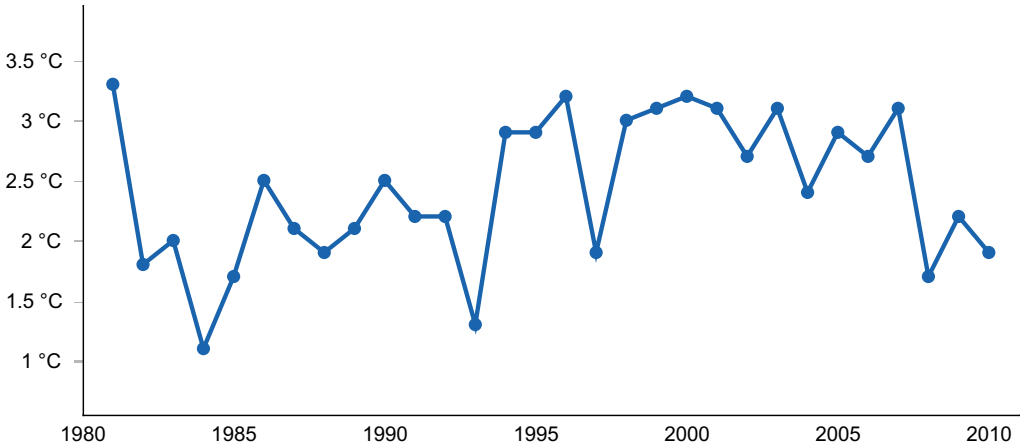


Figure 6. Annual average temperature pattern

Climate stations used

- (1) KREMMLING [USC00054664], Kremmling, CO
- (2) ANTERO RSVR [USC00050263], Fairplay, CO
- (3) WALDEN [USC00058756], Walden, CO

Influencing water features

None

Wetland description

N/A

Soil features

Soils are moderately deep soils with moderately coarse to medium textured profiles. Light colored sandy loam surface horizons range from one to five inches in thickness. Subsoil textures are sandy loams or sandy clay loams. Depth to calcareous material ranges from

10 to 30 inches. Desert pavement of fine to medium sized gravels may be present. Moisture intake rate is rapid with moderate water-holding capacity.

Soils in this site are:

Ojito and Ojera

Table 4. Representative soil features

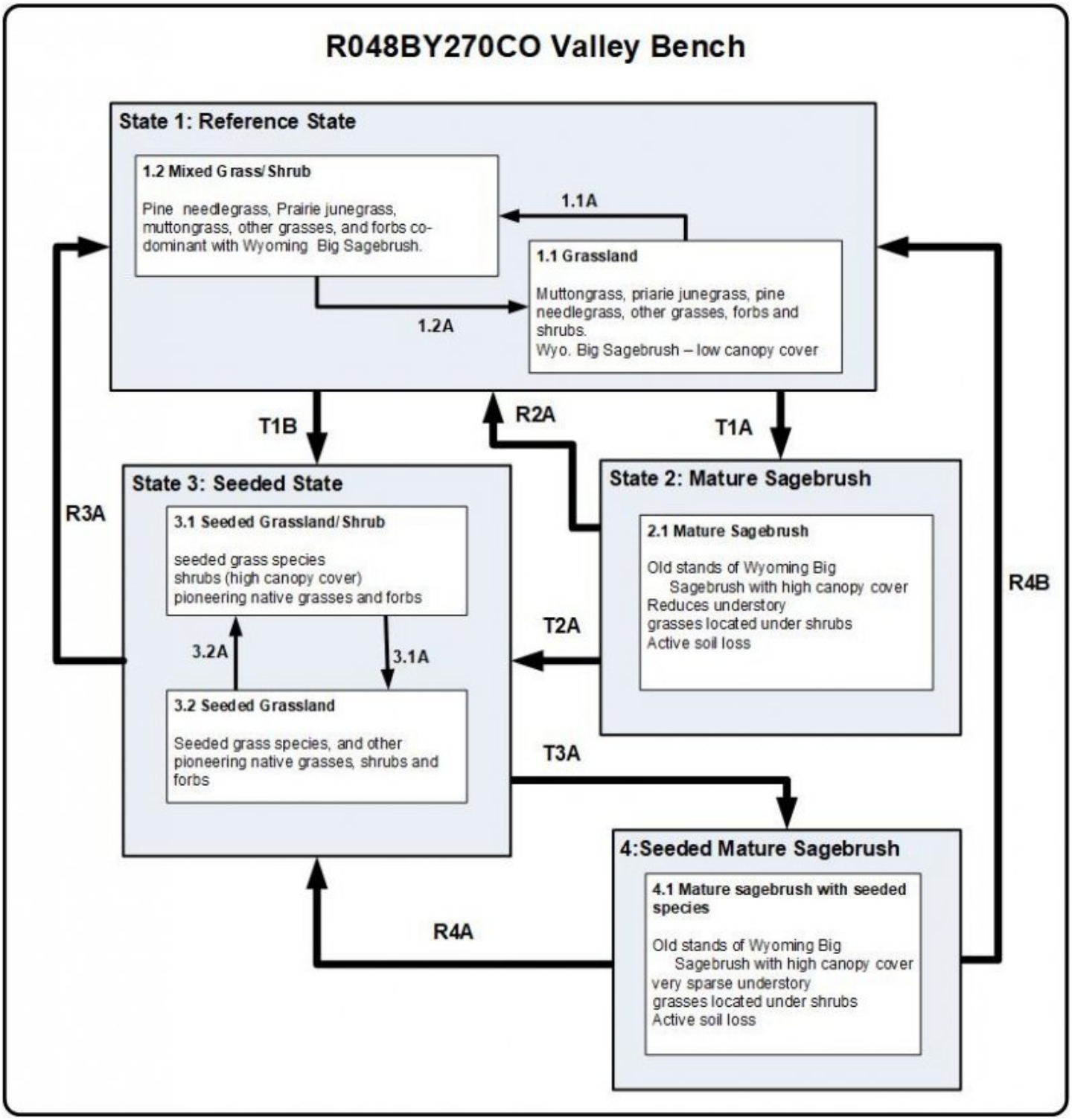
Parent material	(1) Colluvium–sandstone
Surface texture	(1) Sandy loam
Family particle size	(1) Fine-loamy
Drainage class	Well drained
Soil depth	51–102 cm
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–5%
Available water capacity (Depth not specified)	9.4–13.21 cm
Calcium carbonate equivalent (Depth not specified)	0–30%
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)	0–5%

Ecological dynamics

This treeless grassland-sagebrush plant community contains several bunchgrasses mixed with turf-forming wheatgrasses. Pine needlegrass, muttongrass, needle and thread, prairie Junegrass, bluebunch wheatgrass, and Sandberg bluegrass are the most frequently occurring bunchgrasses. Streambank wheatgrass, thickspike wheatgrass, and western wheatgrass all occur on this site and make identification of rhizomatous grasses difficult. Big sagebrush and little (low) rabbitbrush are the principal shrubs. Shrubs of only occasional occurrence are antelope bitterbrush and spineless (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

R048BY270CO Valley Bench



Legend

1.1A, 3.2A, T1A, T3A – Extended improper grazing, lack of fire, extended drought, time without disturbance, and/or lack of insect/pathogen outbreaks

1.2A, 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

Community 1.1
Reference State

Ground cover for the Valley Bench range site is approximately 30 percent. Few species tend to invade this site. Some areas have invasions of rubber (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 (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	331	404	476
Grass/Grasslike	146	359	460
Forb	84	135	185
Total	**561**	**898**	**1121**

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**			269–448	
	pine needlegrass	ACPI2	*Achnatherum pinetorum*	45–90	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	45–90	–
	western wheatgrass	PASM	*Pascopyrum smithii*	45–90	–
	muttongrass	POFE	*Poa fendleriana*	45–90	–
	thickspike wheatgrass	ELLA3	*Elymus lanceolatus*	45–90	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	17–45	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	17–45	–
	squirreltail	ELEL5	*Elymus elymoides*	17–45	–
Forb					
2	**Forbs**			90–179	
	rosy pussytoes	ANRO2	*Antennaria rosea*	17–45	–
	buckwheat	ERIOG	*Eriogonum*	17–45	–
	phlox	PHLOX	*Phlox*	17–45	–
Shrub/Vine					
3	**Shrubs**			359–448	
	big sagebrush	ARTR2	*Artemisia tridentata*	90–269	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	17–56	–

Animal community

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

INTERPRETATIONS FOR WILDLIVE:
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

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

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.

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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.

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Contributors

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Approval

Kirt Walstad, 4/09/2025

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	04/09/2025
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):**

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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:**
