USDA Natural Resources Conservation Service

Ecological site R048AY292CO
Deep Loam

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

Deep Loam occurs alluvial fans, terraces, hills, fan remnants, valley sides, and structural benches. Slopes is between 0 to 25 percent. Soils are deep (60+ inches) in depth. Soils are derived from alluvium from basalt, or sandstone and shale; colluvium from sandstone and shale; slope alluvium from sandstone and shale or eolian

deposits from sandstone and shale. Soil surface texture is loam, sandy clay loam or very channery loam, with a fine-loamy subsurface. It is a mountain big sagebrush – needle-and-thread community. It has an aridic ustic moisture regime and a frigid temperature regime. The effective precipitation ranges from 12 to 16 inches.

Associated sites

R048AY228CO	**Mountain Loam** Mountain Loam occurs mainly alluvial fans, mountain slopes, benches, terraces, or hills. Slopes average between 5 and 10% but can range from 0 to 30%. Soils are moderately deep to deep (20-60 inches) loamy soils derived from residuum from igneous and metamorphic rocks or sandstone and shale; slope alluvium from sandstone and shale, or igneous and metamorphic rocks; colluvium from igneous and metamorphic rocks or sandstone and shale, and/or alluvium from igneous and metamorphic rocks. Soil surface texture are loam, sandy loam or silt loam with loamy subsurface. It is a Mountain Big Sagebrush - Arizona Fescue community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.
R048AY247CO	**Deep Clay Loam** Deep Clay Loam occurs on hills, hillsides, mountain-slope, complex landslides, alluvial fans, and structural benches. Slopes is between 0 to 35%. Soils are deep (60+ inches). Soils are derived from colluvium and slide deposits from igneous, metamorphic and sedimentary rocks, and/or alluvium, residuum or complex landslide deposits from shale. Soil surface texture is loam, clay loam or silty clay loam with fine-textured subsurface. It is a mountain big sagebrush – western wheatgrass community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.
R048AY303CO	**Loamy Slopes** Loamy Slopes occurs on alluvial fans, terraces, hills mountains and mountainsides. Slopes is between 25 to 65%. Soils are moderately deep to deep (20 to 60+ inches). Soils are derived from alluvium from sandstone and siltstone or sandstone; residuum or colluvium from sandstone or outwash from basalt. Soil surface texture is cobbly sandy loam or cobbly, very flaggy or channery loam with loamy-skeletal textured subsurface. It is a mountain mahogany – Indian ricegrass community. It has an aridic ustic moisture regime and frigid temperature. The effective precipitation ranges from 12 to 18 inches.
R048AY245CO	**Mountain Swale** Mountain swale occurs flood plains, alluvial fans, swales, stream terraces, and valley floors. Slopes is between 0 to 12%. Soils are deep (60+ inches) in depth. Soils are derived from alluvium. Soil surface texture is loam, with a fine-loamy subsurface. It is a basin wildrye-western wheatgrass community. It has a typic ustic moisture. The effective precipitation ranges from 16 to 20 inches. It receives extra moisture from surrounding uplands that drain into the area. These areas are sloped themselves and drain into perennially wet areas. They have well drained soils and ephemeral streams.

Similar sites

R048AY228CO	**Mountain Loam** Mountain Loam occurs mainly alluvial fans, mountain slopes, benches, terraces, or hills. Slopes average between 5 and 10% but can range from 0 to 30%. Soils are moderately deep to deep (20-60 inches) loamy soils derived from residuum from igneous and metamorphic rocks or sandstone and shale; slope alluvium from sandstone and shale, or igneous and metamorphic rocks; colluvium from igneous and metamorphic rocks or sandstone and shale, and/or alluvium from igneous and metamorphic rocks. Soil surface texture are loam, sandy loam or silt loam with loamy subsurface. It is a Mountain Big Sagebrush - Arizona Fescue community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. vaseyana*
Herbaceous	(1) *Hesperostipa comata* (2) *Pascopyrum smithii*

Physiographic features

Most commonly found on alluvial fans, terraces and valley sides. Degree of slope ranges from 0 to 25 percent. Direction of slope is not a factor.

Elevation of this site is from 6000 to 8000 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Fan (3) Terrace (4) Hill (5) Hillside (6) Valley side (7) Fan remnant (8) Structural bench
Runoff class	Medium to high
Flooding frequency	None
Ponding frequency	None
Elevation	6,000–8,000 ft
Slope	0–25%
Aspect	Aspect is not a significant factor

Climatic features

Average annual precipitation is about 12 to 16 inches. Of this, approximately 45-55% falls as snow, and 45-55% falls as rain between middle of May to and the end of September. Summer moisture is mostly from thundershowers in July thru October. 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. The average annual total snowfall is 64.8 inches. The snow depth usually ranges from 1 to 5 inches during October thru April. The highest winter snowfall record in this area is 131.9 inches which occurred in 1908-1909. The lowest snowfall record is 11.9 inches during the 1944-1945 winter. The frost-free period typically ranges from 90 to 130 days. The last spring frost is typically the middle of May to the second week of June. The first fall frost is usually the middle of September to the end of September. Mean daily annual air temperature ranges from about 30.7ºF to 64.8ºF, averaging about 25ºF for the winter and 66ºF in the summer. Summer high temperatures of mid-80ºF to low 80ºF are not unusual. The coldest winter temperature recorded was -36ºF on February 8, 1933 and the warmest winter temperature recorded was 66ºF on February 11, 1962. The coldest summer temperature recorded was 24ºF on June 19, 1973 and the warmest was 100ºF on August 2, 1902. Wide yearly and seasonal fluctuations are common for this climatic zone. Data taken from Western Regional Climate Center (2018) for Collbran, 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: 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)	28-98 days
Freeze-free period (characteristic range)	77-131 days
Precipitation total (characteristic range)	13-15 in
Frost-free period (actual range)	13-111 days
Freeze-free period (actual range)	67-141 days
Precipitation total (actual range)	13-15 in
Frost-free period (average)	63 days
Freeze-free period (average)	104 days
Precipitation total (average)	14 in

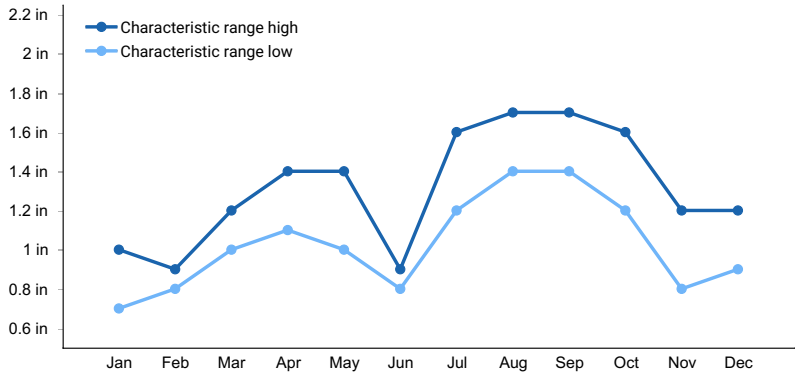


Figure 1. Monthly precipitation range

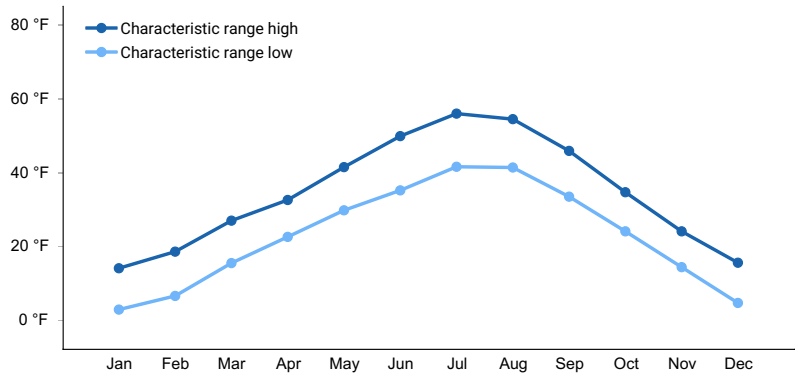


Figure 2. Monthly minimum temperature range

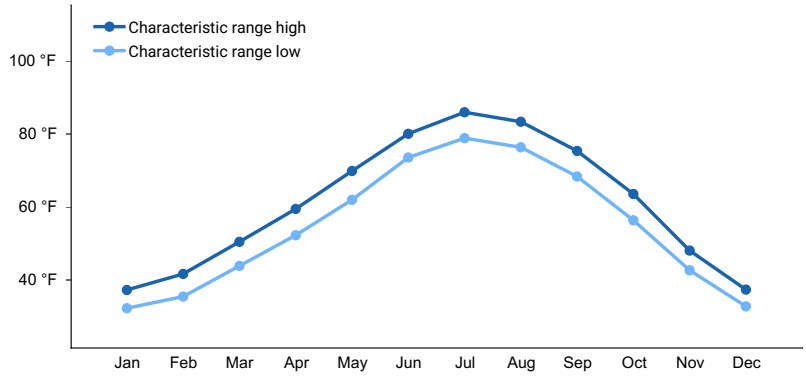


Figure 3. Monthly maximum temperature range

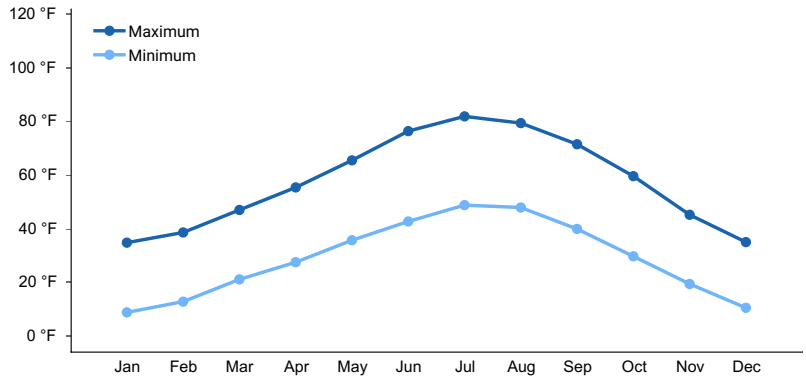


Figure 4. Monthly average minimum and maximum temperature

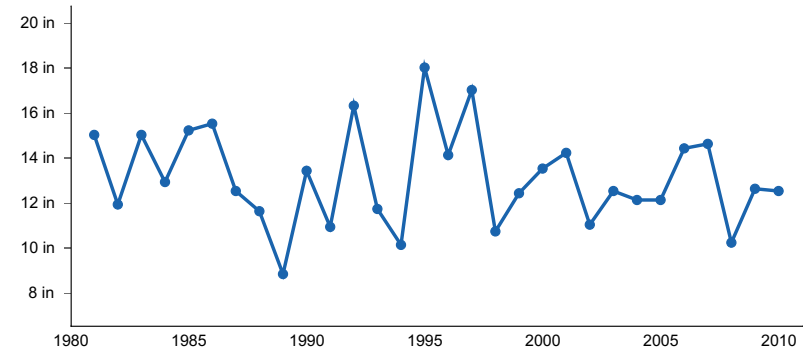


Figure 5. Annual precipitation pattern

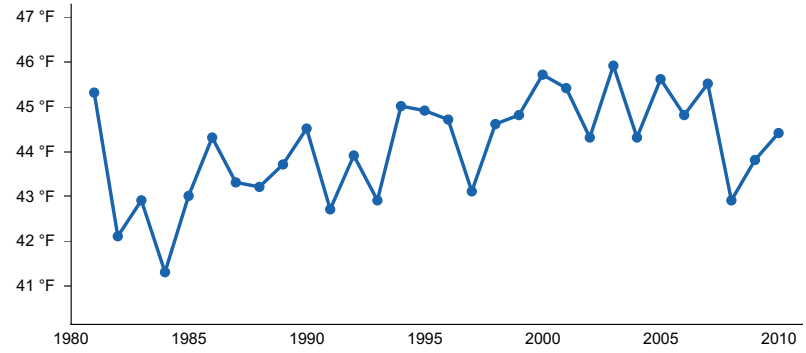


Figure 6. Annual average temperature pattern

Climate stations used

- (1) CIMARRON [USC00051609], Cimarron, CO
- (2) LEADVILLE LAKE CO AP [USW00093009], Leadville, CO
- (3) COLLBRAN [USC00051741], Collbran, CO

- (4) CEDAREDGE 3 E [USC00051443], Cedaredge, CO

Influencing water features

None

Soil features

Soils are moderately deep to deep dark brown loam to light sandy clay loams. Organic matter is 2 to 4 percent. Neutral to slightly alkaline reaction. Soil mixture, subsoil permeability, effective depth, and other soil factors are all favorable for plant growth.

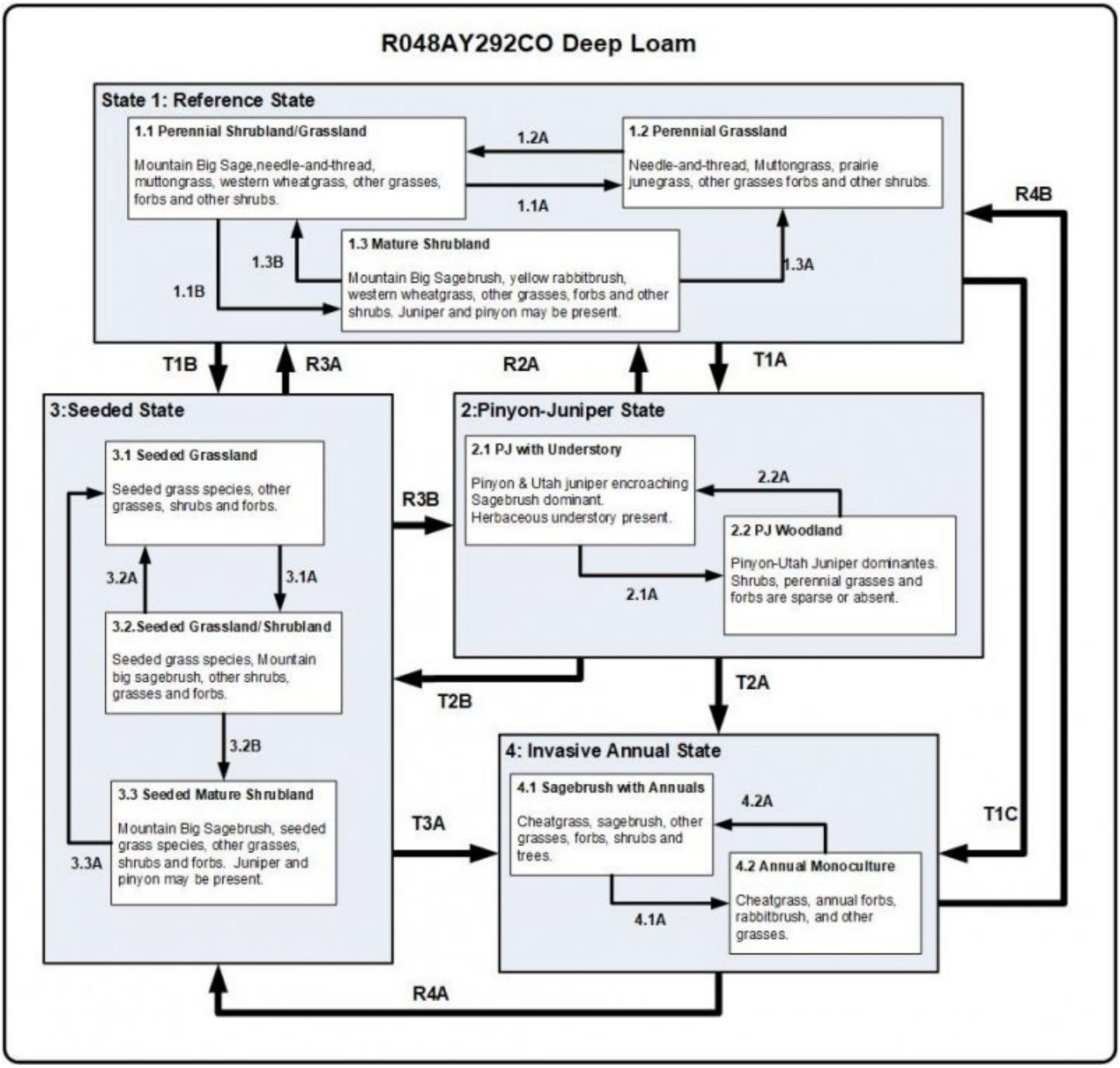
Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone and shale (2) Alluvium–basalt (3) Colluvium–sandstone and shale (4) Slope alluvium–sandstone and shale (5) Eolian deposits–sandstone and shale
Surface texture	(1) Loam (2) Very channery loam (3) Sandy clay loam
Family particle size	(1) Fine-loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderately rapid
Soil depth	60 in
Surface fragment cover <=3"	0–30%
Surface fragment cover >3"	0–3%
Available water capacity (Depth not specified)	5.5–8.1 in
Calcium carbonate equivalent (Depth not specified)	0–15%
Electrical conductivity (Depth not specified)	0–2 mmhos/cm
Soil reaction (1:1 water) (Depth not specified)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0–5%

Ecological dynamics

This is a productive grassland community occurring in the upper foothills and lower oakbrush climatic zone. Important grasses are bluebunch wheatgrass, muttongrass, slender wheatgrass, needle and thread, and western wheatgrass. Principal shrubs include big sagebrush, serviceberry, and snowberry. Other plants include Indian paintbrush, Fremont penstemon, lupine, low larkspur, arrowleaf balsamroot, fleabane, longleaf loco, and tapertip hawksbeard.

State and transition model



Legend

1.1A, 3.2A – Fire, proper grazing, wet climatic cycles, vegetative treatments, and/or small scale insect/pathogen outbreaks

1.1B, 1.2A, 3.1A, 3.2B – Extended improper grazing, lack of fire, extended drought, time without disturbance, and/or lack of insect/pathogen outbreaks

1.3A, 1.3B, 2.2A, R2A, 3.3A – Extended proper grazing, fire, wet climatic cycles, insect/pathogen outbreaks and/or tree encroachment removal

T1A, 2.1A, R3B – lack of fire, time without disturbance, extended drought, lack of insect/pathogen outbreaks, and/or tree encroachment

T1C, T2A, T3A – invasive species establishment, frequent fire, extended improper gazing, surface disturbances and/or long term drought

T1B, T2B – Seeding, and vegetative treatments (fire, mechical, chemical) of shrubs and/trees

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

4.1A – Frequent fire, frequent surface disturbances and/or drought

4.2A, R4A – lack of fire, lack of surface disturbance, vegetative treatments of invasive and/or seeding

R4B - intensive management and inputs maybe required to return to reference state, wet climatic years, native plantings, vegetative treatments, proper grazing , lack of surface disturbances, and/or lack of fire

State 1
Reference State

Community 1.1
Reference State

Optimum ground cover is 35%. Invaders on this site include cheatgrass, Kentucky bluegrass, and pinyon pine and juniper. Total annual production: Favorable years 1800 pounds/Ac (air dry) Median years 1500 pounds/Ac (air dry) Unfavorable years 900 pounds/Ac (air dry)

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	395	750	825
Shrub/Vine	360	525	650
Forb	145	225	325
Total	**900**	**1500**	**1800**

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**			600–900	
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	150–300	–
	western wheatgrass	PASM	*Pascopyrum smithii*	150–225	–
	muttongrass	POFE	*Poa fendleriana*	75–150	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	75–150	–
	basin wildrye	LECI4	*Leymus cinereus*	45–75	–
	Sandberg bluegrass	POSE	*Poa secunda*	45–75	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	15–75	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	30–75	–
Forb					
2	**Forbs**			150–300	
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	15–75	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	15–75	–
	yellow larkspur	DELU	*Delphinium luteum*	15–75	–
	streamside fleabane	ERGLP	*Erigeron glabellus var. pubescens*	15–75	–
	scarlet gilia	IPAG	*Ipomopsis aggregata*	15–75	–
	lupine	LUPIN	*Lupinus*	15–75	–
	bluebells	MERTE	*Mertensia*	15–75	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	15–75	–
	locoweed	OXYTR	*Oxytropis*	15–75	–
	Fremont's beardtongue	PEFR	*Penstemon fremontii*	15–75	–
	longleaf phlox	PHLO2	*Phlox longifolia*	15–75	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	15–75	–
	hollyleaf clover	TRGY	*Trifolium gymnocarpon*	15–75	–
Shrub/Vine					
3	**Shrubs**			450–600	
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	225–300	–
	yellow rabbitbrush	CHVIA4	*Chrysothamnus viscidiflorus ssp. axillaris*	75–225	–
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	75–150	–
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	75–105	–

Animal community

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

INTERPRETATIONS FOR WILDLIFE:
The site offers a high value rating for deer, elk, cottontail, and jackrabbit. It offers a medium value rating for antelope and upland game birds. Waterfowl do not use this site.

Hydrological functions

WATERSHED VALUE:
This site offers 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

This site does not produce any wood products.

Other information

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

The site occurs in the Craig, Eagle, Glenwood Springs, Kremmling, Meeker, and Steamboat Springs field offices.

Type locality

Location 1: Garfield County, CO	
Township/Range/Section	TT7S RR88W S7
General legal description	Missouri Heights, just south of Cattle Creek, on top of a hill. Sec 7, T7S, R88W, Garfield County, Colorado.
Location 2: Eagle County, CO	
Township/Range/Section	TT4S RR84W S35
General legal description	Salt Creek, BLM allotment, near southeast corner of Sec 35, T4S, R84W, Eagle County, Colorado.
Location 3: Moffat County, CO	
General legal description	Along Colorado hwy 13, 8 miles southwest of Craig.

Other references

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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):

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

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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:**
