

Ecological site R048AY241CO Mountain Meadow

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 048A–Southern Rocky Mountains

MLRA 48A makes up about 45,920 square miles (119,000 square kilometers) and is the southern part of the Rocky Mountains. The Southern Rocky Mountains lies east of the Colorado Plateau, south of the Wyoming Basin, west of the Great Plains, and north of the Rio Grande Rift. It is in western and central Colorado, southeastern Wyoming, eastern Utah, and northern New Mexico. The headwaters of major rivers such as the Colorado, Yampa, Arkansas, Rio Grande, North Platte and South Plate rivers are located here. This MLRA has numerous national forests, including the Medicine Bow National Forest in Wyoming; the Routt, Arapaho, Roosevelt, Pike, San Isabel, White River, Gunnison, Grand Mesa, Uncompahgre, Rio Grande, and San Juan National Forests in Colorado; the Carson National Forest and part of the Santa Fe National Forest in New Mexico. Rocky Mountain National Park also is in this MLRA.

MLRA 48A is the southern Rocky Mountains physiographic region. The Southern Rocky Mountains consist primarily of two belts of strongly sloping to precipitous mountain ranges trending north to south. Several basins, or parks, are between the belts. Some high mesas and plateaus are included. It is characterized by mountain ranges that were uplifted during the Laramide Orogeny and then had periods of glaciation. The ranges include the Sangre de Cristo Mountains, the Laramie Mountains, and the Front Range in the east and the San Juan Mountains and the Sawatch and Park Ranges in the west. The ranges are dissected by many narrow stream valleys having steep gradients. In some areas the upper mountain slopes and broad crests are covered by snowfields and glaciers. Elevation typically ranges from 6,500 to 14,400 feet (1,980 to 4,390 meters) in this area. The part of this MLRA in central Colorado includes the highest point in the Rockies, Mount Elbert, which reaches an elevation of 14,433 feet (4,400 meters). More than 50 peaks in the part of the MLRA in Colorado are at an elevation of more than 14,000 feet (4,270 meters). Many small glacial lakes are in the high mountains.

The mountains in this area were formed mainly by crustal uplifts during the late Cretaceous and early Tertiary periods. This large MLRA can be subdivided into at least 4 large general divisions. First is the Rockies on the east side of this area are called the "Front Range," which is a fault block that has been tilted up on edge and uplifted and is largely igneous and metamorphic geology. It was tilted up on the east edge, so there is a steep front on the east and the west side is more gently sloping and in the south east there are rocks exposed in the mountains are mostly Precambrian igneous and metamorphic rocks. Second is the tertiary rocks, primarily basalt and andesitic lava flows, tuffs, breccias, and conglomerates, are throughout this area (San Juan Mountains Area). The third division is Northwest part of the MLRA is dominantly sedimentary rock from the cretaceous/tertiary and Permian/Pennsylvanian periods. The fourth subset is the long and narrow Sangre de Cristos mountains uplifted in the Cenozoic are between the Rio Grande rift and the great plains. Many of the highest mountain ranges were reshaped by glaciation during the Pleistocene. Alluvial fans at the base of the mountains are recharge zones for local basin and valley fill aquifers. They also are important sources of sand and gravel.

The average annual precipitation ranges predominantly from 12 to 63 inches. Summer rainfall commonly occurs as high-intensity, convective thunderstorms. About half of the annual precipitation occurs as snow in winter; this proportion increases with elevation. In the mountains, deep snowpacks accumulate throughout the winter and

generally persist into spring or early summer, depending on elevation. Some permanent snowfields and small glaciers are on the highest mountain peaks. In the valleys at the lower elevations, snowfall is lighter and snowpacks can be intermittent. The average annual temperature is 26 to 54 degrees F (-3 to 12 degrees C). The freeze-free period averages 135 days and ranges from 45 to 230 days, decreasing in length with elevation. The climate of this area is strongly dependent upon elevation; precipitation is greater, and temperatures are cooler at the higher elevations. The plant communities vary with elevation, aspect and change in latitudes due to changing in precipitation kind and timing and temperature.

The dominant soil orders in this MLRA are Mollisols, Alfisols, Inceptisols, and Entisols. The soils in the area dominantly have a frigid or cryic soil temperature regime and an ustic or udic soil moisture regime. Mineralogy is typically mixed, smectitic, or paramicaceous. In areas with granite, gneiss, and schist bedrock, Glossocryalfs (Seitz, Granile, and Leadville series) and Haplocryolls (Rogert series) formed in colluvium on mountain slopes. Dystrocryepts (Leighcan and Mummy series) formed on mountain slopes and summits at the higher elevations. In areas of andesite and rhyolite bedrock, Dystrocryepts (Endlich and Whitecross series) formed in colluvium on mountain slopes. In areas of sedimentary bedrock, Haplustolls (Towave series) formed on mountain slopes at low elevations and with low precipitation. Haplocryolls (Lamphier and Razorba series), Argicryolls (Cochetopa series), and Haplocryalfs (Needleton series) formed in colluvium on mountain slopes at high elevations.

Classification relationships

NRCS:

Major Land Resource Area 48A, Southern Rocky Mountains (United States Department of Agriculture, Natural Resources Conservation Service, 2006).

USFS:

M331F- Southern Parks and Rocky Mountain Range Section Southern Rocky Mountain Steppe - Open Woodland - Coniferous Forest - Alpine Meadow

M331G – South Central Highlands Section Southern Rocky Mountain Steppe - Open Woodland - Coniferous Forest - Alpine Meadow

M331H – North Central Highlands and Rocky Mountains Section Southern Rocky Mountain Steppe - Open Woodland - Coniferous Forest - Alpine Meadow

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

M341B – Tavaputs Plateau Section M341 Nevada-Utah Mountains Semi-Desert - Coniferous Forest - Alpine Meadow (Cleland, et al., 2007).

EPA:

21a – Alpine Zone, 21b – Crystalline Subalpine Forests, 21c – Crystalline Mid-Elevations Forests, 21d -Foothill Shrublands, 21e – Sedimentary Subalpine Forests, 21f – Sedimentary Mid-Elevation Forests, 21g – Volcanic Subalpine Forests, and 21h – Volcanic Mid-Elevation Forests < 21 Southern Rockies < 6.2 Western Cordillera < 6 Northwestern Forested Mountains North American Deserts (Griffith, 2006).

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

Ecological site concept

R048AY241CO Mountain Meadow occurs flood plains, stream terraces, drainageways, ephemeral streams, flood-plain step and depressions. This site has natural sub-irrigation. Slopes is between 0 to 12%. Soils are moderately deep to very deep (20 to 60+ inches). Soils are derived from alluvium from sandstone and shale, sedimentary rock,

igneous, metamorphic and sedimentary rock, or shale. Soil surface texture is loam, silty clay loam, clay loam, clay, sandy clay loam or sandy loam with fine-loamy or fine textured subsurface. It has a typic aquic or oxyaquic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.

Associated sites

R048AY237CO	<p>Stony Loam</p> <p>Stony Loam occurs mainly alluvial fans, mountain slopes mountains and valley sides. Slopes is between 0 to 30%. Soils are deep (60 inches or more) loamy soils derived from outwash; till; colluvium from basalt, sandstone or granite and gneiss; and/or alluvium from igneous and metamorphic rocks; or basalt. Soil surface texture are stony to extremely stony loam, cobbly loam; or cobbly to very cobbly sandy loam with loamy-skeletal subsurface. It is a Mountain Big Sagebrush - Bluebunch wheatgrass community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.</p>
R048AY240CO	<p>Shallow Pine</p> <p>Shallow Pine occurs on mountains and mountainsides. Slopes are 5 to 50%. Soils are shallow (10 to 20 inches). Soils are derived from slope alluvium from volcanic breccia, gneiss, granite, or sandstone and/or residuum from granite, granodiorite and/or gneiss. Soil surface texture is a gravelly to very gravelly sandy loam or very gravelly loam with loamy-skeletal subsurface. It is a Ponderosa Pine - Arizona Fescue – Mountain Muhly community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.</p>
R048AY245CO	<p>Mountain Swale</p> <p>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.</p>
R048AY238CO	<p>Brushy Loam</p> <p>Brushy Loam occurs on hills, mountains, complex landslides, and benches. Slopes is between 3 to 35%. Soils are moderately deep to deep (20 to 60+ inches), soils derived from colluvium, residuum, slope alluvium and alluvium from sandstone and shale. Soil surface texture is loam or clay loam with fine-textured subsurface. It is a Gambel's oak – slender wheatgrass community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.</p>
R048AY222CO	<p>Loamy Park</p> <p>Loamy Park occurs on alluvial and colluvial fans, hillsides, plains, sideslopes, terraces, valley sideslopes, and valley bottoms Slopes are from 0 to 30%. Soils are moderately deep to deep (20-60 inches) loamy soils derived from residuum from igneous and metamorphic rocks; alluvium from granite, gneiss, schist, or sandstone and shale. Soil surface texture are sandy loam to loam with loam subsurface. It is a Arizona Fescue – Mountain Muhly community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.</p>
R048AY247CO	<p>Deep Clay Loam</p> <p>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.</p>
R048AY228CO	<p>Mountain Loam</p> <p>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.</p>

R048AY230CO	<p>Shallow Loam</p> <p>Shallow Loam occurs on mountains, and hills. Soils are very shallow to shallow (less than 20 inches) loamy-skeletal soils derived from slope alluvium from trachyte, volcanic breccia, gneiss, granite and/or sandstone; residuum from weathered volcanic breccia, tuff, igneous rock, sandstone or sandstone and shale. Soils surface textures are gravelly to very gravelly loam, gravelly to very gravelly sandy loam, cobbly loam. Or very cobbly sandy loam. It is an Arizona Fescue-Mountain Muhly community with scattered mountain mahogany, snowberry and current. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.</p>
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Similar sites

R048AY245CO	<p>Mountain Swale</p> <p>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.</p>
R048AY285CO	<p>Foothill Swale</p> <p>Foothill Swale - The site occurs in the watershed in areas that receive extra water and fine sediment from surrounding uplands. The soils are deep and loamy in texture with high water-holding capacity. Buried surface horizons and very little rock characterize the soil profile. The soil moisture regime is aridic ustic, and the soil temperature regime is frigid. The aspect of this site is a valley grassland plant community with a rather sparse stand of shrubs. Basin wildrye, western and thickspike wheatgrasses, Indian ricegrass, squirreltail, and Sandburg bluegrass are the dominant grasses. Shrubs include basin big sagebrush, and rubber rabbitbrush.</p>

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Deschampsia cespitosa</i> (2) <i>Carex nebrascensis</i>

Physiographic features

The site occurs in on flood plains, stream terraces, drainageways, ephemeral streams, flood-plain step and depressions.

Topography is nearly level to gently sloping. There may be slight irregularities, but the terrain is generally smooth. Slopes are mostly 0 to 2 percent, but can range up to 12 percent. Slope has no significant influence on plant growth. Elevation ranges from about 6,800 to 10,000 feet.

Common surrounding upland sites are usually Mountain Loam (R048AY228CO) Subalpine Loam (R048AY250CO), and some forested sites dominated by aspen. The Mountain Swale ecological site (R048AY245CO) commonly drains into these mountain meadow sites.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Stream terrace (3) Drainageway (4) Ephemeral stream (5) Flood-plain step (6) Depression
Runoff class	Low
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Rare to frequent
Ponding duration	Brief (2 to 7 days)

Ponding frequency	None to occasional
Elevation	2,073–3,048 m
Slope	0–12%
Ponding depth	0–3 cm
Water table depth	0–61 cm
Aspect	Aspect is not a significant factor

Climatic features

Average annual precipitation is about 16 to 20 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. However, the key to existence of the site is natural sub-irrigation in a cool mountain climate, rather than amount of precipitation. Summer moisture is mostly from thundershowers in July, August and September. December to February is the driest period of the year with the driest month being January. July thru September is the wettest period and the wettest month is usually August. The average annual total snowfall is 84.9 inches. The snow depth usually ranges from 1 to 5 inches during November thru March. The highest winter snowfall record in this area is 127 inches which occurred in 2007-2008. The lowest snowfall record is 46.5 inches during the 2017-2018 winter. The frost-free period typically ranges from 80 to 120 days. The last spring frost is typically the middle 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 25.5°F to 60.3°F, averaging about 24°F for the winter and 61.8°F in the summer. Summer high temperatures of mid-70°F to low 80°F are not unusual. The coldest winter temperature recorded was -36°F on February 2, 1985 and the warmest winter temperature recorded was 65°F on December 5, 1995. The coldest summer temperature recorded was 19°F on June 2, 1990 and the warmest was 98°F on July 31, 2002. Wide yearly and seasonal fluctuations are common for this climatic zone. Data taken from Western Regional Climate Center (2018) for Ridgway, 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: Alterbern, Aspen, Avon, Glenwood Springs #2, Shoshone, Placerville and Ridgway. This LRU zone is use in write up above. Driest month is usually January, February and June and wettest months are July, August and September.

Northwest Zone Climate Stations: Meeker and Yampa are at the low end of this LRU zone. Driest months usually are January and February. Wettest months usually are April and August.

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

Southwest Volcanics: There are no climate stations in this LRU zone.

Northeast (Front Range Igneous and Metamorphic): Cabin Creek, Caribou Ranch, Dillion 1 R, Fraser, Georgetown, Grand lake 1 NW, Hourglass Reservoir, Nederland 2 NNE, Red Feathers Lakes, Red Feather Lakes 2 SE and Victor. April, May, July and August are the wettest months. February, December, November and October are the driest. The climate stations is this zone are cryic. These areas have shorter growing seasons by 20 to 40 days over the frigid stations.

Southeast (Sangre de Cristo Mtns): There are no climate stations in this zone in MLRA 48A. Closest ones are in MLRA 49. The growing season appears to be longer on the Sangre de Cristos. Driest months are December to February and the wettest are July & August.

Cryic High elevation valleys: Pitkin, Taylor River and Meredith. These areas have shorter growing seasons by 20 to 40 days over the frigid stations.

Table 3. Representative climatic features

Frost-free period (characteristic range)	23-78 days
Freeze-free period (characteristic range)	75-111 days
Precipitation total (characteristic range)	432-457 mm
Frost-free period (actual range)	5-101 days
Freeze-free period (actual range)	43-134 days
Precipitation total (actual range)	432-483 mm
Frost-free period (average)	54 days
Freeze-free period (average)	92 days
Precipitation total (average)	457 mm

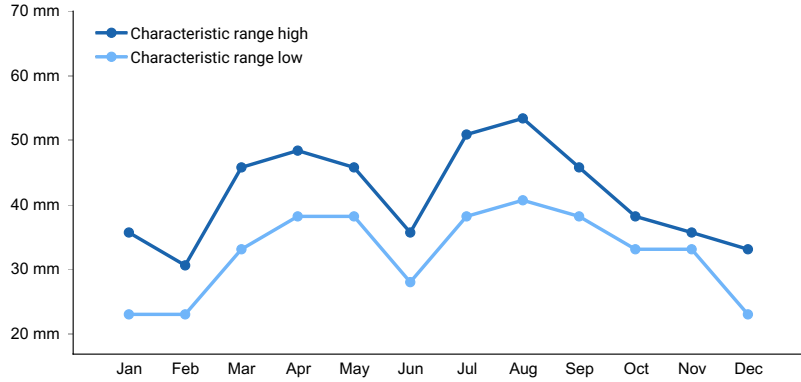


Figure 1. Monthly precipitation range

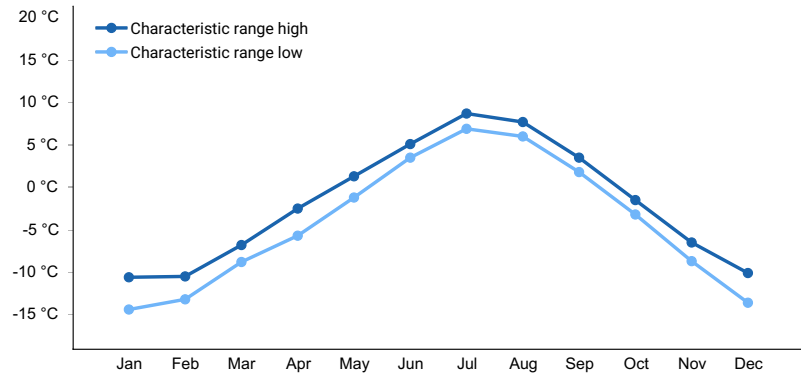


Figure 2. Monthly minimum temperature range

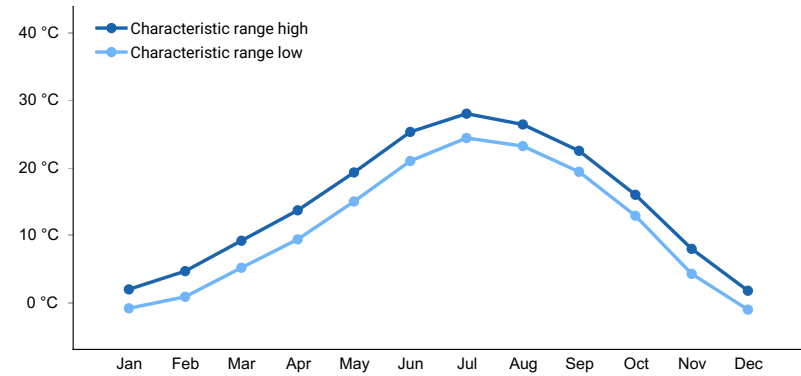


Figure 3. Monthly maximum temperature range

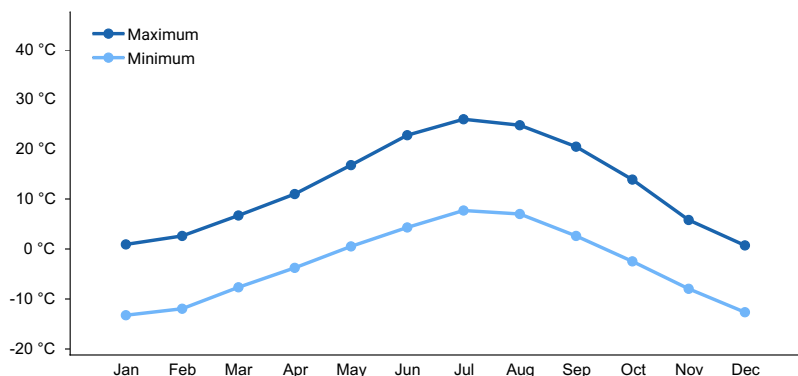


Figure 4. Monthly average minimum and maximum temperature

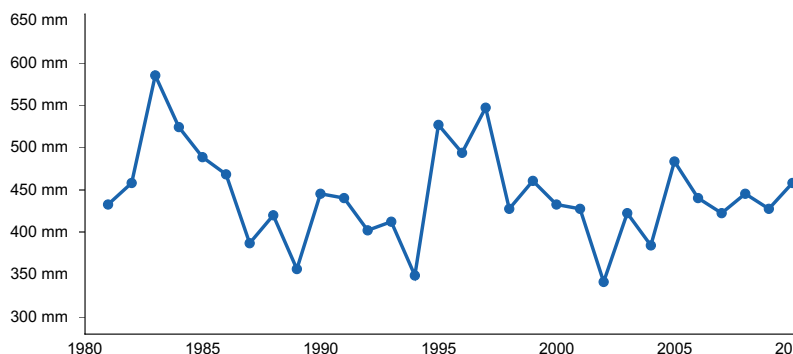


Figure 5. Annual precipitation pattern

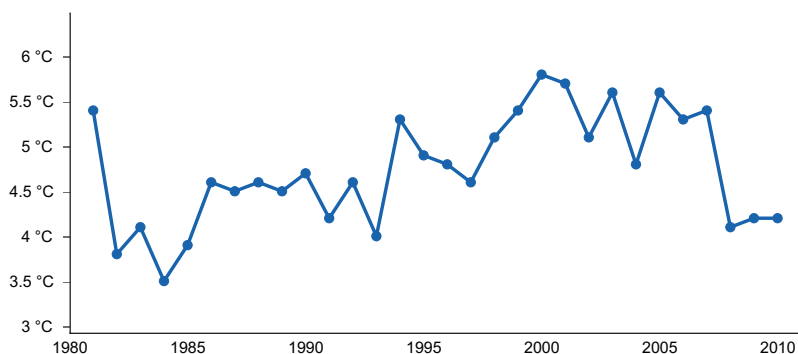


Figure 6. Annual average temperature pattern

Climate stations used

- (1) GEORGETOWN [USC00053261], Idaho Springs, CO
- (2) GLENWOOD SPGS #2 [USC00053359], Glenwood Springs, CO
- (3) YAMPA [USC00059265], Toponas, CO
- (4) ASPEN PITKIN CO AP [USW00093073], Aspen, CO
- (5) FRASER [USC00053116], Fraser, CO
- (6) HOURGLASS RSVR [USC00054135], Bellvue, CO
- (7) RIDGWAY [USC00057020], Ridgway, CO

Influencing water features

This site is associated with an perennial stream that is often sinuous and highly mobile. Mountain meadows act to store and move large quantities of water to streams or rivers. If functioning properly, they decrease they can easily dissipated stored energy in the water to reduce erosion and act as a sponge to reduce flooding, especially lower in the watershed. The hydrologic function mountain meadows are imperative to insuring the health of both the upland landscape and ecosystems lower in the watershed.

Soil features

Soils are moderately deep to very deep, very dark colored, highly organic, poorly to very poorly drained, and typically acid in reaction. They range from sandy loam to clay in texture and include peats and mucks. Loam surface textures are the most common. Peat sometimes can form layers up to 6 inches thick at certain locations. Cobbles are commonly present, but located in the subsurface most of the time. Soil moisture is plentiful throughout the growing season in most years. Soils may become dry on the surface in some spots in late summer and fall or during unusually dry spells; other spots are nearly always wet.

Fine-Loamy Soils:

Alamosa, Blackwell, Giradot. Kovich Family, Menbar, Novary, Spinney and Venable

Fine Loamy over sandy or sandy-skeletal:

Platdon, Vastine and Walden

Fine Soils:

Bayfield, Big Blue, Crooked Creek, Jarvie, Swansonlake, Tottles and Ute

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Alluvium–shale (3) Alluvium–granite (4) Alluvium–igneous and metamorphic rock (5) Alluvium–igneous and sedimentary rock (6) Alluvium–sandstone and shale (7) Alluvium–volcanic rock (8) Alluvium–granite and gneiss (9) Alluvium–schist
Surface texture	(1) Loam (2) Silty clay loam (3) Clay loam (4) Clay (5) Sandy clay loam (6) Fine sandy loam
Family particle size	(1) Fine-loamy (2) Fine
Drainage class	Very poorly drained to poorly drained
Permeability class	Slow to moderate
Soil depth	102–254 cm
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–10%
Available water capacity (Depth not specified)	7.62–17.78 cm
Calcium carbonate equivalent (Depth not specified)	0–5%
Electrical conductivity (Depth not specified)	0–2 mmhos/cm
Soil reaction (1:1 water) (Depth not specified)	5.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0–40%

Ecological dynamics

Grasses and sedges give the site its characteristic appearance, although a great variety of forbs are showy when in bloom and may comprise up to 20% of the annual yield. Nebraska sedge or other large sedges are dominant on the lowest, usually permanently wet, areas. Tufted hairgrass dominates slightly higher ground, which may be dry on the surface at times. The two types intergrade in many places. Other common grasses or grass-like plants are slender wheatgrass (drier portions), ovalhead sedge, Baltic rush, Canada bluegrass, and bluejoint and northern reedgrasses. Thurber fescue or other fescues may show up on drier portions at higher elevations. Several others can be expected in trace amounts. Some of the prominent forbs are also common to lower meadow sites, native clovers, Rocky Mountain iris, asters, arnicas, groundsels, herbaceous cinquefoils, mints, yarrow, golden pea, vetch, and water hemlock. Some forbs such as ligusticum and fireweed are common on drier mountain sites. But a number of plants typical of this site are primarily, if not entirely, on wet or semi-wet ground in the mountains. Among these are false hellebore, monkshood, elkslip, marsh marigold, saxifrages, sedums, shooting star, primroses, swertia, some gentians, elephant head, bog birch, and shrubby cinquefoil. Willow usually makes up a minor part of the plant community. At some locations there are small amounts of silver sagebrush.

The state and transition model was added to fill the provisional ecological site instruction. It is a very general model.

State and transition model

R048Ay241CO Mountain Meadow

State 1: Reference State

1.1 Grass Meadow

Tufted Hairgrass, Nebraska sedge, slender wheatgrass, other grasses other sedges and rushes.

1.1A

1.2 Grass with Mixed Shrubs

Rushes have increased. Nebraska sedge, slender wheatgrass, tufted haorgrass, willows, shrubby cinquefoil. other grasses other sedges and rushes are present.

1.2A

T1A

State 2: Current Potential State

2.1 Grass Meadow

Tufted Hairgrass, Nebraska sedge, slender wheatgrass, other grasses other sedges and rushes. Present of introduced grasses (Kentucky blugrass, timothy, redtop) and forbs.

2.1A

2.2 Grasses with Mixed Shrubs

Kentucky bluegrass, timothy and redtop are dominant. Other grasses, sedges and rushes with willows are present introduced grasses and forbs are present.

2.2A

T2A

State 3: Altered State

3.1 Grass Dominated

Seeded grass species, other grasses, shrubs and forbs. Present of introduced grasses and forbs.

3.2A

3.1A

3.2 Grasses with Shrubs

Seeded grass species, shrubs and forbs. Present of introduced grasses and forbs.

Legend

1.1A, 2.1A, 3.1A – lack of fire, improper grazing, prolonged drought, time without disturbance

1.2A, 2.2A, 3.2A – disturbance, fire, insect herbivory of shrubs, proper grazing, wetter climate cycles

T1A – Establishment of non-native invasive plants

T2A – Vegetation and/or mechanical treatments of the landscape

State 1

Reference State

Community 1.1

Reference State

Tree species are not natural to the site. Approximate ground cover is 70%. Species most likely to invade the site are dandelion and introduced forage grasses, especially timothy, red top, and Kentucky bluegrass. Canada thistle is a troublesome invader in some spots. Annual forbs such as owl-cover may also come in. As the ecological condition declines, some of the above plants usually become prominent. Several plants natural to the site in small amounts also tend to increase at the expense of most climax grasses. Typical plants in this category are Baltic rush, iris, yarrow, herbaceous cinquefoils, false hellebore, rose, and shrubby cinquefoil. Fescues and silver sagebrush also tend to increase but are not consistently on the site. Shrubby cinquefoil gives the dominant aspect to many deteriorated spots. Sedges on permanently wet spots retain their position much longer than plants on slightly drier spots because of reluctance of livestock to graze in water. Gullies can lower the watertable, greatly changing the moisture relationship, on sloping ground. Total annual production Favorable years 4000 pounds/AC air dry Median years 3000 pounds/Ac air dry Unfavorable years 2000 pounds/AC air dry

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1614	2270	3026
Forb	314	588	729
Shrub/Vine	314	504	729
Total	2242	3362	4484

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, sedges, & rushes			1849–2690	
	Nebraska sedge	CANE2	<i>Carex nebrascensis</i>	897–1121	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	560–785	–
	smallwing sedge	CAMI7	<i>Carex microptera</i>	280–560	–
	sedge	CAREX	<i>Carex</i>	112–224	–
	rush	JUNCU	<i>Juncus</i>	28–84	–
Forb					
2	Forbs			336–841	
	Forb (herbaceous, not grass nor grass-like)	2FORB	<i>Forb (herbaceous, not grass nor grass-like)</i>	224–448	–
	white false hellebore	VEAL3	<i>Veratrum album</i>	56–168	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	56–168	–
	Rocky Mountain iris	IRMI	<i>Iris missouriensis</i>	56–168	–
	cinquefoil	POTEN	<i>Potentilla</i>	56–168	–
Shrub/Vine					
3	Shrubs			336–673	
	willow	SALIX	<i>Salix</i>	224–448	–
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	112–224	–

Animal community

INTERPRETATIONS FOR LIVESTOCK:

The site provides a high value for grazing by cattle and horses and a medium value for grazing by sheep.

INTERPRETATIONS FOR WILDLIFE

For deer, elk and waterfowl it provides a medium value rating. It provides a low value rating for cottontail and upland game birds. Antelope, bison, and jackrabbits do not use this site. The site provides a high value rating for snowshoe rabbits.

Recreational uses

INTERPRETATIONS FOR RECREATION AND NATURAL BEAUTY:

The site provides a high value rating for recreation and natural beauty

Wood products

Wood products are not produced on this site.

Other information

Rare threatened plants and animals

Orchids such as fairy slipper (calypso) may occur along edges of the site.

This site occurs in the Alamosa, Canon City, Castle Rock, Center, Colorado Springs, Cortez, Craig, Cripple Creek, Delta, Durango, Eagle, Fort Collins, Glenwood Springs, Golden, Gunnison, Kremmling, Longmont, Meeker, Monte Vista, Pagosa Springs, Pueblo, Salida, Steamboat Springs, Trinidad, Walden, Walsenburg, Westcliffe, San Luis, and La Jara field offices.

Type locality

Location 1: Routt County, CO	
General legal description	Wet areas in California Park, Routt County
Location 2: El Paso County, CO	
General legal description	East of Monument in Black Forest, El Paso County
Location 3: Teller County, CO	
General legal description	West Creek area in Teller County

Other references

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

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

Soil Conservation Service (SCS). August 1975. Range Site Description for Mountain Meadow #241. : USDA, Denver Colorado

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

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

Contributors

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Approval

Kirt Walstad, 3/05/2024

Acknowledgments

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--Site Development and Testing Plan--:

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

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

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

Rangeland health reference sheet

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

Author(s)/participant(s)	
Contact for lead author	
Date	05/17/2024
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):**
-
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:**
-
17. **Perennial plant reproductive capability:**

