

## Ecological site R048AY245CO Mountain Swale

Last updated: 3/05/2024  
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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 and the southern part of Unita Basin Section Colorado Plateaus Province

### **Ecological site concept**

Mountain swale occurs flood plains, alluvial fans, swales, stream terraces, and valley floors. Slopes is between 0 to 12 percent. 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.

### Associated sites

R048AY247CO	<p><b>Deep Clay Loam</b></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>
R048AY241CO	<p><b>Mountain Meadow</b></p> <p>Mountain Meadow occurs on floodplains, flood-plain steps, valley floors, drainageways and low terraces. This site has natural sub-irrigation. Slopes is between 0 to 15%. 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, sandy loam, sandy clay loam or clay loam with fine-loamy textured subsurface. It has a typic aquic or oxyaquic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.</p>
R048AY228CO	<p><b>Mountain Loam</b></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>
R048AY237CO	<p><b>Stony Loam</b></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>
R048AY239CO	<p><b>Brushy Mountain Loam</b></p> <p>Brushy Mountain Loam occurs on mountainsides, mountains, and complex landslides. Slopes is between 3 to 50%. Soils are deep (60+ inches). Soils are derived from colluvium from igneous, metamorphic and sedimentary rock. Soil surface texture is very gravelly sandy clay loam, very stony loam, or gravelly loam with loamy-skeletal or clayey-skeletal textured subsurface. It is a Mountain Mahogany - Gambel's oak community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.</p>
R048AY257CO	<p><b>Clayey Valley</b></p> <p>Clayey Valley occurs on hillslopes, and old high terraces. Slopes is between 1 to 12%. Soils are moderately deep to very deep (20 to 60+ inches). Soils are derived from slope alluvium from shale or mixed alluvium from sandstone and shale. Soil surface texture is loam or clay loam with fine textured subsurface. It is Western wheatgrass – Arizona Fescue. It has a Typic ustic moisture regime and frigid temperature regime. The effective precipitation ranges from 18 to 22 inches.</p>

### Similar sites

R048AY285CO	<p><b>Foothill Swale</b></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>
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R048AY241CO	<p><b>Mountain Meadow</b></p> <p>Mountain Meadow occurs on floodplains, flood-plain steps, valley floors, drainageways and low terraces. This site has natural sub-irrigation. Slopes is between 0 to 15%. 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, sandy loam, sandy clay loam or clay loam with fine-loamy textured subsurface. It has a typic aquic or oxyaquic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.</p>
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**Table 1. Dominant plant species**

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Leymus cinereus</i> (2) <i>Pascopyrum smithii</i>

## Physiographic features

This site occurs in the swales, valleys, and other low laying areas which receive runoff from adjacent uplands. Elevation ranges from 6000 to 8500 feet.

**Table 2. Representative physiographic features**

Landforms	(1) Flood plain (2) Alluvial fan (3) Swale (4) Stream terrace (5) Valley floor (6) Valley
Runoff class	Low to medium
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to occasional
Ponding frequency	None
Elevation	6,000–8,500 ft
Slope	0–12%
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, due to its position, the site receives beneficial moisture from run in water and overflow water. 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.

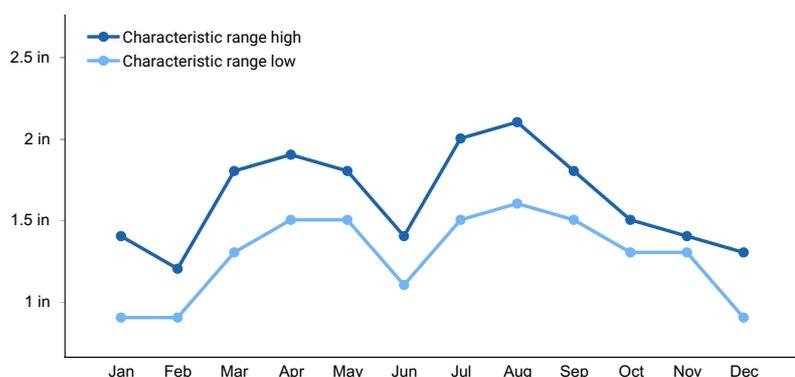
Northeast (Front Range Igneous and Metamorphic): Cabin Creek, Caribou Ranch, Dillion 1 R, Fraser, Georgetown, Grand lake 1 NW, Hourglass Reservoir, Nederland 2 NNE, Red Feathers Lakes, Red Feather Lakes 2 SE and Victor. April, May, July and August are the wettest months. February, December, November 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.

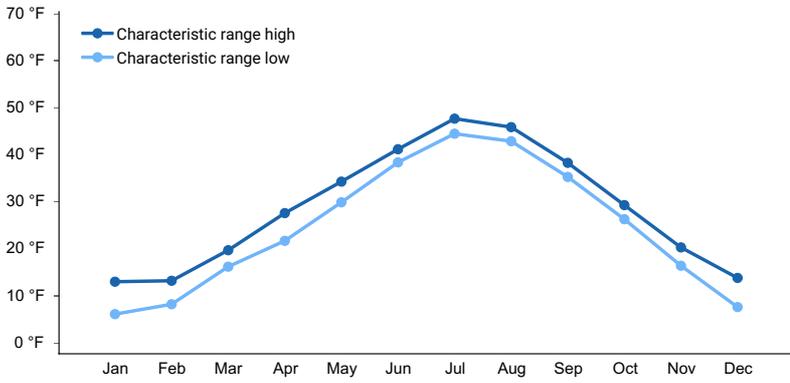
Crylic High elevation valleys: Pitkin, Taylor River and Meredith. These areas have shorter growing seasons by 20 to 40 days over the frigid stations.

**Table 3. Representative climatic features**

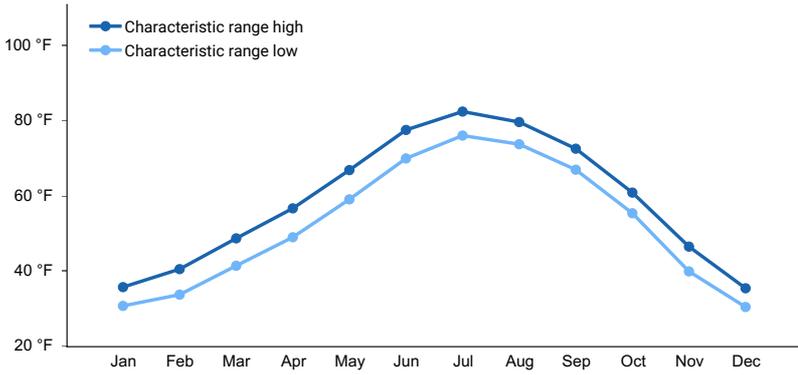
Frost-free period (characteristic range)	23-78 days
Freeze-free period (characteristic range)	75-111 days
Precipitation total (characteristic range)	17-18 in
Frost-free period (actual range)	5-101 days
Freeze-free period (actual range)	43-134 days
Precipitation total (actual range)	17-19 in
Frost-free period (average)	54 days
Freeze-free period (average)	92 days
Precipitation total (average)	18 in



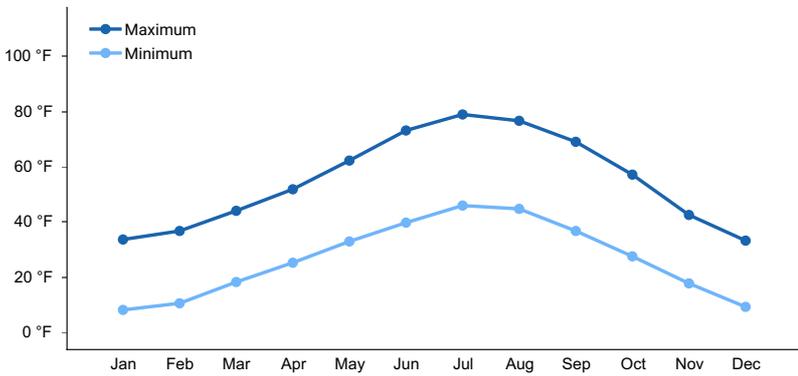
**Figure 1. Monthly precipitation range**



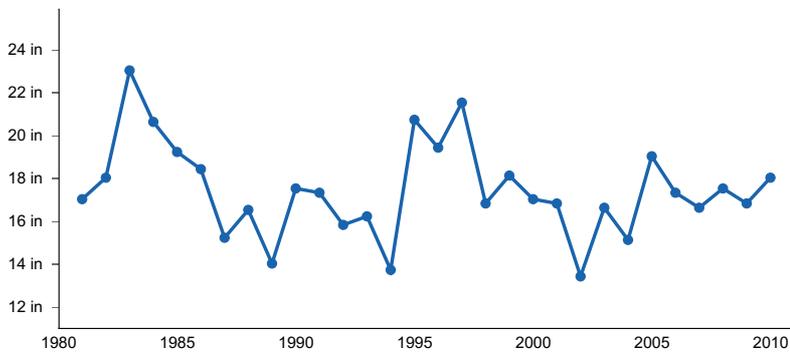
**Figure 2. Monthly minimum temperature range**



**Figure 3. Monthly maximum temperature range**



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



**Figure 5. Annual precipitation pattern**

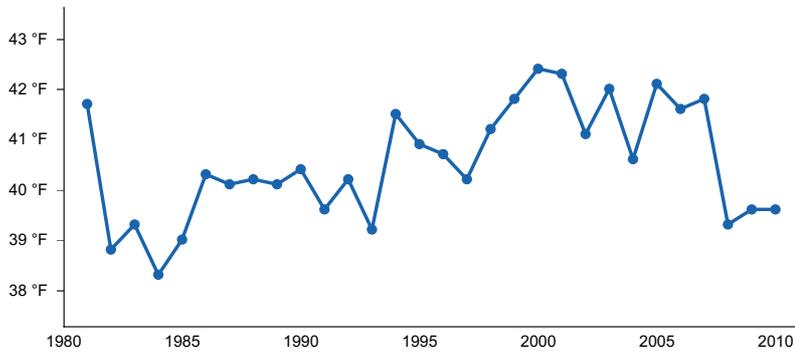


Figure 6. Annual average temperature pattern

### Climate stations used

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

### Influencing water features

This ecological site is located in swales and valleys. 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. The water table is usually greater than 60 inches. Periodic flooding is not unusual as long as it is less than 14 days. Gleying and mottles are often present in lower portions of the profile.

### Soil features

The soils are loamy, weakly developed, with an AC horizon. They are formed from colluvial materials of varied origin. The A-1 layer builds up too fast for a B2t layer to develop. Organic matter content is high. The soil has a very favorable soil-water-plant relationship.

Soils series:

Breece loam

Ohwiler

Silas loam

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Loam
Family particle size	(1) Fine-loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to moderate
Soil depth	60 in
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–5%
Available water capacity (Depth not specified)	5.5–8.7 in

Soil reaction (1:1 water) (Depth not specified)	6.1–7.8
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0–2%

### Ecological dynamics

This is a grassland site with minor amounts of forbs and shrubs. Dominant grasses are basin wildrye, slender wheatgrass, western wheatgrass, Letterman needlegrass, Columbia needlegrass, sedges, and rushes. Forbs include fleabane, geranium, herbaceous cinquefoil, American bistort, and yarrow. Snowberry, chokecherry, rose, dogwood, serviceberry, and willows are the major shrubs.

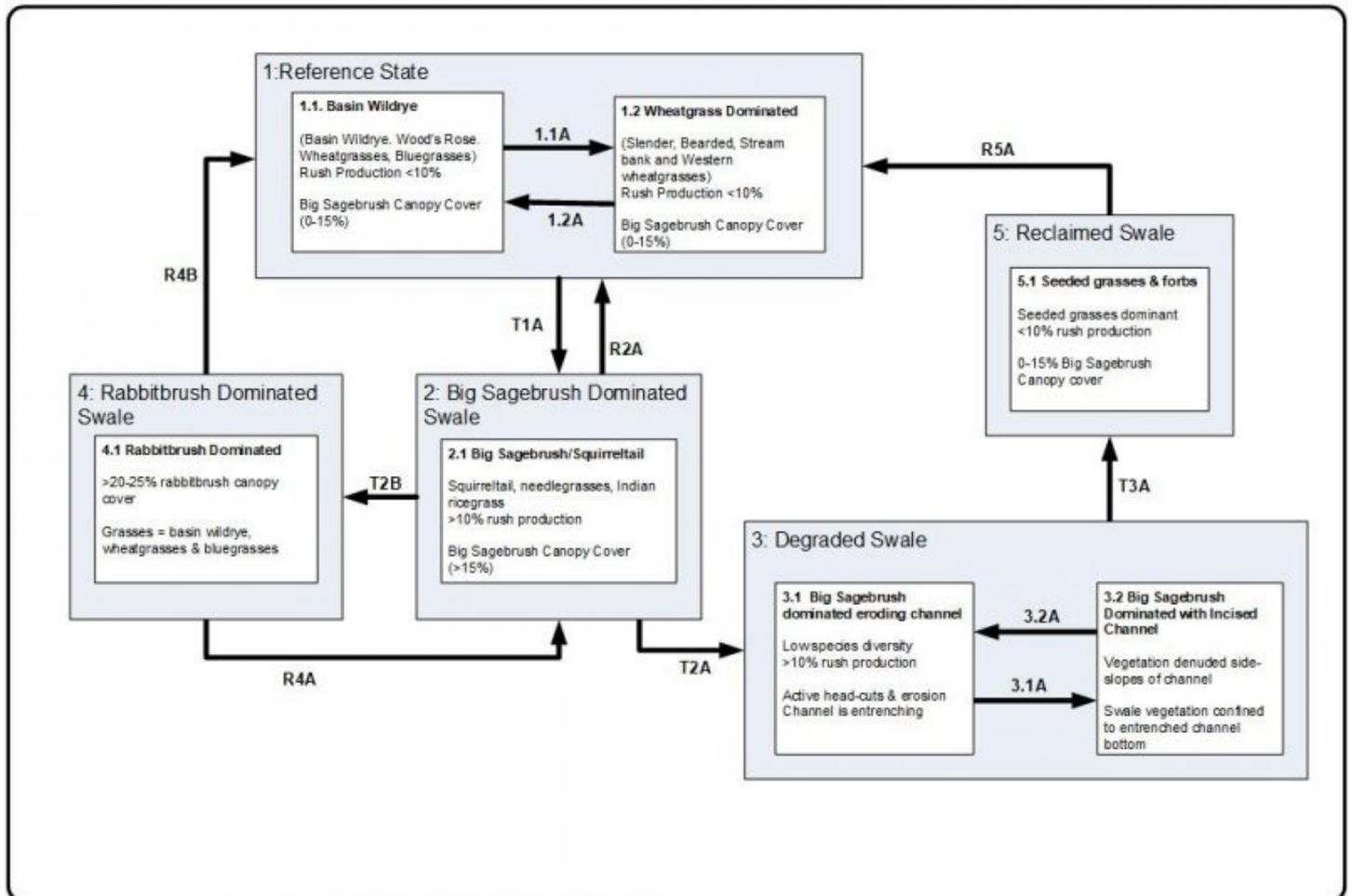
Big sagebrush and tall rabbitbrush are very minor species until the site begins to deteriorate, at which time they may become a solid stand.

Small wet areas occur in the stream bottoms growing principally sedges, rushes, willows, and an occasional narrowleaf cottonwood.

Species that invade this site are: Kentucky bluegrass, thistles, mustard, dandelion, and annual weeds. Kentucky bluegrass may become a solid stand.

### State and transition model

R048AY245CO - Mountain Swale



# Legend

- 1.2A, 3.2A, T1A – lack of fire, time without disturbance, extended improper grazing, extended drought, lack of insect or pathogen outbreaks and/or lack of run-in water from adjacent uplands
- 1.1A, 3.1A, R2A – Fire, proper grazing, wet climatic cycles, vegetative treatments, and/or small scale insect/pathogen outbreaks
- T2A – extended drought, lack of fire, extended improper grazing, lack of insect or pathogen outbreaks and/or large flow event(s)
- T2B – repeated fires, and vegetative treatment of sagebrush
- T3A – time, resource and energy intensive inputs, water table restored to entire swale, erosion control structure may be necessary
- R4A, R4B – time without disturbance, sagebrush re-establishment, treatment of rabbitbrush, seedings, and/or proper grazing
- R5A – time, resource and energy intensive, seedings, vegetative treatments, time with out disturbances and/or proper grazing.

## State 1 Reference State

### Community 1.1 Reference State

Optimum ground cover is 50 percent. Species that invade this site are: Kentucky bluegrass, thistles, mustard, dandelion, and annual weeds. Kentucky bluegrass may become a solid stand. Total annual production Favorable years 3000 pounds per acre per year Median years 2500 pounds per acre per year Unfavorable years 2000 pounds per acre per year

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1365	1500	1950
Shrub/Vine	400	690	650
Forb	235	315	400
<b>Total</b>	<b>2000</b>	<b>2505</b>	<b>3000</b>

## Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Grasses</b>			1250–1750	
	basin wildrye	LECI4	<i>Leymus cinereus</i>	375–875	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	250–375	–
	Columbia needlegrass	ACNE9	<i>Achnatherum nelsonii</i>	250–375	–
	thickspike wheatgrass	ELLA3	<i>Elymus lanceolatus</i>	125–375	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	125–250	–
	slender wheatgrass	ELTRS	<i>Elymus trachycaulus ssp. subsecundus</i>	50–125	–
	rush	JUNCU	<i>Juncus</i>	50–125	–
	Letterman's needlegrass	ACLE9	<i>Achnatherum lettermanii</i>	50–125	–
	sedge	CAREX	<i>Carex</i>	50–125	–
	bluegrass	POA	<i>Poa</i>	25–75	–
	nodding brome	BRAN	<i>Bromus anomalus</i>	0–50	–
	mountain brome	BRMA4	<i>Bromus marginatus</i>	0–50	–
<b>Forb</b>					
2	<b>Forbs</b>			250–375	
	yarrow	ACHIL	<i>Achillea</i>	25–75	–
	aster	ASTER	<i>Aster</i>	25–75	–
	streamside fleabane	ERGLP	<i>Erigeron glabellus var. pubescens</i>	25–75	–
	geranium	GERAN	<i>Geranium</i>	25–75	–
	American bistort	POBI6	<i>Polygonum bistortoides</i>	25–75	–
	cinquefoil	POTEN	<i>Potentilla</i>	25–75	–
	stinging nettle	URDI	<i>Urtica dioica</i>	25–75	–
<b>Shrub/Vine</b>					
3	<b>Shrubs</b>			500–875	
	Saskatoon serviceberry	AMAL2	<i>Amelanchier alnifolia</i>	125–250	–
	mountain snowberry	SYOR2	<i>Symphoricarpos oreophilus</i>	125–250	–
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	25–125	–
	yellow rabbitbrush	CHVIP4	<i>Chrysothamnus viscidiflorus ssp. puberulus</i>	25–125	–
	dogwood	CORNU	<i>Cornus</i>	0–125	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	25–125	–
	chokecherry	PRVI	<i>Prunus virginiana</i>	0–125	–
	willow	SALIX	<i>Salix</i>	0–125	–

## Animal community

### INTERPRETATIONS FOR GRAZING ANIMALS:

This site offers a high value for grazing of cattle, sheep, and horses.

### INTERPRETATIONS FOR WILDLIFE:

The site offers a high value rating for deer and elk. It offers a medium value rating for cottontail and a low value rating for antelope, jackrabbits, and upland game birds. It is not used by waterfowl.

## Hydrological functions

This site offers a medium rating for watershed.

## Recreational uses

### RECREATION AND NATURAL BEAUTY

The site offers a medium value rating for both recreation and natural beauty.

## Wood products

No wood products are produced on this site.

## Other information

### RARE, THREATENED OR ENDANGERED PLANTS AND ANIMALS:

To be added when known

The site occurs in the Craig, Delta, Eagle, Glenwood Springs, Grand Junction, Gunnison, Kremmling, Meeker, Montrose, Norwood, and Steamboat Springs Field Offices.

## Type locality

Location 1: Routt County, CO	
General legal description	At the head of most drainages which have their origin in the Montane Zone in Rio Blanco, Moffat, and Routt Counties.
Location 2: Rio Blanco County, CO	
General legal description	At the head of most drainages which have their origin in the Montane Zone in Rio Blanco, Moffat, and Routt Counties.
Location 3: Moffat County, CO	
General legal description	At the head of most drainages which have their origin in the Montane Zone in Rio Blanco, Moffat, and Routt Counties.
Location 4: Rio Blanco County, CO	
General legal description	One mile south of the Rio Blanco-Moffat county line, just east of Highway 13, in the Ninemile area

## 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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## Contributors

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## Approval

Kirt Walstad, 3/05/2024

## Acknowledgments

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

### --Site Development and Testing Plan--:

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

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

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

## Rangeland health reference sheet

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

Author(s)/participant(s)	
Contact for lead author	
Date	05/10/2025
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:**  

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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):**  

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**  

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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:

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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:**

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