USDA Natural Resources Conservation Service

Ecological site R048AY238CO
Brushy Loam

Last updated: 3/05/2024
Accessed: 05/12/2025

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

Brushy Loam occur 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.

Associated sites

F048AY448CO	**Mountain Pinyon** Mountain Pinyon occurs on mountains, ridges, hills, hillslopes and structural benches. Slopes is between 3 to 30%. Soils are very shallow to shallow (5 to 20 inches) in depth. Soils are derived from colluvium, residuum, slope alluvium from sandstone and/or siltstone. Soil surface texture is loam, gravelly to gravelly loam, channery loam or sandy loam with a loamy or loamy skeletal subsurface. It is a Two-needle pinyon – Gambel's oak – western wheatgrass community. It has an aridic ustic moisture regime and a frigid temperature regime. The effective precipitation ranges from 12 to 16 inches.
R048AY222CO	**Loamy Park** 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.
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.
R048AY230CO	**Shallow Loam** 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.
R048AY235CO	**Dry Exposure** Dry Exposure occurs on steep slopes, ridges, hill tops and other exposed, tree-less areas seen from high mountain valleys and parks on very shallow to shallow soils. Soil textures are gravelly sandy loams to gravelly loams; light colored. Soils have a droughty desert pavement. It is a winterfat-fringed sagebrush-bunchgrass community. It has an ustic aridic moisture regime and frigid temperature regime. The effective precipitation ranges from 12 to 16 inches.
R048AY237CO	**Stony Loam** 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.
R048AY239CO	**Brushy Mountain Loam** 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.

R048AY241CO	**Mountain Meadow** 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.
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.
R048AY255CO	**Pine Grasslands** Pine Grassland occurs on structural benches, dip slopes, hills, mesas and canyon benches. Slopes is between 0 to 35%. Soils are moderately deep to very deep (20 to 60+ inches). Soils are derived from eolian deposits from sandstone; alluvium, colluvium or slope alluvium from sandstone and shale; or residuum from igneous and metamorphic rock. Soil surface texture is loam, sandy loam or gravelly loam with fine-loamy or fine-silty textured subsurface. It is a Ponderosa Pine – Arizona Fescue community. It has a typic ustic moisture regime and frigid temperature 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.

Similar sites

R048AY239CO	**Brushy Mountain Loam** 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.
R048AY248CO	**Mountain Clay Loam** Mountain Clay Loam occurs on alluvial fans, mesas, hills and mountain slopes. Slopes is between 0 to 35%. Soils are deep to very deep (40 to 60+ inches). Soils are derived from alluvium and slope alluvium from shale; or alluvium, slope alluvium, colluvium and/or residuum from sandstone and shale. Soil surface texture is loam or a clay loam with fine-textured subsurface. It is Arizona Fescue – western wheatgrass – Gambel's Oak community. It has a typic ustic moisture regime and frigid temperature 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.
R048AY379CO	**Brushy Slopes** Brushy Slopes occurs on canyons. Slopes is between 25 to 75%. Soils are moderately deep (20 to 40 inches). Soils are derived from colluvium or residuum from sandstone. Soil surface texture is cobbly sandy loam with loamy textured subsurface. It is a mountain big sagebrush – muttongrass community. It has a typic ustic moisture regime and frigid temperature regime. The effective precipitation ranges from 16 to 20 inches.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Quercus gambelii*
Herbaceous	(1) *Elymus trachycaulus*

Physiographic features

This site occupies on gently sloping and rolling upland slopes. Slope is generally 3 to 35 percent. Elevation ranges from 6200 feet to 9000 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Mountainside (2) Mountain (3) Bench (4) Mountain slope (5) Complex landslide (6) Structural bench (7) Hill
Runoff class	High to very high
Flooding frequency	None
Ponding frequency	None
Elevation	1,890–2,743 m
Slope	3–35%
Aspect	Aspect is not a significant factor

Climatic features

Average annual precipitation is about 16 to 20 inches. Of this, approximately 45-55 percent falls as snow, and 45-55 percent falls as rain between middle of May to and the end of September. 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. Range forage plants are favored by spring moisture from accumulated snow. 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 25.5ºF to 60.3ºF, averaging about 24ºF for the winter and 61.8ºF in the summer. Summer high temperatures of mid-70ºF to low 80ºF are not unusual. The coldest winter temperature recorded was -36ºF on February 2, 1985 and the warmest winter temperature recorded was 65ºF on December 5, 1995. The coldest summer temperature recorded was 19ºF on June 2, 1990 and the warmest was 98ºF 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

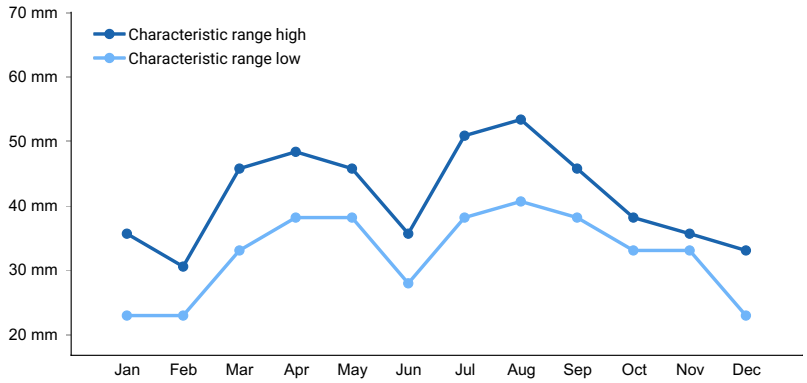


Figure 1. Monthly precipitation range

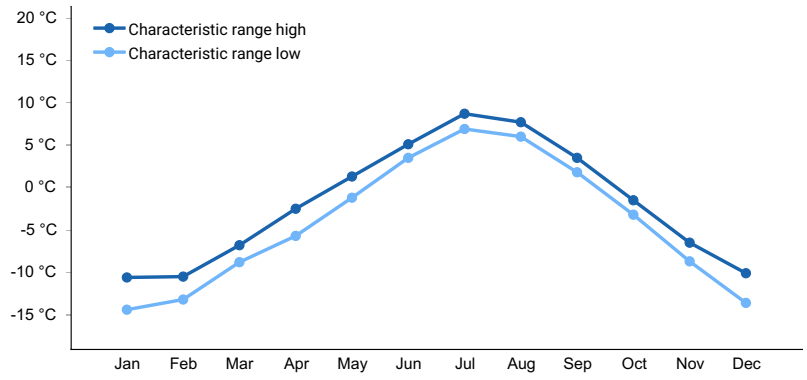


Figure 2. Monthly minimum temperature range

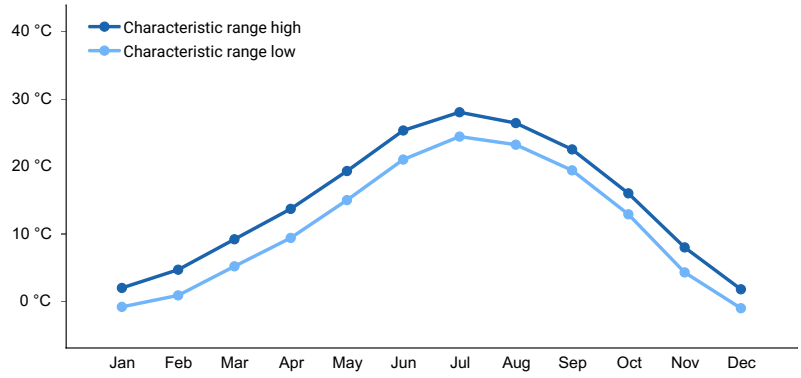


Figure 3. Monthly maximum temperature range

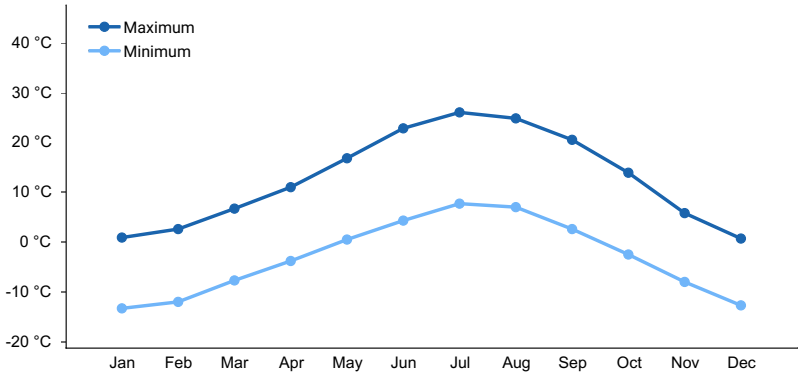


Figure 4. Monthly average minimum and maximum temperature

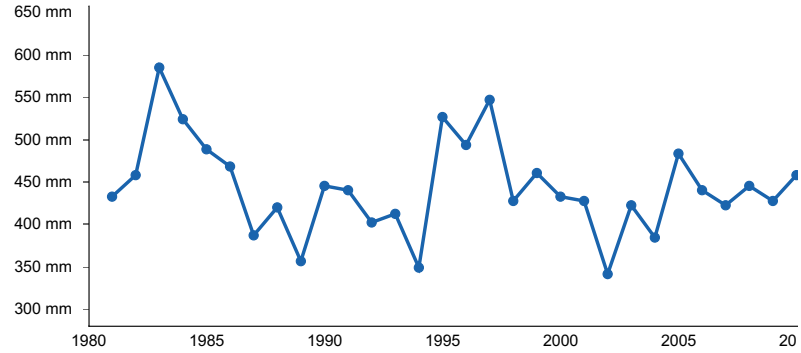


Figure 5. Annual precipitation pattern

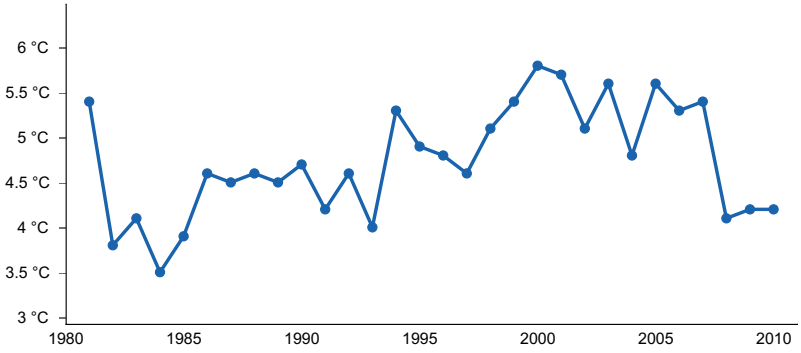


Figure 6. Annual average temperature pattern

Climate stations used

- (1) ASPEN PITKIN CO AP [USW00093073], Aspen, CO
- (2) FRASER [USC00053116], Fraser, CO
- (3) GLENWOOD SPGS #2 [USC00053359], Glenwood Springs, CO

- (4) GEORGETOWN [USC00053261], Idaho Springs, CO
- (5) HOURGLASS RSVR [USC00054135], Bellvue, CO
- (6) RIDGWAY [USC00057020], Ridgway, CO
- (7) YAMPA [USC00059265], Toponas, CO

Influencing water features

None

Soil features

Soils of this site are dark brown to very dark brown loams to heavy clay loams. The subsoil is moderately to strong structured clay loam to clay, one to four feet thick The soil is very favorable for plant growth.

Soils associated with this site based on family particle size are (not all are listed):

fine-loamy - Detra, Empedrado, Hesperus, Jemco, Shermap, and Southbaldy

fine- Absarokee, Cochetopa, Delson, Fughes, Gothic, Jerry, Narraguinnep and Pagoda

loamy-skeletal - Bendire, Curecanti, and Sheek

clayey-skeletal - Godding, and Winnemucca

This site needs to be broken out into several ecological sites. 1) fine; 2) clayey-skeletal; 3) fine-loamy; 4) loamy-skeletal; and 5) sites greater than 35%. Fine family soils data was used in this section as it is the most common family particle size.

Table 4. Representative soil features

Parent material	(1) Residuum–sandstone and shale (2) Colluvium–sandstone and shale (3) Colluvium–shale (4) Slope alluvium–sandstone and shale (5) Slope alluvium–shale (6) Alluvium–sandstone and shale
Surface texture	(1) Loam (2) Clay loam
Family particle size	(1) Fine
Drainage class	Well drained
Permeability class	Slow to moderate
Soil depth	102–152 cm
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–5%
Available water capacity (Depth not specified)	10.16–21.08 cm
Calcium carbonate equivalent (Depth not specified)	0–5%
Soil reaction (1:1 water) (Depth not specified)	6.6–7.8
Subsurface fragment volume <=3" (Depth not specified)	0–20%
Subsurface fragment volume >3" (Depth not specified)	0–15%

Ecological dynamics

The appearance of this site is a shrub dominated community. Saskatoon serviceberry and Gamble oak are the major woody species. Mountain snowberry, chokecherry, and Woods rose are other shrub species. Nodding brome, mountain brome, slender wheatgrass, western wheatgrass, Letterman needlegrass, Columbia needlegrass, and elk sedge are the major grass/grass-like species on the site. Major forb species include aspen peavine, fleabane, western yarrow, American vetch, and lupine. Additional plants present on this site include oniongrass, mountain big sagebrush, geranium, and low larkspur.

Ground cover and structure
Plant type %canopy cover average ht %basal area
Grasses 55 1.5 25
Forbs 10 1 1
Shrubs 15 4 2
Trees 20 8 2

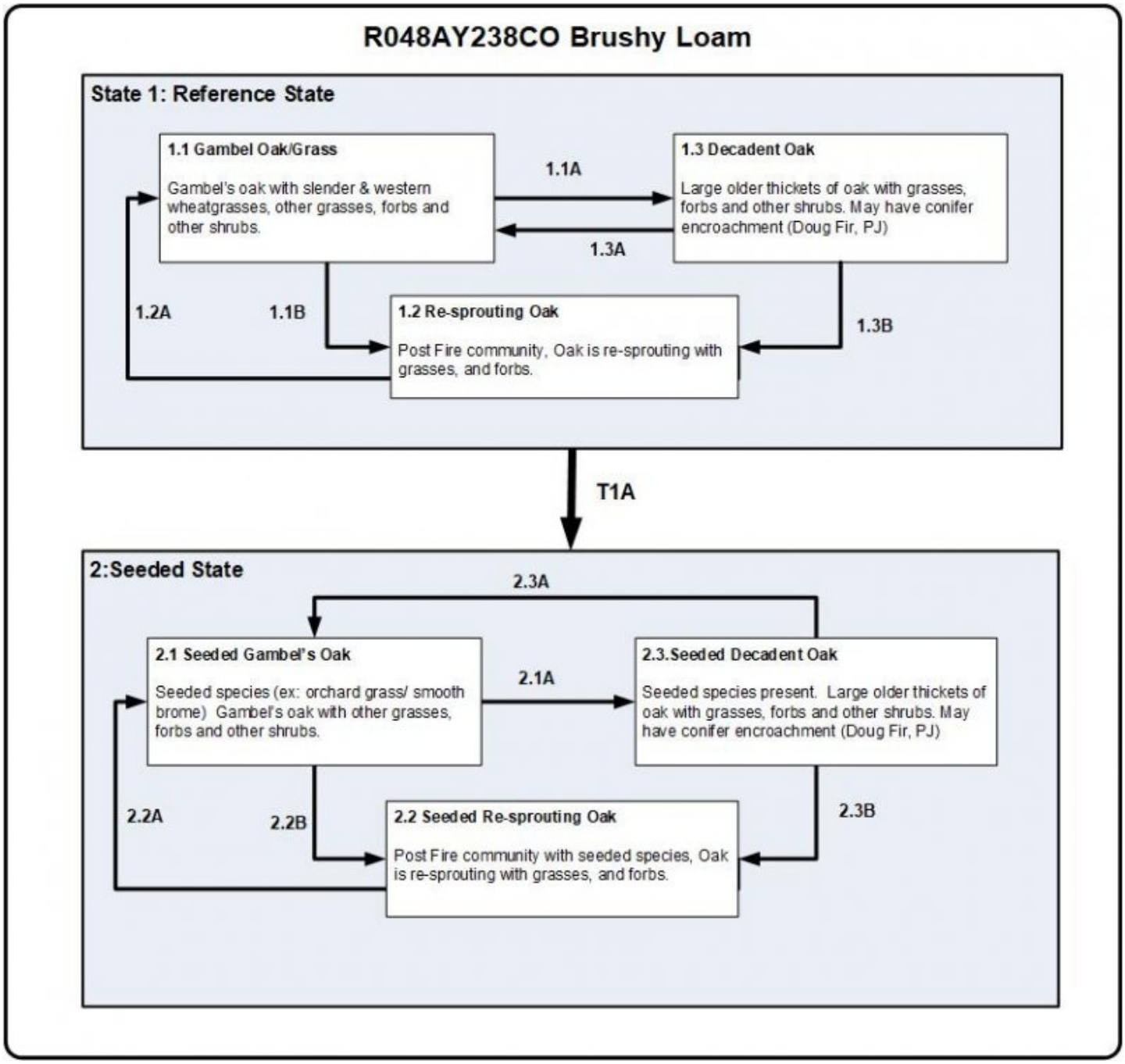
Range Site Description:

This site is generally treeless, except for possibly a few scattered aspen, which have little or no market value. Optimum ground cover is 60%.

Invaders of this site include rabbitbrush, Kentucky bluegrass, and Canada thistle.

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

State and transition model



Legend

1.1A, 2.1A – lack of fire/disturbance, time without disturbance, lack of insect/pathogen outbreaks, and/or possible tree encroachment (pinyon, or Doug fir)

1.1B, 1.3B, 2.1B. 2.3B – fire/natural disturbance, insect/pathogens outbreaks, and/or tree encroachment removal

1.2A, 2.2A – lack of fire/disturbance, time without disturbance, lack of insect/pathogen outbreaks

1.3A, 2.3A – natural disturbance, insect/pathogens outbreaks and/or tree encroachment removal on a smaller scale

T1A – Seeding, and/or vegetative treatments (fire, mechical, chemical) of shrubs and/trees

State 1
Reference State

Community 1.1

Reference State

Total annual production Grass 50-70% Forbs 5-10% Shrubs 20-30 Trees 5-10 Favorable years 3000 pounds/acre Average years 2000 pounds/acre Unfavorable 1500 pounds/acre

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1126	1345	2404
Shrub/Vine	448	729	729
Forb	106	168	230
Total	**1680**	**2242**	**3363**

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**			1121–1569	
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	112–336	–
	western wheatgrass	PASM	*Pascopyrum smithii*	112–336	–
	muttongrass	POFE	*Poa fendleriana*	0–224	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	112–224	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	112–224	–
	nodding brome	BRAN	*Bromus anomalus*	112–224	–
	mountain brome	BRMA4	*Bromus marginatus*	112–224	–
	elk sedge	CAGA3	*Carex garberi*	112–224	–
	Arizona fescue	FEAR2	*Festuca arizonica*	0–224	–
	Idaho fescue	FEID	*Festuca idahoensis*	0–224	–
	Thurber's fescue	FETH	*Festuca thurberi*	0–224	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	112–224	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	112–224	–
	basin wildrye	LECI4	*Leymus cinereus*	0–112	–
	oniongrass	MEBU	*Melica bulbosa*	0–112	–
	mountain muhly	MUMO	*Muhlenbergia montana*	0–112	–
	squirreltail	ELEL5	*Elymus elymoides*	0–112	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–112	–
Forb					
2	**Forbs**			112–224	
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	0–112	–
	silvery lupine	LUAR3	*Lupinus argenteus*	0–90	–
	cowparsnip	HERAC	*Heracleum*	0–90	–
	American vetch	VIAM	*Vicia americana*	0–67	–
	mule-ears	WYAM	*Wyethia amplexicaulis*	0–67	–
	trailing fleabane	ERFL	*Erigeron flagellaris*	0–67	–
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	0–45	

	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	0–45	–
	Richardson's geranium	GERI	*Geranium richardsonii*	0–45	–
	twolobe larkspur	DENU2	*Delphinium nuttallianum*	0–45	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	0–45	–
	nettleleaf giant hyssop	AGUR	*Agastache urticifolia*	0–45	–
	white sagebrush	ARLUC8	*Artemisia ludoviciana ssp. candicans*	0–45	–
	Nevada pea	LALAL3	*Lathyrus lanszwertii var. leucanthus*	0–45	–
	tall bluebells	MEPA	*Mertensia paniculata*	0–45	–
	purple locoweed	OXLA3	*Oxytropis lambertii*	0–22	–
	Rocky Mountain penstemon	PEST2	*Penstemon strictus*	0–22	–
	Fendler's meadow-rue	THFE	*Thalictrum fendleri*	0–22	–
	Allegheny Mountain goldenbanner	THMO2	*Thermopsis mollis*	0–22	–
	timber milkvetch	ASMIM4	*Astragalus miser var. miser*	0–22	–
	Fendler's sandwort	ARFE3	*Arenaria fendleri*	0–22	–
Shrub/Vine					
3	**Shrubs**			560–897	
	Gambel oak	QUGA	*Quercus gambelii*	112–224	–
	black sagebrush	ARNO4	*Artemisia nova*	0–112	–
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	0–112	–
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	0–112	–
	snowbrush ceanothus	CEVE	*Ceanothus velutinus*	0–112	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	0–112	–
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	67–112	–
	chokecherry	PRVI	*Prunus virginiana*	0–67	–
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	0–67	–
	silver sagebrush	ARCA13	*Artemisia cana*	0–67	–
	Woods' rose	ROWO	*Rosa woodsii*	0–45	–
	creeping barberry	MARE11	*Mahonia repens*	0–22	–

Animal community

INTERPRETATIONS FOR GRAZING ANIMALS:
Grazing value of this site when it is near its potential plant community is excellent due to high production of palatable grasses and shrubs. There can be a problem with uniform grazing use due to sheep slopes as well as thick brush limiting access. Brush management (usually by prescribed burning) may be considered for forage improvement but is only a temporary measure. This is generally done for improvement of the forage resource for wildlife. To maintain the benefits from prescribed burning, this practice needs to be repeated every three to eight years.

Stocking rates given below are based on continuous use for the entire growing season and are intended only as an initial guide. Forage needs are calculated on the basis of 900 pounds of air-dry forage per animal unit month (AUM). To maintain proper use and allow for forage that disappears through trampling, small herbivore use, weathering, etc., about 35 percent of the palatable forage produced is considered available for grazing by large herbivores.

Condition percent climax

Class vegetation AUM/Ac Ac/AUM Ac/AU
Excellent 76-100 .56-.63 1.8-1.6 22-19
Good 51-75 .63-.44 1.6-2.3 19-28
Fair 26-50 .44-.35 2.3-2.9 28-35
Poor 0-25 .35-.28 2.9-3.6 35-43

Adjustments to the initial stocking rates should be made as needed to obtain proper use. With specialized grazing systems, large livestock breeds, uncontrolled big game, inaccessibility, dormant season use, presence of introduced forage species, seeded rangeland etc., will require stocking rate adjustments.

Site Degradation:
If site degradation is cattle induced, the more palatable grasses such as big bluegrass, elk sedge, Indian ricegrass, Letterman needlegrass, mountain muhly, muttongrass, needleandthread, oniongrass, slender wheatgrass, as well as the fescues and the bromes will decline in relative amounts. Some of the most palatable grasses will drop out of the plant community completely. The shrubs become more abundant as the grasses decline. If site degradation is sheep induced, most of the forbs and the palatable shrubs within reach of the sheep will decline in relative abundance. Plants which can invade and become a part of the plant community as degradation progresses include rubber rabbitbrush, Canada thistle and Japanese brome. Another invader of this site is Kentucky bluegrass whish is very palatable to livestock, however, it produces much less vegetation than the plants native to the site.

Poisonous plants:
Nuttall larkspur (Delphinium nuttallianum) can be poisonous to cattle, horses, and rarely sheep in spring and early summer when other green forage is not available. Poisoning is cumulative. Symptoms include loss of appetite, salvation, muscular twitching, general uneasiness, and staggering gait. In advanced cases the animal falls and lies with feet extended more or less rigidly. Poisoned animals are constipated and severe cases are nauseated and bloating may occur.

Chokecherry can be poisonous to cattle and sheep. Symptoms include extreme salvation, labored breathing, muscle tremors, incoordination, bloating, and convulsions. Symptoms start within 5 minutes and death can occur within 15 minutes. It is most serious in spring and early summer when leaves contain large amounts of toxins as well as a period of short forage and freezing weather.

Silvery lupine (Lupinus argenteus) is poisonous to all livestock occasionally. It is poisonous when other forage is scarce and if hay contains immature lupine pods (especially dangerous during seed stage). Lupine seeds are toxic to sheep when .25 to 1.5 percent of the animals body weight is consumed in one feeding. 150 to 175 gm (.33 to .38 lbs) per day has been lethal to sheep. The toxic substance is a non cumulative alkaloid. Small amounts ingested over a period of time create no difficulties.

Gamble oak can be poisonous to cattle and sheep in early spring during budding and leafing and after a frost. As leaves mature, toxicity decreases.

Lambert crazyweed (Oxytropis lambertii) is poisonous to all animals in all season but especially spring. Poisoning is cumulative. Signs of poisoning appear after 2 to 3 weeks of continuous grazing. With acute poisoning in cows and ewes, abortion and congenital skeletal malformations frequently occur. Animals must eat large amounts for 2 to 5 weeks before death occurs. Constipation, incoordination of muscles and peculiar gait, crazed actions, loss of flesh, loss of sense of direction, and nervousness are the visable signs.

Princesplume can be poisonous to cattle and sheep. Symptoms include animals walking into objects, blind staggers, hoofs grow abnormally and hair falls out. Symptoms occur when feed is scarce.

Timber Poisonvetch can be poisonous to cattle and occasionally sheep and horses. The type of poisoning is cumulative to acute on high selenium soils and also alkaloids. Chronis symptoms include sluggishness, weakness, defective nutrition, impared vision, wander aimlessly, partial paralysis (especially in hind legs) with acute symptoms being nervousness, frequent urination, irregular gait causing heels to knock together, inability to stand, white coloration of the lining of mouth and eyes, rapid weak pulse, difficult breathing, coma, and convulsions. Poisoning occurs in early spring when forage is scarce and during flowering or seeding periods.

INTERPRETATIONS FOR GRAZING WILDLIFE:

Wildlife that are common to this site during some season of the year can include tiger salamander, western rattle snake, western garter snake, rufous-side towhee, green-tailed towhee, dusky flycatcher, dusky flycatcher, downy woodpecker, band-tailed pidgeon, wild turkey, blue grouse, Cooper's hawk, red-tailed hawk, golden eagle, mourning dove, black-headed grosbeak, Virginia's warbler, black-capped chickadee, coyote, black bear, mule deer, Rocky Mountain elk, golden-mantled ground squirrel, and Nuttall's cottontail.

Practices such as prescribed burning, roller beating and chaining are recommended for areas that contain old decadent shrubs. For wildlife that prefer edges such as deer and elk, treatments should be less than 40 acres in size and long and narrow in shape. Treatments for wildlife that prefer interior habitats should be large and square or circular in shape. Diversity of wildlife can be promoted by maintaining a variety of large and small areas in various stages of maturity throughout this site.

Hydrological functions

Soils in this site are grouped into the "C" hydrologic group, as outlined in the Soils of Colorado Loss Factors and Erodibility Hydrologic Groupings 1979 Handbook. Field investigations are needed to determine hydrologic cover conditions and hydrologic curve numbers. Refer to NRCS National Engineering Handbook, Section 4, and Peak Flows in Colorado Handbook for more information.

Recreational uses

This site is in the mountain zone and has adequate precipitation to support a lush growth of vegetation. With a wide variety of herbaceous and shrub vegetation along with interspersed oak many individuals consider this site as scenic areas. Spring brings flowering forbs.

Summers are cool so the area is attractive for summer activities such as picnicking, sightseeing, photography, wildlife watching, hiking, and camping. The site is good wildlife habitat and generally is a good area for hunting deer and elk. Good fall color occurs on the shrubs in most years adding to the attractiveness of this site.

Wood products

No wood products are produced on this site.

Other products

Endangered Plants and Animals.
When this site is in a complex with rock outcrops or adjacent to cliffs, the rock outcrops and cliff areas frequently were historical peregrine falcon nesting sites.

Other information

This site occurs in the following Counties:
Archuleta, Delta, Eagle, Garfield, LaPlata, Mesa, Moffat, Montezuma, Montrose, Pitkin, Rio Blanco, Routt, and San Miguel.

Type locality

Location 1: Eagle County, CO	
Township/Range/Section	TT4S RR87W S25
General legal description	SE ¼, Sec 25, T4S, R87W, Eagle County
Location 2: Routt County, CO	
Township/Range/Section	TT4N RR85W S18
General legal description	Sec 18, T4N, R85W, Route County
Location 3: Rio Blanco County, CO	

Township/Range/Section	TT15S RR93W S12
General legal description	NW ¼ SW ¼, Sec 12, T15S, R93W, Rio Blanco County
Location 4: Eagle County, CO	
Township/Range/Section	TT5S RR83W S34
General legal description	Sec 34, T5S, R83W, Eagle County
Location 5: Mesa County, CO	
Township/Range/Section	TT9S RR94W S34
General legal description	Sec 34, T9S, R94W, Mesa County
Location 6: Moffat County, CO	
Township/Range/Section	TT6N RR90W S32
General legal description	NW ¼, Sec 32, T6N, R90W, Moffat County
Location 7: Routt County, CO	
General legal description	West slope on P&M mine, north of mining area, Route County
Location 8: Garfield County, CO	
Township/Range/Section	TT6S RR88W S36
General legal description	Sec 36, T6S, R88W, Garfield County

Other references

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Suzanne Mayne-Kinney

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)	J. Murray, C. Holcomb, L. Santana, F. Cummings, A. Jones, P. Billig, S. Jaouen
Contact for lead author	
Date	12/08/2004
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None

2. **Presence of water flow patterns:** None

3. **Number and height of erosional pedestals or terracettes:** None

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not**

bare ground): Expect <10% bareground. Extended drought can cause bareground to increase.

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5. **Number of gullies and erosion associated with gullies:** None

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None

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7. **Amount of litter movement (describe size and distance expected to travel):** Movement expected to be short and minimal.

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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):** Stability class rating anticipated to be 5-6 in the interspaces at soil surface.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soils are typically deep with a very dark color. Soil surface texture is fine clay loam, well drained.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Diverse grass, forb, shrub canopy and root structure reduces raindrop impact and slows overland flow providing increased time for infiltration to occur.

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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):** None

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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: Shrubs >

    Sub-dominant: cool season bunchgrass > forbs > sedges >

    Other: cool season rhizamatous grass

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Typically minimal, expect for weather related (late spring freezes on oak brush)

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14. **Average percent litter cover (%) and depth (in):** 70-80% litter cover at 1-2 inch depth

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 2000 lbs./ac. low precip years; 2500 lbs./ac. average precip years; 4000 lbs./ac. above average precip years. After extended drought or the first growing season following wildfire, production may be significantly reduced by 600 - 800 lbs./ac. or more.

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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:** Kentucky bluegrass and noxious weeds

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17. **Perennial plant reproductive capability:** The only limitations are weather-related, wildfire, natural disease, inter-species competition, wildlife, and insects that may temporarily reduce reproductive capability.
