

Ecological site R048AY303CO Loamy Slopes

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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

Loamy Slopes occurs on alluvial fans, terraces, hills mountains and mountainsides. Slopes is between 25 to 65 percent. 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.

Associated sites

R048AY287CO	<p>Stony Foothills Stony Foothills occurs on mountains, escarpments and hills. Slopes is between 3 to 30%. Soils are moderately deep to deep (20 to 60+ inches). Soils are derived from alluvium, residuum or colluvium from sandstone and shale or alluvium from basalt. Soil surface texture is gravelly, stony, or very stony sandy loam or very cobbly loam with loamy-skeletal textured subsurface. It is a Wyoming Big Sagebrush – western wheatgrass community. It has a aridic ustic moisture regime and frigid temperature regime. The effective precipitation ranges from 12 to 16 inches.</p>
R048AY228CO	<p>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.</p>
R048AY238CO	<p>Brushy Loam 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>
R048AY235CO	<p>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.</p>
R048AY247CO	<p>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.</p>

Similar sites

R048AY379CO	<p>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.</p>
R048AY238CO	<p>Brushy Loam 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>

R048AY239CO	<p>Brushy Mountain Loam</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>
R048AY248CO	<p>Mountain Clay Loam</p> <p>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.</p>

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Cercocarpus montanus</i> (2) <i>Purshia tridentata</i>
Herbaceous	(1) <i>Achnatherum hymenoides</i> (2) <i>Koeleria macrantha</i>

Physiographic features

This site occurs on moderate to very steep stony slopes. Elevation ranges from 6000 to 8300 feet.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Terrace (3) Hill (4) Mountain (5) Mountainside
Runoff class	Medium to very high
Flooding frequency	None
Ponding frequency	None
Elevation	6,000–8,300 ft
Slope	25–65%
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation varies from 12 to 18 inches. Of this, approximately 45-55% falls as snow, and 45-55% falls as rain between middle of May to and the end of September. Summer moisture is mostly from thundershowers in July thru October. November to February and June is the driest period of the year with the driest month being June. August to October and March to April is the wettest period and the wettest month is usually April. The average annual total snowfall is 64.8 inches. The snow depth usually ranges from 1 to 5 inches during October thru April. The highest winter snowfall record in this area is 131.9 inches which occurred in 1908-1909. The lowest snowfall record is 11.9 inches during the 1944-1945 winter. The frost-free period typically ranges from 90 to 130 days. The last spring frost is typically the middle of May to the second week of June. The first fall frost is usually the middle of September to the end of September. Mean daily annual air temperature ranges from about 30.7°F to 64.8°F, averaging about 25°F for the winter and 66°F in the summer. Summer high temperatures of mid-80°F to low 80°F are not unusual. The coldest winter temperature recorded was -36°F on February 8, 1933 and the warmest winter temperature recorded was 66°F on February 11, 1962. The coldest summer temperature recorded was 24°F on June 19, 1973 and the warmest was 100°F on August 2, 1902. Wide yearly and seasonal fluctuations are common for this climatic zone. Data taken from Western Regional Climate Center (2018) for Collbran, Colorado Climate

Station.

This zone in MLRA 48 will need to be broken up into at multiple land resources zones in future projects based on current knowledge of precipitation and temperature patterns.

West Central Zone Stations: Collbran, Basalt, and Cedaredge. This LRU zone is use in write up above. November to February and June is the driest period of the year with the driest month being June. August to October and March to April is the wettest period and the wettest month is usually April. Frigid

Northwest Zone Climate Stations: Meeker#2. Driest months usually are January and February. Wettest months usually are August and September. Frigid.

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

Southwest Volcanics: Lake City, Creede, and Hermit 7 ESE. These high elevation and low precipitation areas are cryic with shorter growing season days of 20 to 70 days per year. Wettest months are August and July. Driest months are December thru February.

Northeast (Front Range Igneous and Metamorphic): Grant, Estes park, Hohnholz Ranch, Leadville and Leadville 2 SW. July and August are the wettest months. January is the driest month. The climate stations is this zone are cryic. The growing seasons is 50 to 90 days.

Southeast (Sangre de Cristo Mtns): Westcliffe. Red Wing 1 WSW and Sheep Mountain. The growing season is 90 to 140 days. Driest months are December to February and the wettest are July & August. Frigid.

Table 3. Representative climatic features

Frost-free period (characteristic range)	28-90 days
Freeze-free period (characteristic range)	77-131 days
Precipitation total (characteristic range)	13-15 in
Frost-free period (actual range)	13-95 days
Freeze-free period (actual range)	67-141 days
Precipitation total (actual range)	13-15 in
Frost-free period (average)	58 days
Freeze-free period (average)	104 days
Precipitation total (average)	14 in

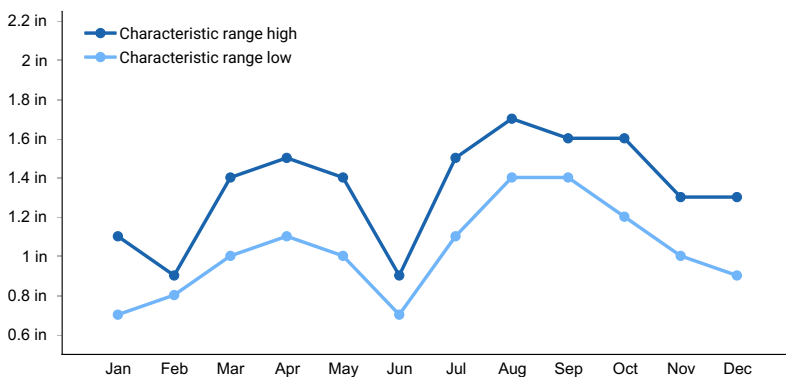


Figure 1. Monthly precipitation range

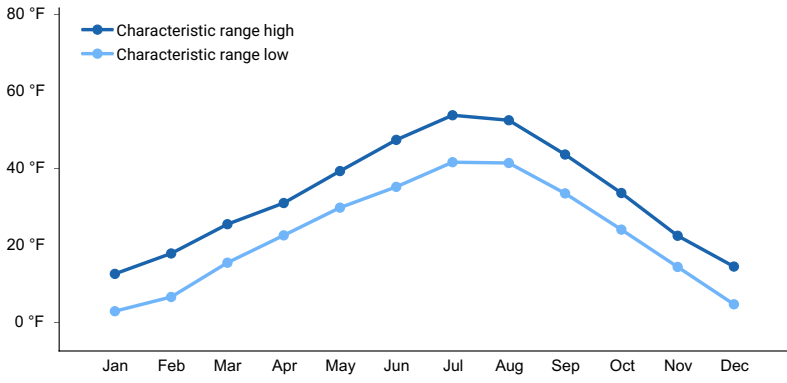


Figure 2. Monthly minimum temperature range

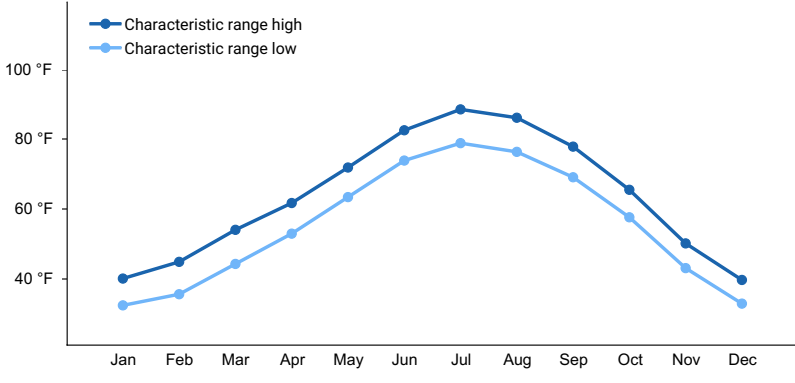


Figure 3. Monthly maximum temperature range

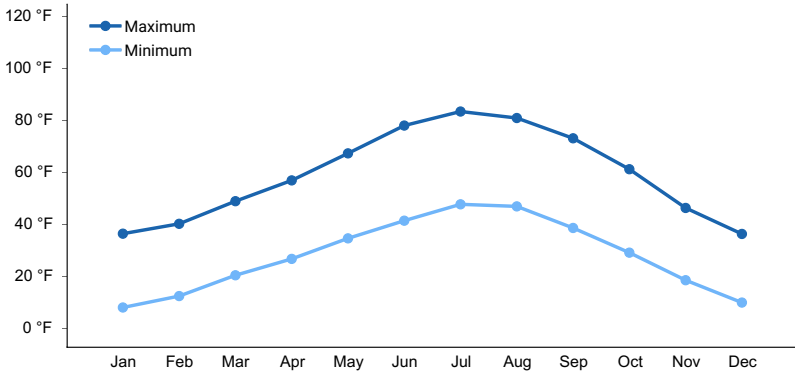


Figure 4. Monthly average minimum and maximum temperature

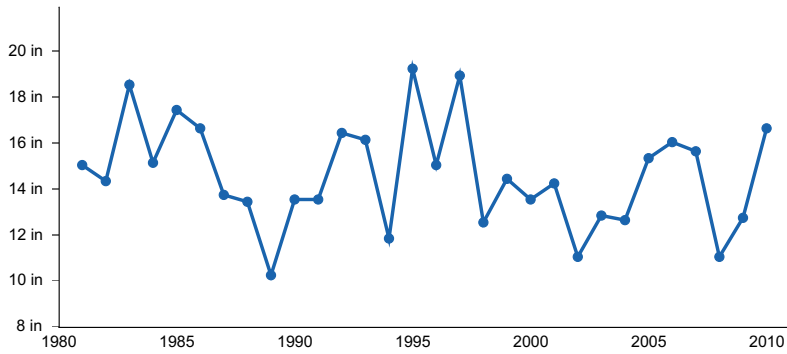


Figure 5. Annual precipitation pattern

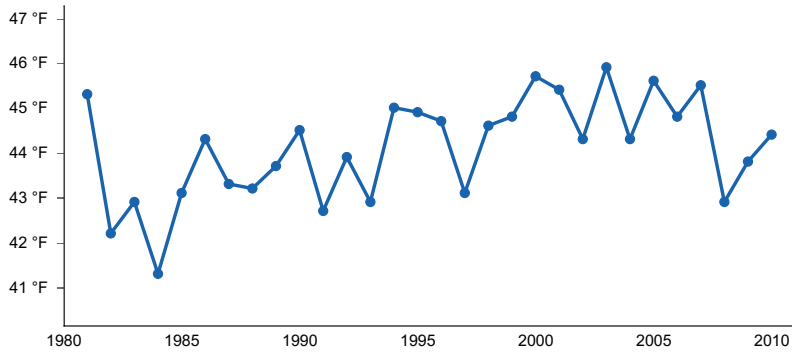


Figure 6. Annual average temperature pattern

Climate stations used

- (1) CIMARRON [USC00051609], Cimarron, CO
- (2) LEADVILLE LAKE CO AP [USW00093009], Leadville, CO
- (3) CEDAREEDGE [USC00051440], Cedaredge, CO
- (4) COLLBRAN [USC00051741], Collbran, CO

Influencing water features

None

Soil features

Soils in this range site are moderately deep to deep stone-filled soils. The surface textures are rock filled sandy loam to light clay loam. The subsurface is loam to light clay loam. Moisture holding capacity is reduced due to stoniness. These soils are droughty because of steepness of slopes. Stones in the profile enhance plant growth by increasing water available in a given volume of soil.

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone and siltstone (2) Colluvium–sandstone (3) Residuum–sandstone (4) Alluvium–basalt (5) Outwash–basalt
Surface texture	(1) Cobbly sandy loam (2) Cobbly, very flaggy, channery loam
Family particle size	(1) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	20–60 in
Surface fragment cover <=3"	10–25%
Surface fragment cover >3"	5–20%
Available water capacity (Depth not specified)	1.9–4.5 in
Calcium carbonate equivalent (Depth not specified)	0–10%
Soil reaction (1:1 water) (Depth not specified)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	15–35%

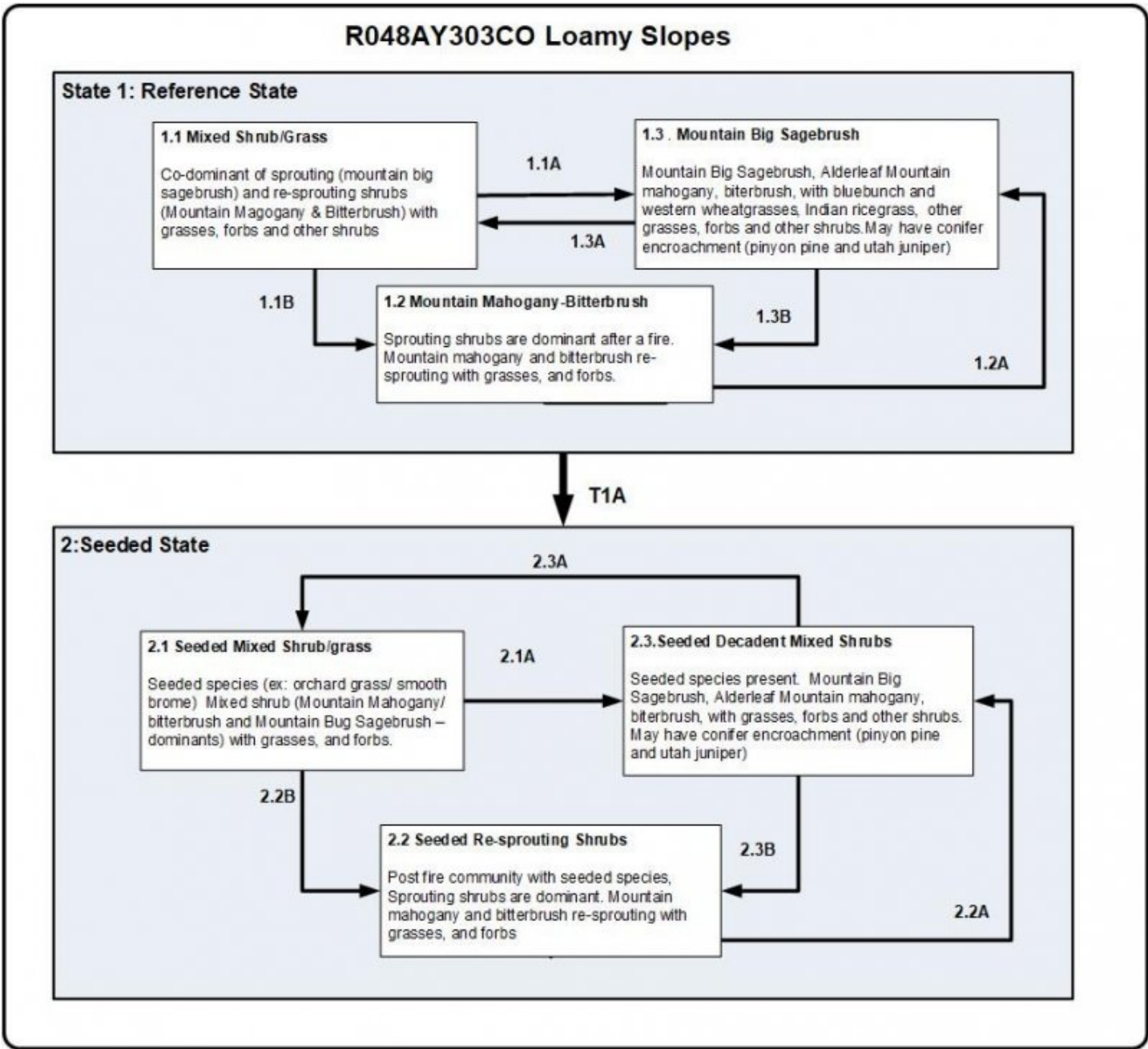
Subsurface fragment volume >3" (Depth not specified)	5–40%
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Ecological dynamics

This is a browse-grass plant community. Approximately half of the annual production is made up of grass species. Bluebunch wheatgrass, Indian ricegrass, western wheatgrass, prairie Junegrass, and bottlebrush squirreltail are the most abundant grasses. The main browse plants are mountain mahogany, antelope bitterbrush, serviceberry, and big sagebrush. Principal forb species include Indian paintbrush, arrowleaf balsamroot, low larkspur, buckwheat, and longleaf phlox.

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 Utah juniper)

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

1.2A, 1.3A, 2.2A, 2.3A – lack of fire/disturbance, time without disturbance, lack of insect/pathogen outbreaks

T1A – Seeding, and/or vegetative treatments (fire, mechanical, chemical) of shrubs; removal of trees if present

State 1

Reference State

Community 1.1

Reference State

This site may have scattered pinyon pine and/or Utah juniper. Optimum ground cover is 25 percent. Invaders of this site are cheatgrass cactus, thistle species, plus numerous other annual species which move in as the plant community deteriorates. Total annual production Favorable years 1200 Pounds per Acre air dry Median years 900 Pounds per Acre air dry Unfavorable years 500 Pounds per Acre air dry

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	95	385	560
Shrub/Vine	320	405	500
Forb	85	115	140
Total	500	905	1200

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	Grasses			315–450	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	45–90	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	70–90	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	70–90	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	45–90	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	45–70	–
	needle and thread	HECOC8	<i>Hesperostipa comata</i> ssp. <i>comata</i>	45–70	–
	muttongrass	POFE	<i>Poa fendleriana</i>	45–50	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	45–50	–
	sedge	CAREX	<i>Carex</i>	20–45	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	30–45	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	20–45	–

	saine wildrye	LESA4	<i>Leymus sainus</i>	20–45	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	10–30	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	10–30	–
Forb					
2	Forbs			90–135	
	pussytoes	ANTEN	<i>Antennaria</i>	10–25	–
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	10–25	–
	Indian paintbrush	CASTI2	<i>Castilleja</i>	10–25	–
	larkspur	DELPH	<i>Delphinium</i>	10–25	–
	buckwheat	ERIOG	<i>Eriogonum</i>	10–25	–
	hairy false goldenaster	HEVI4	<i>Heterotheca villosa</i>	10–25	–
	mat penstemon	PECA4	<i>Penstemon caespitosus</i>	10–25	–
	beardtongue	PENST	<i>Penstemon</i>	10–25	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	10–25	–
	longleaf phlox	PHLO2	<i>Phlox longifolia</i>	10–25	–
	silver cinquefoil	POAR8	<i>Potentilla argentea</i>	10–25	–
	ragwort	SENEC	<i>Senecio</i>	10–25	–
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	10–25	–
	stemless mock goldenweed	STAC	<i>Stenotus acaulis</i>	10–25	–
Shrub/Vine					
3	Shrubs			360–450	
	alderleaf mountain mahogany	CEMO2	<i>Cercocarpus montanus</i>	45–135	–
	serviceberry	AMELA	<i>Amelanchier</i>	70–90	–
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	70–90	–
	rabbitbrush	CHRYS9	<i>Chrysothamnus</i>	35–45	–
	Gambel oak	QUGA	<i>Quercus gambelii</i>	30–45	–
	snowberry	SYMPH	<i>Symphoricarpos</i>	35–45	–
	spineless horsebrush	TECA2	<i>Tetradymia canescens</i>	10–20	–

Animal community

INTERPRETATIONS FOR GRAZING ANIMALS:

The site offers a low value rating for cattle and sheep and a low value rating for horses.

INTERPRETATIONS FOR WILDLIFE:

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

Hydrological functions

The site has a low value rating for watershed.

Recreational uses

It offers a medium value rating for recreation and natural beauty.

Wood products

This site produces only a few scattered Pinyon Juniper trees.

Other information

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

Rare, threatened or endangered plants and animals
(To be added when known)

Type locality

Location 1: Moffat County, CO	
Township/Range/Section	TT6N RR100W S29
General legal description	Sec 29, T6N, R100W, Moffat County, Colorado – south side of Yampa Bench Road at the foot of the Castle Park Dugway.
Location 2: Garfield County, CO	
Township/Range/Section	TT6S RR89W S27
General legal description	Sec 27, T6S, R89W, Garfield County, Colorado – east side of the Four Mile Road.

Other references

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Approval

Kirt Walstad, 3/05/2024

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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.

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Date	01/18/2005
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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:** Flow paths are inherent to this site. Some path lengths will be short, broken up by surface rock, others may be longer and connected.

3. **Number and height of erosional pedestals or terracettes:** Pedestals associated with flow paths. Surface rocks act as small dams, catching litter, debris and/ or sediment.

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

bare ground): Expect 40-50% bareground. Extended drought can cause bare ground to increase. Surface and sub-surface rock are inherent to this site.

5. **Number of gullies and erosion associated with gullies:** Lack of ground cover and steepness of slope contribute to occasional gullies.

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

7. **Amount of litter movement (describe size and distance expected to travel):** Some movement is expected. Distance varies from 1-5 feet following intense rainfall events.

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 2-4 in the interspaces at soil surface.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface soils are moderately deep to deep stone filled and well drained, formed in glacial outwash and/ or sandstone. The A-horizon ranges from 0-8 inches in depth and color ranges from reddish brown to brown. Surface structure is moderate medium to coarse granular.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Lack of understory vegetation, shrub dominance and inherent interspaces between plants allow for overland flow, providing a lost opportunity for infiltration to occur. The composition of the plant community has less effect on infiltration and runoff than does effects of slope and rock.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None

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 >

Other: cool season rhizomatous grass

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Typically minimal, except for weather related.

14. **Average percent litter cover (%) and depth (in):** 20-30% litter cover at 0.25 inch depth. Extended drought can reduce litter to 10-15%.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 500 lbs./ac. low percip years; 900 lbs./ac. average precip years; 1200 lbs./ac. above average precip years. After extended drought or the first growing season following wildfire, production may be significantly reduced by 200 - 400 lbs./ac. or more.

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:** Cheatgrass

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.
