

Ecological site R048AY242CO

Dry Mountain Shale

Last updated: 4/03/2025
Accessed: 09/22/2026

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

Dry Mountain Shale occur on hills and structural benches. Slopes is between 5 to 20%. Soils are deep (60 inches or more) loamy soils derived from colluvium from sandstone and shale; or from residuum from sandstone and shale. Soil surface texture is loamy with fine-loamy subsurface. It is a Wyoming Big Sagebrush – Western wheatgrass community. It has an aridic ustic moisture regime and a frigid temperature regime. The effective precipitation ranges from 12 to 16 inches.

Associated sites

R048AY228CO	Mountain Loam Mountain Loam occurs mainly alluvial fans, mountain slopes, benches, terraces, or hills. Slopes average between 5 and 10% but can range from 0 to 30%. Soils are moderately deep to deep (20-60 inches) loamy soils derived from residuum from igneous and metamorphic rocks or sandstone and shale; slope alluvium from sandstone and shale, or igneous and metamorphic rocks; colluvium from igneous and metamorphic rocks or sandstone and shale, and/or alluvium from igneous and metamorphic rocks. Soil surface texture are loam, sandy loam or silt loam with loamy subsurface. It is a Mountain Big Sagebrush -Arizona Fescue community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.
R048AY238CO	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.
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.

Similar sites

R048AY228CO	Mountain Loam Mountain Loam occurs mainly alluvial fans, mountain slopes, benches, terraces, or hills. Slopes average between 5 and 10% but can range from 0 to 30%. Soils are moderately deep to deep (20-60 inches) loamy soils derived from residuum from igneous and metamorphic rocks or sandstone and shale; slope alluvium from sandstone and shale, or igneous and metamorphic rocks; colluvium from igneous and metamorphic rocks or sandstone and shale, and/or alluvium from igneous and metamorphic rocks. Soil surface texture are loam, sandy loam or silt loam with loamy subsurface. It is a Mountain Big Sagebrush -Arizona Fescue community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.
R048AY292CO	Deep Loam Deep Loam occurs alluvial fans, terraces, hills, fan remnants, valley sides, and structural benches. Slopes is between 0 to 25%. Soils are deep (60+ inches) in depth. Soils are derived from alluvium from basalt, or sandstone and shale; colluvium from sandstone and shale; slope alluvium from sandstone and shale or eolian deposits from sandstone and shale. Soil surface texture is loam, sandy clay loam or very channery loam, with a fine-loamy subsurface. It is a mountain big sagebrush – needle-and-thread community. It has an aridic ustic moisture regime and a frigid temperature regime. The effective precipitation ranges from 12 to 16 inches.
R048AY231CO	Dry Mountain Loam Dry Mountain Loam occur on alluvial fans, valley sides, mountainsides, and terraces. Slopes are less than 30%. Soils are moderately deep to deep (20 to 60+ inches) soils derived from alluvium from sedimentary rock; colluvium from basalt; or colluvium sandstone. Soil surface texture is a loam with fine-loamy subsurface. It is a Wyoming Big Sagebrush – Needlegrass community. It has an aridic ustic moisture regime and a frigid temperature regime. The effective precipitation ranges from 12 to 16 inches

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata ssp. wyomingensis</i>
Herbaceous	(1) <i>Pascopyrum smithii</i> (2) <i>Elymus elymoides</i>

Physiographic features

Topography of the site is gently rolling hills. It occurs on hillsides, sideslopes, and toeslopes. The site occurs on south slopes at the higher elevations and north facing slopes at the lower elevations. Slopes can range from 5 to 20 percent. Elevation is between 6800 and 8000 feet.

Table 2. Representative physiographic features

Landforms	(1) Structural bench (2) Hill
Runoff class	Medium
Flooding frequency	None

Ponding frequency	None
Elevation	2,070 – 2,440 m
Slope	10 – 20 %
Aspect	Aspect is not a significant factor

Climatic features

Average annual precipitation is about 12 to 16 inches. Of this, approximately 45-55% falls as snow, and 45-55% falls as rain between middle of May to and the end of September. Summer moisture is mostly from thundershowers in July thru October. November to February and June is the driest period of the year with the driest month being June. August to October and March to April is the wettest period and the wettest month is usually April. The average annual total snowfall is 64.8 inches. The snow depth usually ranges from 1 to 5 inches during October thru April. The highest winter snowfall record in this area is 131.9 inches which occurred in 1908-1909. The lowest snowfall record is 11.9 inches during the 1944-1945 winter. The average growing season is about 140 days. Native plants green up about May 15th. Active growth continues through July 1. Plants are usually dormant by mid-October. 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.

Other:

Relative humidity in areas where this site occurs is usually very low (10 percent). Since much of the summer precipitation comes in the form of light showers, much of it evaporates before it becomes effective to the native plants.

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)	60-100 days
Freeze-free period (characteristic range)	100-140 days

Precipitation total (characteristic range)	360-380 mm
Frost-free period (actual range)	50-110 days
Freeze-free period (actual range)	90-140 days
Precipitation total (actual range)	360-380 mm
Frost-free period (average)	80 days
Freeze-free period (average)	120 days
Precipitation total (average)	380 mm

- (1) CIMARRON [USC00051609], Cimarron, CO
- (2) CEDAREGE 3 E [USC00051443], Cedaredge, CO
- (3) COLLBRAN [USC00051741], Collbran, CO

Influencing water features

None

Soil features

Soils are deep to very deep and well drained. Surface texture is loam. Soft shale is at 22 to 60 inches (56 to 152 cm). Soils are dark colored originating from the shale parent material (Wasatch Formation). Soils are not well developed and have a strong shale influence.

Soils correlated to this site:

Emmons

Table 4. Representative soil features

Parent material	(1) Colluvium – sandstone and shale (2) Residuum – sandstone and shale
Surface texture	(1) Loam
Family particle size	(1) Fine-loamy
Drainage class	Well drained
Permeability class	Slow

Soil depth	150 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	Not specified
Available water capacity (Depth not specified)	13.97 – 17.02 cm
Calcium carbonate equivalent (Depth not specified)	0 – 10 %
Soil reaction (1:1 water) (Depth not specified)	7.4 – 7.8
Subsurface fragment volume <=3" (Depth not specified)	0 – 10 %
Subsurface fragment volume >3" (Depth not specified)	0 – 10 %

Ecological dynamics

The production is predominantly made up of wheatgrasses, however, the aspect is big sage with grasses. The dominant grasses are wheatgrasses, needleandthread, prairie Junegrass, and bottlebrush squirreltail. Less abundant grasses are Letterman needlegrass, muttongrass, and Sandberg bluegrass. Forbs that make up the plant community are hoods phlox, mountain bluebells, rose pussytoes, sulfur buckwheat, and trailing fleabane.

Shrubs that occur on this site are big sagebrush and Saskatoon serviceberry.

If ecological retrogression is cattle-induced, desirable grasses will decrease. However, if retrogression is sheep-induced, desirable forbs and shrubs will be reduced. Deterioration of this site caused by overgrazing of cattle will decrease the percentage of grasses such as bluebunch wheatgrass, muttongrass, needleandthread, and prairie Junegrass. With the decrease of above mentioned plants, bottlebrush squirreltail and Sandberg bluegrass will increase initially. Forbs such as sulfur buckwheat and shrubs such as big sagebrush, serviceberry, and yellow rabbitbrush will also increase. Plant species likely to invade the site and increase in density will be rabbitbrush, and in some areas, Utah juniper and pinyon pine and annuals such as cheatgrass.

Vegetation density (vegetation density = basal area. This is the area of ground surface covered by the perennial stem or stems. Usually, this is measured one inch (2.54 cm) above the soil in contrast to the full spread of perennial foliage.) is approximately 15 percent.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Grasses			202-252	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	34-84	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	34-50	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	17-34	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	17-34	–
	muttongrass	POFE	<i>Poa fendleriana</i>	0-17	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0-17	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	0-11	–
	elk sedge	CAGA3	<i>Carex garberi</i>	0-11	–
	Letterman's needlegrass	ACLE9	<i>Achnatherum lettermanii</i>	0-6	–
Forb					
2	Forbs			34-50	
	sulphur-flower buckwheat	ERUM	<i>Eriogonum umbellatum</i>	11-28	–
	tall fringed bluebells	MECI3	<i>Mertensia ciliata</i>	6-17	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	6-17	–
	trailing fleabane	ERFL	<i>Erigeron flagellaris</i>	6-17	–
	rosy pussytoes	ANRO2	<i>Antennaria rosea</i>	6-17	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	6-17	–
	twogrooved milkvetch	ASBI2	<i>Astragalus bisulcatus</i>	6-11	–
	western Indian paintbrush	CAOC4	<i>Castilleja occidentalis</i>	6-11	–
	tapertip onion	ALAC4	<i>Allium acuminatum</i>	6-11	–
	two-lobed larkspur	DENU2	<i>Delphinium nuttallianum</i>	0-6	–
Shrub/Vine					
3	Shrubs			50-84	
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	34-50	–
	Saskatoon serviceberry	AMAL2	<i>Amelanchier alnifolia</i>	17-34	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0-17	–

Animal community

INTERPRETATIONS FOR GRAZING ANIMALS: This site has limited value for grazing of livestock due to low production of the native species. Proper grazing use and a planned grazing system are conservation practices which very much help to improve range condition. The species are a variety of grasses and shrubs that provide good nutrition for grazing animals. Continuous year-long grazing or grazing from mid-May to mid-October by cattle cause the most desirable grasses to decrease and be replaced by an increase in forbs, shrubs, and invaders. A system of deferred grazing, which varies the season of grazing in pastures during successive years, is needed to maintain a healthy well-balanced plant community. Rest during different seasons of the year benefits different plants. Fall and winter rest (September-October) benefits shrubs such as rabbitbrush and mountain big sagebrush. Spring rest (mid-May through early July) benefits cool-season plants such as western wheatgrass, and prairie Junegrass. Deferment during late winter and spring reduces competition between grazing animals for palatable shrubs and forbs. INTERPRETATIONS FOR WILDLIFE: South facing slopes at lower elevations of this site are often considered critical big game winter range. Higher elevations are particularly important as elk winter range. Nuttall's cottontail, white-tailed jackrabbits, Richardson's ground squirrel, sage grouse, Brewers sparrow, and sage sparrow can also be found on this site. Where the site is adjacent to cliffs and/or large trees, it can be an important component of golden eagle, red-tailed hawk, and American kestrels habitat.

Hydrological functions

Soils in this site are grouped into "C" hydrologic group, as outlined in the "Soils of Colorado Loss Factors and Erodibility Hydrologic Groupings 1979" handbook. Field investigations are needed to determine hydrological cover conditions and hydrologic curve numbers. The hydrologic curve number for Group "C" soil is about 78 for all the soils except the Aaberg series which is Group "D" with a hydrologic curve number of 83 when hydrologic conditions are good, as shown in "Peak Flows in Colorado" handbook. Refer to SCS National

Engineering Handbook, Section 4, to determine runoff quantities from the curves.

Recreational uses

RECREATION AND NATURAL BEAUTY: The site is good habitat for big game, upland game birds, rabbits, and coyotes. Therefore, hunting is a form of recreation which can take place on the site. This site receives enough snow to make good conditions for cross country skiing and snowmobiling.

Wood products

Utah juniper can be an invader on this site. If a thick stand of juniper becomes established, the trees can be cut for firewood and posts. By cutting these invading trees, the understory production can be increased.

Other information

ENDANGERED PLANTS AND ANIMALS: (Species names to be included as reliable information becomes available). MAJOR PLANTS POISONOUS TO LIVESTOCK THAT MAY CAUSE POISONING: Greasewood is poisonous in the spring. Cattle and sheep are affected. Effects and symptoms: Poisoning is "acute". Early signs of poisoning (4-6 hours after animals eat toxic amounts) are dullness, loss of appetite, lowering of the head, reluctance to follow the band and irregular gait. Advanced signs are drooling, nasal discharge, progressive weakening, rapid shallow breathing, and coma. Cattle may die after eating 3 to 3.5 pounds in a short time. Halogeton is poisonous when growing rapidly in spring (April-June). Sheep are affected. Effects and symptoms: Poisoning is "acute". Signs of poisoning occur in 2 to 6 hours after an animal eats a fatal amount and death occurs in 9 to 11 hours. Early signs are dullness, loss of appetite, lowering of the head, and reluctance to follow the band. Advanced signs are drooling with white or reddish froth about the mouth, Progressive weakening, animals unable to stand, rapid and shallow breathing, and coma followed by violent struggle for air. Twogrooved milkvetch is poisonous year long especially in the spring. All livestock are affected. Effects and symptoms: Poisoning is "accumulative." Signs of poisoning are rough coat, abnormal growth of long mane and tail hair, lack of coordination of muscles, constipation, and a peculiar gait. Utah juniper Utah juniper can only be poisonous to cattle when desirable forage is not available. Death loss from this species is rare. Stock may be poisoned if large quantities of berries are eaten. GUIDE TO INITIAL STOCKING RATES 2/ Condition % Climax Class Vegetation Ac/AUM AUM/Ac Ha/AUM AUM/Ha Excellent 76-100 20 .05 8.1 .12 Good 51-75 25+ .04 10.1 .10 Fair 26-50 - - - - Poor 0-25 - - - - 2/Stocking rates are based on an average growing season. Based on 1200 pounds (540Kg) of forage (air-dry) per animal unit month. (This figure takes into account the vegetation that disappears through trampling, small herbivores, etc., which amounts to approximately 7.9 pounds (3.6Kg) per day under normal conditions). LOCATION OF TYPICAL EXAMPLES OF THE SITE: Field offices where the site occurs are Eagle and Kremmling.

Type locality

Location 1: Grand County, CO	
Township/Range/Section	TT1N RR80W S21
General legal description	W ½ section 21, T1N, R80W, Grand County, CO

Other references

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Contributors

Jim Kellogg
Suzanne Mayne-Kinney

Approval

Kirt Walstad, 4/03/2025

Acknowledgments

Project Staff: Suzanne Mayne-Kinney, Ecological Site Specialist, NRCS MLRA, Grand Junction SSO Chuck Peacock, MLRA Soil Survey Leader, NRCS MLRA Grand Junction SSO Program Support: Rachel Murph, NRCS CO State Rangeland Management Specialist, Denver Scott Woodhall, NRCS MLRA Ecological Site Specialist-QA Phoenix, AZ Eva Muller, Regional Director, Rocky Mountain Regional Soil Survey Office, Bozeman, MT B.J. Shoup, CO State Soil Scientist, Denver Eugene Backhaus, CO State Resource Conservationist, Denver 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	04/03/2025
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. Number and extent of rills:

2. Presence of water flow patterns:

3. Number and height of erosional pedestals or terracettes:

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

5. Number of gullies and erosion associated with gullies:

6. Extent of wind scoured, blowouts and/or depositional areas:

7. Amount of litter movement (describe size and distance expected to travel):

8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):

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

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

12. Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):

Dominant:

Sub-dominant:

Other:

Additional:

13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):

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

15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):

16. Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:

17. Perennial plant reproductive capability:
