

Ecological site R048BY280CO Dry Mountain Swale

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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): 048B–Southern Rocky Mountain Parks and Valleys

This area is in Colorado (96 percent) and Wyoming (4 percent). It makes up about 2,325 square miles (6,020 square kilometers). The town of Walden, in the northern part of this MLRA, is in a wide valley locally known as North Park. The town of Kremmling is in a valley locally known as Middle Park. The town of Hartsel, in the center of the southern part of the MLRA, is in a broad intermontane basin locally known as South Park. The northern part is bordered by the Medicine Bow, Routt, and Arapaho National Forests, and the southern part is bordered by the San Isabel and Pike National Forests. The Arapaho National Wildlife Refuge is directly south of the town of Walden.

This area is within the Southern Rocky Mountains Province of the Rocky Mountain System. It consists of nearly level to rolling mountain parks and valleys and a few narrow mountain ridges. It occurs as two separate parts in the center of the Southern Rockies. The southern half of the northern part is on the west side of the Continental Divide, and the rest of the MLRA is on the east side of the divide. Elevation ranges from 7,850 to 10,850 feet (2,395 to 3,310 meters). The head waters of North Platte River leaves Colorado and enters Wyoming in the northern half of the northern part of the MLRA (North Park). The headwaters of Colorado River is in the southern half of the northern part of the MLRA (Middle Park). The headwaters of South Platte River is in the southern part of the MLRA (South Park).

The mountain valleys and parks that are characteristic of this MLRA are surrounded by high mountain peaks of the adjacent Southern Rocky Mountains MLRA (48A). Steep slopes give rise to steep-gradient streams that can move cobbles and gravel from the mountain slopes down into the valleys. The coarse textured sediments on the surface of this area were deposited by either glacial meltwater or present-day rivers. Buried deep beneath the sediments is a complex of sedimentary and igneous rocks. Residuum from sedimentary rocks is on the steeper slopes that were not covered by alluvium and glacial outwash.

The average annual precipitation is mainly 10 to 16 inches (255 to 405 millimeters), but it is as high as 28 inches (710 millimeters) at the higher elevations that border the Southern Rocky Mountains MLRA. Precipitation generally increases with elevation. Rainfall occurs as high-intensity, convective thunderstorms during the growing season. About half of the annual precipitation falls as snow. Soil moisture is unevenly distributed within short distances because of snowdrifts. The amount of precipitation is highly influenced by rain shadows. The surrounding peaks receive most of the precipitation as storm systems traverse the area. The average annual temperature is 35 to 42 degrees F (1 to 6 degrees C). The freeze-free period averages 95 days and ranges from 70 to 120 days, decreasing in length with elevation.

The dominant soil order in this MLRA is Mollisols. Alfisols are of lesser extent. The soils are very shallow to deep, generally well drained, and loamy or clayey and have mixed or smectitic mineralogy. The soil temperature regime is dominantly cryic, but it is frigid in some small areas, primarily on south- or west-facing slopes. The soil moisture regime is mainly ustic, but a marginal aridic regime has been identified in areas where the average annual precipitation is less than about 12 inches (305 millimeters). The most extensive great group is Argicryolls (Hodden, Lucky, Parlin, Tiagos, and Cabin series), which commonly formed in outwash and slope alluvium on outwash

terraces, fan remnants, hills, and mountain slopes. Haplocryolls (Redcloud and Tealson series) formed in outwash and slope alluvium on outwash terraces, valley side slopes, hills, and ridges. Haplocryalfs (Gebson and Harsha series) formed in slope alluvium and outwash on outwash terraces, fan remnants, hills, ridges, and mountain slopes. Cryaquolls (Dobrow and Randman series) formed in alluvium on stream terraces and flood plains.

Classification relationships

NRCS:

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

USFS:

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

EPA:

21i – Sagebrush Parks and 21j – Grassland Parks < 21 Southern Rockies < 6.2 Western Cordillera < 6 Northwestern Forested Mountains North American Deserts (Griffith, 2006).

USGS: Southern Rocky Mountain Province

Ecological site concept

R048BY280CO Dry Mountain Swale occurs on alluvial flat, stream terraces, drainageways, flood plains and flood-plain steps. Slopes is between 0 to 5 percent. Soils are very deep (60 inches or greater). Soils are derived from alluvium. Soil surface texture is usually loam, sandy loam or clay loam with fine-loamy, fine-silty or fine textured subsurface. This site receives extra moisture from surrounding uplands that drain into the area. It is a western wheatgrass – slender wheatgrass community. It has an aridic ustic moisture regime. The effective precipitation ranges from 12 to 16 inches.

Associated sites

R048BY222CO	<p>Loamy Park R048BY222CO Loamy Park occurs on flood plains, flood-plain steps, hills, fans and stream terrace. Slopes is between 0 to 15%. Soils are very deep (60+ inches). Soils are derived from alluvium or colluvium. Soil surface texture is usually loam or sandy loam with fine-loamy textured subsurface. It is an Arizona fescue – mountain muhly community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.</p>
R048BY224CO	<p>Dry Salt Playa R048BY224CO Dry Salt Playa occurs drainageways, alluvial flats and playas. Slopes is between 0 to 5%. Soils are deep to very deep (40 to 80 inches). Soils are derived from alluvium. Soil surface texture is usually coarse sandy loam with fine textured subsurface. This soil has gypsum and salt accumulations. It is a seepweed – alkali cordgrass – saltgrass community.</p>
R048BY232CO	<p>Dry Shallow Loam R048BY232CO Dry Shallow Loam occurs on hills, pediments, ridges and knobs. Slopes is between 1 to 30%. Soils are shallow to moderately deep (10 to 40 inches). Soils are derived from slope alluvium from volcanic breccia, limestone, sandstone, shale, gneiss, granodiorite, and/or schist; colluvium from limestone; or residuum from limestone and sandstone. Soil surface texture is usually loam, channery loam, very gravelly loam, sandy loam or gravelly sandy loam with loamy or loamy-skeletal textured subsurface. It is a Arizona fescue – Indian ricegrass community.</p>
R048BY227CO	<p>Dry Loamy Slopes R048BY227CO Dry Loamy Slopes occurs on fan remnants, pediments, fills, outwash terrace and fan terraces. Slopes is between 3 to 40%. Soils are deep to very deep (40 to 80 inches). Soils are derived from alluvium; slope alluvium from tuff, limestone, sandstone and/or shale; colluvium from tuff; residuum from tuff; or outwash from granite and gneiss or sedimentary rock. Soil surface texture is usually gravelly loam, very cobbly loam or very cobbly sandy loam or sandy loam with fine-loamy or loamy-skeletal textured subsurface. It is a mountain muhly – Arizona fescue community.</p>

R048AY377CO	<p>Skeletal Loam R048BY377CO Skeletal Loam occurs on hills, mountains, mountainsides, fan terraces, pediments, outwash terrace and mesas. Slopes is between 5 to 55%. Soils are deep to very deep (40 to 60+ inches). Soils are derived from slope alluvium from conglomerate, sandstone, trachyte, or volcanic breccia; outwash; colluvium from volcanic rock, trachyte, or volcanic breccia or residuum from volcanic rock. Soil surface texture is usually very gravelly loam, gravelly loam, very cobbly loam or very gravelly sandy loam with loamy-skeletal or clayey skeletal textured subsurface. It is an Arizona fescue – Parry's oatgrass community.</p>
R048BY225CO	<p>Mountain Loam 10-16 PZ South Park R048BY225CO Mountain Loam 10-16" South Park occurs fan remnants, pediments and hills. Slopes is between 1 to 25%. Soils are deep to very deep (40 to 80 inches). Soils are derived from alluvium; slope alluvium from volcanic breccia, limestone, sandstone, and/or shale; and outwash from sedimentary rock or granite and gneiss. Soil surface texture is usually loam, sandy loam, gravelly loam or very gravelly sandy loam with either a fine-loamy or loamy-skeletal textured subsurface. It is an Arizona fescue – western wheatgrass community.</p>
R048AY230CO	<p>Shallow Loam R048AY230CO – Shallow Loam occurs on mountain, hills, ridges, mountain sides and mountain slopes. Soils are very shallow to shallow (less than 20 inches) loamy-skeletal soils derived from slope alluvium from trachyte, volcanic breccia, gneiss, granite and/or sandstone; residuum from weathered volcanic breccia, tuff, igneous rock, sandstone or sandstone and shale. Soils surface textures are gravelly to very gravelly loam, gravelly to very gravelly sandy loam, cobbly loam, or very cobbly sandy loam. It is an Arizona fescue-mountain muhly community with scattered mountain mahogany, snowberry and current. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.</p>
R048BY268CO	<p>Dry Flood Plain Step R048BY268CO Dry Flood-Plain Step occurs on flood plain steps in South Park. Slopes is between 0 to 5%. Soils are very deep (60+ inches). Soils are derived from alluvium. Soil surface texture is usually loam or clay loam with fine-loamy over sandy or sandy-skeletal textured subsurface. This site has a strongly contrasting textural stratification at 20 to approximately 30 inches. It is a tufted hairgrass – Nebraska sedge community.</p>
R048BY241CO	<p>Mountain Meadow R048BY241CO Mountain Meadow occurs on flood plains, stream terraces, drainageways and alluvial flats. Slopes is between 0 to 5%. Soils are moderately deep to very deep (25 to 100 inches). Soils are derived from alluvium from igneous and metamorphic rock. Soil surface texture is usually loam, fine sandy loam, silty clay loam or sandy clay loam with fine-loamy, fine-loamy over sandy-skeletal or coarse-loamy textured subsurface. It is a tufted hairgrass – Nebraska sedge community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.</p>

Similar sites

R048AY245CO	<p>Mountain Swale R048AY245CO Mountain Swale occurs flood plains, alluvial fans, swales, stream terraces, and valley floors. Slopes is between 0 to 12%. Soils are deep (60+ inches) in depth. Soils are derived from alluvium. Soil surface texture is loam, with a fine-loamy subsurface. It is a basin wildrye-western wheatgrass community. It has a typic ustic moisture. The effective precipitation ranges from 16 to 20 inches. It receives extra moisture from surrounding uplands that drain into the area. These areas are sloped themselves and drain into perennially wet areas. They have well drained soils and ephemeral streams.</p>
R048AY285CO	<p>Foothill Swale R048AY285CO Foothill Swale - The site occurs in the watershed in areas that receive extra water and fine sediment from surrounding uplands. The soils are deep and loamy in texture with high water-holding capacity. Buried surface horizons and very little rock characterize the soil profile. The soil moisture regime is aridic ustic, and the soil temperature regime is frigid. The aspect of this site is a valley grassland plant community with a rather sparse stand of shrubs. Basin wildrye, western and thickspike wheatgrasses, Indian ricegrass, squirreltail, and Sandburg bluegrass are the dominant grasses. Shrubs include basin big sagebrush, and rubber rabbitbrush.</p>

R048BY268CO	<p>Dry Flood Plain Step</p> <p>R048BY268CO Dry Flood-Plain Step occurs on flood plain steps in South Park. Slopes is between 0 to 5%. Soils are very deep (60+ inches). Soils are derived from alluvium. Soil surface texture is usually loam or clay loam with fine-loamy over sandy or sandy-skeletal textured subsurface. This site has a strongly contrasting textural stratification at 20 to approximately 30 inches. It is a tufted hairgrass – Nebraska sedge community. It has an aridic ustic moisture regime. The effective precipitation ranges from 12 to 16 inches.</p>
R048BY241CO	<p>Mountain Meadow</p> <p>R048BY241CO Mountain Meadow occurs on flood plains, stream terraces, drainageways and alluvial flats. Slopes is between 0 to 5%. Soils are moderately deep to very deep (25 to 100 inches). Soils are derived from alluvium from igneous and metamorphic rock. Soil surface texture is usually loam, fine sandy loam, silty clay loam or sandy clay loam with fine-loamy, fine-loamy over sandy-skeletal or coarse-loamy textured subsurface. It is a tufted hairgrass – Nebraska sedge community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.</p>
R048AY241CO	<p>Mountain Meadow</p> <p>R048AY241CO Mountain Meadow occurs flood plains, stream terraces, drainageways, ephemeral streams, flood-plain step and depressions. This site has natural sub-irrigation. Slopes is between 0 to 12%. Soils are moderately deep to very deep (20 to 60+ inches). Soils are derived from alluvium from sandstone and shale, sedimentary rock, igneous, metamorphic and sedimentary rock, or shale. Soil surface texture is loam, silty clay loam, clay loam, clay, sandy clay loam or sandy loam with fine-loamy or fine textured subsurface. It has a typic aquic or oxyaquic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.</p>

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Pascopyrum smithii</i> (2) <i>Elymus trachycaulus</i>

Physiographic features

This site occurs on deep alluvial soils deposited from volcanic and sedimentary parent material. The site is found along the stream-beds and swale directly associated with the Mountain Loam 10 to 16 inch precipitation ecological site. Elevation ranges from 8600 to 9600 feet.

Table 2. Representative physiographic features

Landforms	(1) Alluvial flat (2) Stream terrace (3) Drainageway (4) Flood plain (5) Flood-plain step
Runoff class	Low
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to rare
Ponding frequency	None
Elevation	2,621–2,926 m
Slope	0–5%
Aspect	Aspect is not a significant factor

Climatic features

Average annual precipitation is about 12 to 16 inches. Of this, approximately 65 to 75 percent falls as snow, and 25 to 35 percent falls as rain between middle of June and the end of September. Summer moisture is mostly from thundershowers in June thru September. November thru March is the driest period of the year with the driest month

being February. July and August are the wettest months.

The average annual total snowfall is 77.1 inches. The snow depth usually ranges from one to 16 inches during September thru May. The highest winter snowfall record in this area is 174.8 inches which occurred in 1983-1984. The lowest snowfall record is 35 inches during the 1980-1981 winter.

The frost-free period typically ranges from 50 to 85 days. The last spring frost is typically the middle of June to the first of July. The first fall frost is usually the middle of August to the second week of September.

Mean daily annual air temperature ranges from about 21.8 degrees F to 51.1 degrees F, averaging about 16 degrees F for the winter and 56 degrees F in the summer. Summer high temperatures of low-70 degrees F to mid-70 degrees F are not unusual. The coldest winter temperature recorded was -46 degrees F on January 10, 1962 and the warmest winter temperature recorded was 58 degrees F on December 24, 1971. The coldest summer temperature recorded was 21 degrees F on June 1, 1990 and the warmest was 89 degrees F on July 1, 2002.

Wide yearly and seasonal fluctuations are common for this climatic zone. Data taken from Western Regional Climate Center (2018) for Grand Lake 6 SSW, Colorado Climate Station.

This zone in MLRA 48B will need to be broken up into at least two land resources zones in future projects based on current knowledge of precipitation and temperature patterns based on North Park-Middle Park and South Park. Lake George 8 SW is in South Park. Green Mountain Dam, Spicer, and Rand are in North Park, Williams Fork Dam, Hot Sulphur Springs 2 SW and Grand Lake 6SSW are in Middle Park.

Middle Park is used in the write-up above. Graphical and tabular data presented following this section, is a combination of all the climate stations within this MLRA, which shows a greater range of variability than captured in the write up.

North Park has growing season of 15 to 45 days; July and August are the wettest months; and the driest months is February. North Park: Green Mountain Dam, Spicer, and Rand. Middle Park: Hot Sulphur Springs 2 SW and Grand Lake 6SSW

South Park has a growing season of 80 to 110 days with July and August being the wettest months and January is the driest month. Lake George 8 SW

Effective precipitation is limited by the low water intake rate of the soil. Over fifty percent of the precipitation falls in the form of snow. Optimum growing season for native plants is mid-April to the first of July. Winters are cold with deep snow cover. Native plants are favored by spring moisture from accumulated snow. July and August are normally dry months during the growing season.

Table 3. Representative climatic features

Frost-free period (characteristic range)	20-63 days
Freeze-free period (characteristic range)	66-91 days
Precipitation total (characteristic range)	356-381 mm
Frost-free period (actual range)	8-85 days
Freeze-free period (actual range)	50-96 days
Precipitation total (actual range)	305-406 mm
Frost-free period (average)	41 days
Freeze-free period (average)	78 days
Precipitation total (average)	356 mm

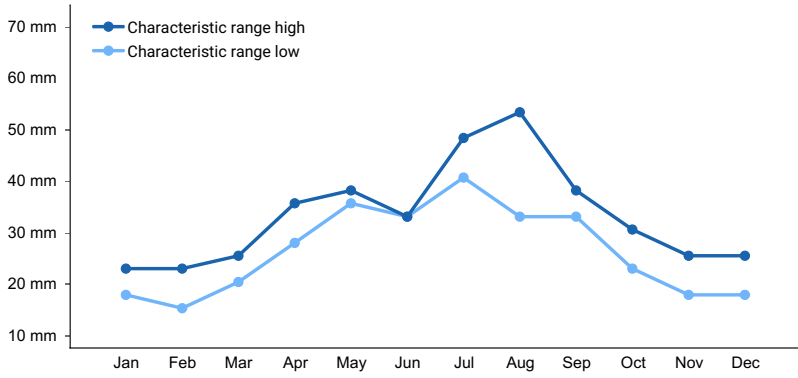


Figure 1. Monthly precipitation range

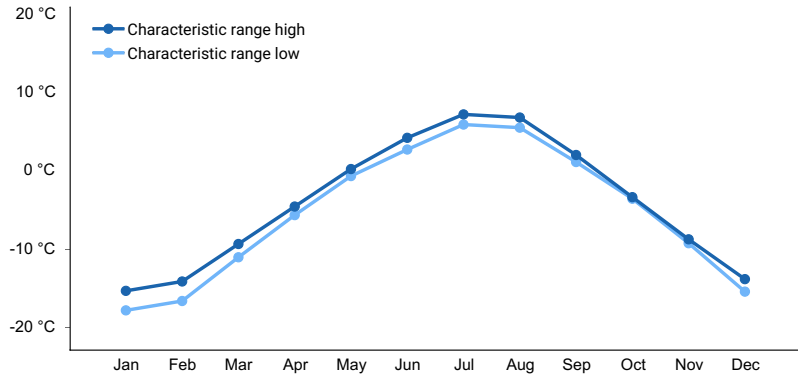


Figure 2. Monthly minimum temperature range

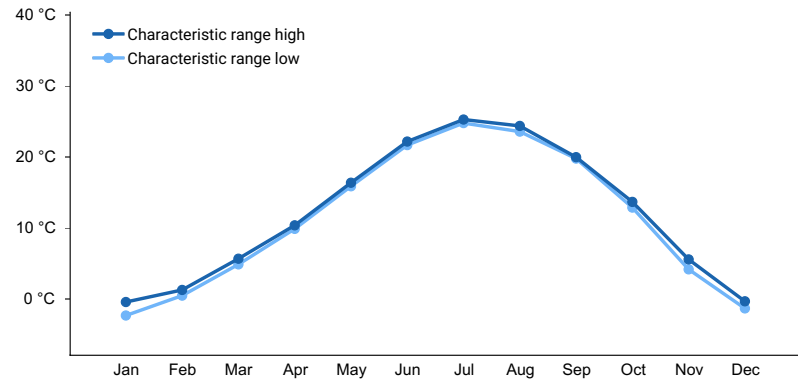


Figure 3. Monthly maximum temperature range

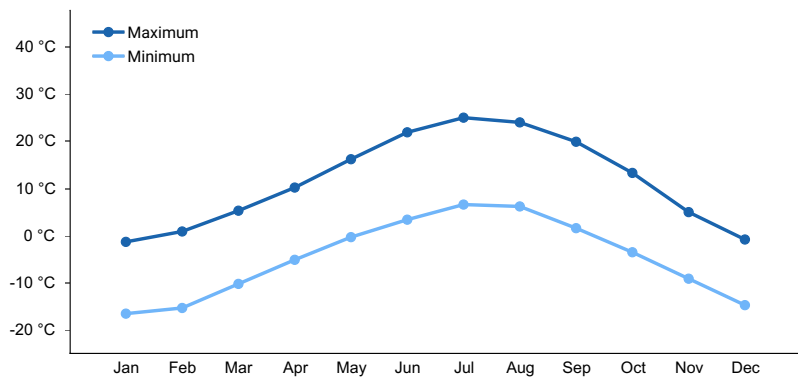


Figure 4. Monthly average minimum and maximum temperature

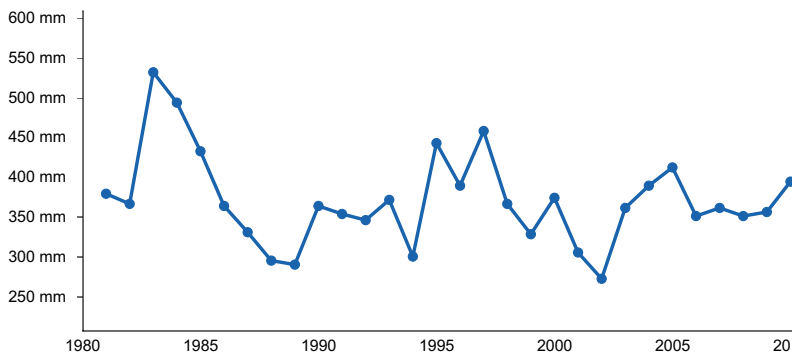


Figure 5. Annual precipitation pattern

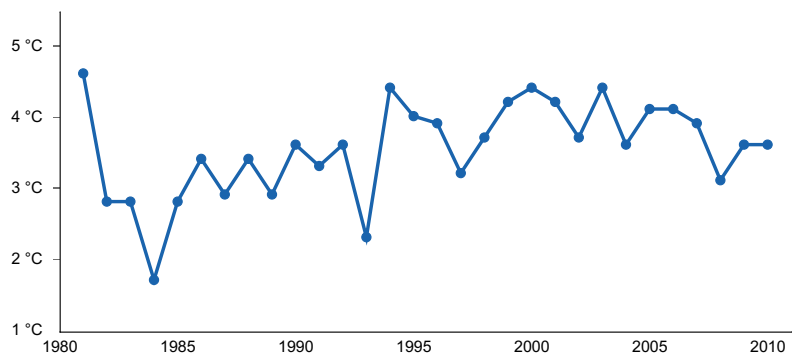


Figure 6. Annual average temperature pattern

Climate stations used

- (1) GRAND LAKE 6 SSW [USC00053500], Granby, CO
- (2) GREEN MT DAM [USC00053592], Silverthorne, CO
- (3) LAKE GEORGE 8 SW [USC00054742], Lake George, CO
- (4) SPICER [USC00057848], Coalmont, CO

Influencing water features

This ecological site is located in swales and valleys. It receives extra moisture from surrounding uplands that drain into the area. They have well drained soils and ephemeral streams. The water table is usually greater than 60 inches. Periodic flooding is not unusual as long as it is less than 7 days.

Wetland description

N/A

Soil features

This site occurs on deep, moderately well drained soils developed in alluvium in depressions and first terraces above stream bottoms. Typically the surface is loam, clay loam or fine sandy loam around 12 inches thick overlying loam, clay loam, and silty clay loam materials over 60 inches deep. Permeability is moderately slow, and water holding capacity is high. Effective rooting depth is greater than 60 inches, and the lower portion of the root zones can be affected slightly by seasonal high water table.

Major Soils Associated With This Site:

Fine-loamy Particle Section Control Soils: Lanswick

Fine Particle Section Control Soils: Garo

Fine-silty Particle Section Control Soils: Jodero Variant

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Loam (2) Fine sandy loam (3) Clay loam
Family particle size	(1) Fine-loamy (2) Fine-silty (3) Fine
Drainage class	Moderately well drained to well drained
Permeability class	Slow to moderate
Soil depth	152 cm
Surface fragment cover <=3"	0–10%
Available water capacity (Depth not specified)	7.62–12.7 cm
Calcium carbonate equivalent (Depth not specified)	0–10%
Electrical conductivity (Depth not specified)	0–2 mmhos/cm
Soil reaction (1:1 water) (Depth not specified)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–10%

Ecological dynamics

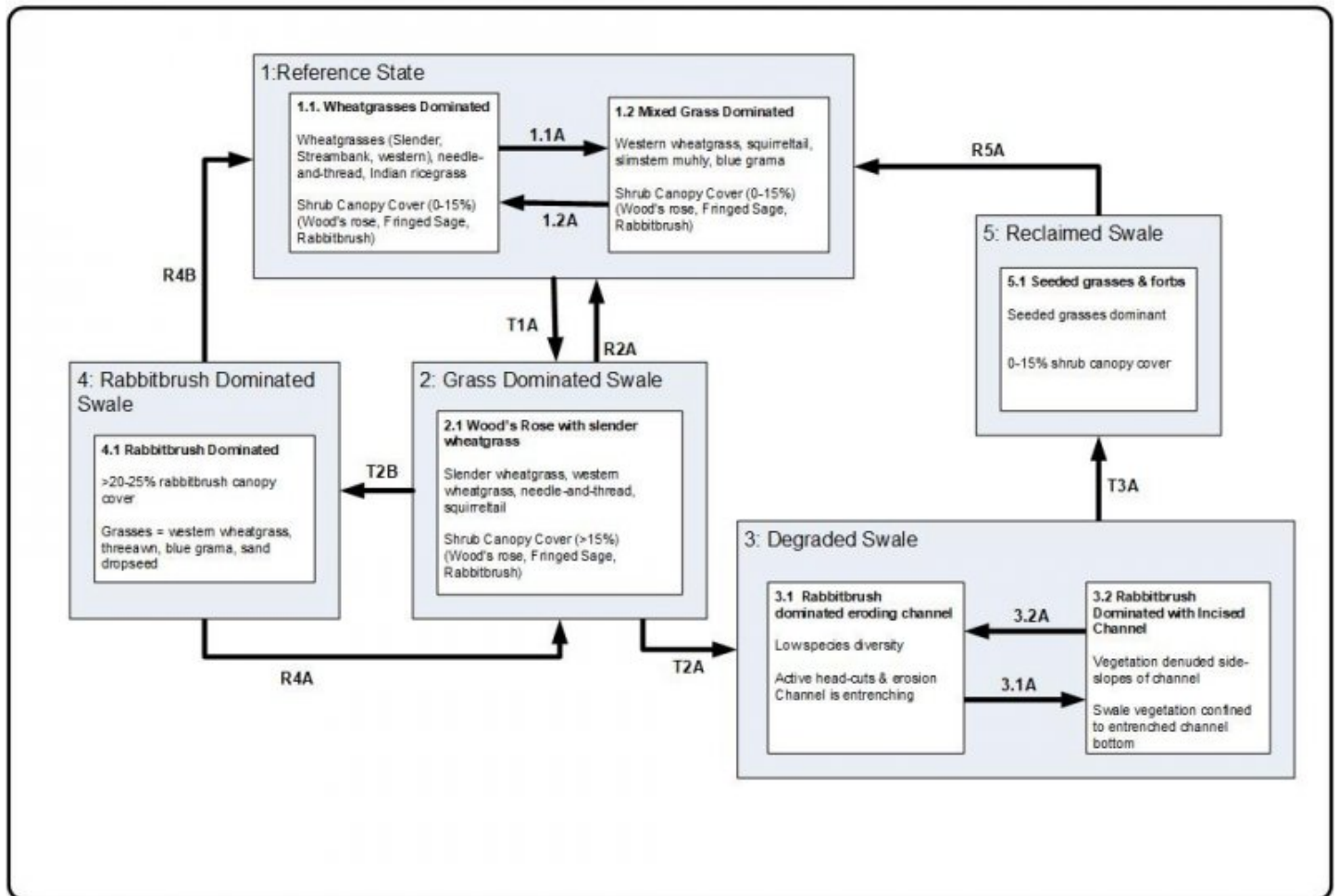
The plant community is about 80 to 90 percent grass, 5 percent forbs, and 5 to 10 percent shrubs air-dry weight.

The production is predominantly made up of western wheatgrass; however, needle-and-thread and streambank wheatgrass can make up a major portion of the community in local areas. Forbs that make up the plant community are Parry geranium, Western aster, Oregon fleabane, and western yarrow.

The dominant half-shrub that occurs is fringed sage. Other minor shrubs include scouler willow and red-osier dogwood along perennial streams in the bottom, and small rabbitbrush, shrubby cinquefoil, broom snakeweed, plains prickly pear, and snowball cactus on the upland areas.

State and transition model

R048BY280CO – Dry Mountain Swale



Legend

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

State 1 Reference State

If ecological retrogression is cattle-induced, nodding brome, slender wheatgrass, Letterman's needlegrass, and Indian ricegrass will decrease and soon disappear. Western wheatgrass initially increases then declines with further overgrazing. Red-osier dogwood and Scouler willow both disappear completely under continuous heavy gazing pressure. Less desirable shrubs and half-shrubs increase with fringed sagewort dominating the site in poor condition. Kentucky bluegrass may invade areas of more moisture.

Community 1.1 Reference State

Optimum ground cover is 50 percent. Species that invade this site are: Kentucky bluegrass, thistles, mustard, dandelion, and annual weeds. Kentucky bluegrass may become a solid stand. Total annual production Favorable years 1600 pounds per acre per year Median years 1200 pounds per acre per year Unfavorable years 900 pounds per acre per year

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	857	1143	1524
Shrub/Vine	101	135	179
Forb	50	67	90
Total	1008	1345	1793

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			1009–1289	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	392–729	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	28–135	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	67–135	–
	nodding brome	BRAN	<i>Bromus anomalus</i>	28–67	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	28–67	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	28–67	–
	Letterman's needlegrass	ACLE9	<i>Achnatherum lettermanii</i>	0–67	–
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	0–67	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–67	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0–27	–
	mat muhly	MURI	<i>Muhlenbergia richardsonis</i>	13–27	–
	slimstem muhly	MUFI	<i>Muhlenbergia filiculmis</i>	0–13	–
	Fendler's threeawn	ARPUF	<i>Aristida purpurea var. fendleriana</i>	0–13	–
Forb					
2	Forbs			56–84	
	western aster	SYAS3	<i>Symphyotrichum ascendens</i>	13–28	–
	aspen fleabane	ERSP4	<i>Erigeron speciosus</i>	0–13	–
	Parry's geranium	GECAP2	<i>Geranium caespitosum var. parryi</i>	0–13	–
	hairy false goldenaster	HEVI4	<i>Heterotheca villosa</i>	0–13	–
	pingue rubberweed	HYRI	<i>Hymenoxys richardsonii</i>	0–13	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0–13	–
Shrub/Vine					
3	Shrubs			84–140	
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	39–67	–
	Woods' rose	ROWO	<i>Rosa woodsii</i>	28–56	–
	yellow rabbitbrush	CHVIS5	<i>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus</i>	0–28	–

Animal community

This range site provides habitats which support a resident animal community that is characterized by small mammals and birds, as well as antelope, deer, and elk. This site provides both forage and drinking water from intermittent and perennial streams which flow through this site.

Livestock Grazing - This site has good potential for providing late spring and summer forage for livestock. Because of its proximity to water and accessibility, this site's tendency for ecological retrogression is much greater than associated range sites. Continuous season-long grazing by cattle causes desirable grasses to be replaced by fringed sage.

A system of deferred grazing, which varies the season of grazing use in pastures during successive years, is important in restoring a healthy well-balanced plant community. Additionally, cattle should be moved frequently enough to prevent excessively long periods of grazing during the growing season. Rotation back to a previously grazed site should be deferred for a long enough period to allow grazed plants to recover. Early spring deferment would benefit western wheatgrass, Indian ricegrass, and needle-and-thread most. Summer deferment would benefit all grasses, but especially blue grama.

Wildlife Values -

Habitat values for all associated species can be drastically changed as this site retrogresses. Closely associated riparian habitat can be severely damaged through continuous grazing, even by small numbers of livestock. Fish habitat is lost through bank erosion which results from too heavy browsing and grazing of riparian vegetation.

Hydrological functions

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

Recreational uses

Recreation activities involve limited fishing on perennial streams, and occasional antelope, deer, or elk hunting. This site has little natural beauty that would attract people.

Wood products

No potential production on this site.

Inventory data references

Adjacent to Badger Creek and its intermittent drainages in Fremont and Park Counties.

Other references

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

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

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Approval

Kirt Walstad, 9/07/2023

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--Site Development and Testing Plan--:

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

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

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

Rangeland health reference sheet

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

Author(s)/participant(s)	
Contact for lead author	
Date	05/12/2024
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. Number and extent of rills:

2. Presence of water flow patterns:

3. **Number and height of erosional pedestals or terracettes:**

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

5. **Number of gullies and erosion associated with gullies:**

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

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

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

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

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

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

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

Dominant:

Sub-dominant:

Other:

Additional:

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

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

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

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

17. **Perennial plant reproductive capability:**
