USDA Natural Resources Conservation Service

Ecological site R048BY235CO
Dry Exposure

Last updated: 9/07/2023
Accessed: 05/11/2025

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 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

R048BY235CO Dry Exposure occurs on ridges, mountainsides, breaks, fans and terraces. Slopes is between 10 to 50 percent. Soils are shallow (5 to 20 inches). Soils are derived from alluvium from sedimentary rock. Soil surface texture is usually cobbly loam or gravelly coarse sandy loam with loamy textured subsurface. It is a needle and thread – prairie Junegrass community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.

Associated sites

R048AY303CO	**Loamy Slopes** R048AY303CO Loamy Slopes occurs on alluvial fans, terraces, hills mountains and mountainsides. Slopes is between 25 to 65%. Soils are moderately deep to deep (20 to 60+ inches). Soils are derived from alluvium from sandstone and siltstone or sandstone; residuum or colluvium from sandstone or outwash from basalt. Soil surface texture is cobbly sandy loam or cobbly, very flaggy or channery loam with loamy-skeletal textured subsurface. It is a mountain mahogany – Indian ricegrass community. It has an aridic ustic moisture regime and frigid temperature. The effective precipitation ranges from 12 to 18 inches.
R048AY238CO	**Brushy Loam** R048AY238CO 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 oak – slender wheatgrass community.

Similar sites

R048AY240CO	**Shallow Pine** R048AY240CO Shallow Pine occurs on mountains and mountainsides. Slopes are 5 to 50%. Soils are shallow (10 to 20 inches). Soils are derived from slope alluvium from volcanic breccia, gneiss, granite, or sandstone and/or residuum from granite, granodiorite and/or gneiss. Soil surface texture is a gravelly to very gravelly sandy loam or very gravelly loam with loamy-skeletal subsurface. It is a Ponderosa Pine - Arizona fescue – mountain muhly community.
R048AY229CO	**Rocky Loam** R048AY229CO – Rocky Loam occurs on ridges, mountainside, mountain slopes and mountains. Soils are very shallow to shallow (less than 20 inches) loamy-skeletal soils derived from residuum from granite, gneiss, phyllite, schist, sandstone and/or limestone. Soil surface texture are generally coarse sandy loams to light clay loams. It is a mountain big sagebrush – western wheatgrass community.

R048AY230CO	**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.
R048AY235CO	**Dry Exposure** R048AY235CO 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 sagewort - bunchgrass community. It has an ustic aridic moisture regime and frigid temperature regime. The effective precipitation ranges from 12 to 16 inches.
R048BY232CO	**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. It has an aridic ustic moisture regime. The effective precipitation ranges from 10 to 16 inches.
R048AY307CO	**Shallow Slopes** R048AY307CO – Shallow Slopes occurs on hillsides, ridges, mountainside and canyon walls. Soils are shallow (less than 20 inches) loamy textured soils derived from residuum from sandstone and limestone. Soil surface textures are generally sandy loam or gravelly sandy loam. It is a black sagebrush – western wheatgrass community. It has an aridic ustic moisture regime and frigid temperature regime. The effective precipitation ranges from 12 to 16 inches.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Hesperostipa comata* (2) *Koeleria macrantha*

Physiographic features

Landscape characteristics are the steep slopes, ridges, hill tops and other exposed, treeless areas seen from high mountain valleys and parks. Slopes vary from gentle to steep rolling with exposure or direction of slope not in any consistent direction.

Table 2. Representative physiographic features

Landforms	(1) Ridge (2) Mountainside (3) Breaks (4) Terrace (5) Fan
Runoff class	High to very high
Flooding frequency	None
Ponding frequency	None
Elevation	7,500–9,500 ft
Slope	10–50%
Aspect	Aspect is not a significant factor

Climatic features

Average annual precipitation is about 16 to 20 inches. Of this, approximately 60 to 70 percent falls as snow, and 30 to 40 percent falls as rain between mid-June and the end of September. Summer moisture is mostly from thundershowers in June thru September. October, November, February and March are the driest periods of the year with the driest month being October. April, May, July, and August are the wettest periods; the wettest month is usually August.

The average annual total snowfall is 137.9 inches. The snow depth usually ranges from 1 to 24 inches during October thru May. The highest winter snowfall record in this area is 228.80 inches which occurred in 1961-1962. The lowest snowfall record is 57.8 inches during the 1980-1981 winter.

The frost-free period typically ranges from 12 to 65 days. The last spring frost is typically the end of June to the end of July. The first fall frost is usually the end of July to the end of August. Mean daily annual air temperature ranges from about 20.1ºF to 52.9ºF, averaging about 18.2ºF for the winter and 54.9ºF in the summer. Summer high temperatures of low-70ºF to mid-70ºF are not unusual.

The coldest winter temperature recorded was -43ºF on January 13, 1963 and the warmest winter temperature recorded was 56ºF on February 26, 1950. The coldest summer temperature recorded was 16ºF on June 26, 1978 and the warmest was 92ºF on July 15, 1978.

Wide yearly and seasonal fluctuations are common for this climatic zone. Data taken from Western Regional Climate Center (2018) for Grand Lake 1 NW, Colorado Climate Station.

This zone in MLRA 48B will need to be broken up into at multiple land resources zones in future projects based on current knowledge of precipitation and temperature patterns based on North Park-Middle Park and South Park. There are only 2 climate stations in this LRU climatic zone and they are both in middle park (Grand Lake 1 NW and Dillion 1 E). Grand Lake is on the high end of precipitation and Dillion is on the lower end.

Table 3. Representative climatic features

Frost-free period (characteristic range)	12-13 days
Freeze-free period (characteristic range)	55 days
Precipitation total (characteristic range)	16-19 in
Frost-free period (actual range)	12-13 days
Freeze-free period (actual range)	55-65 days
Precipitation total (actual range)	16-20 in
Frost-free period (average)	13 days
Freeze-free period (average)	55 days
Precipitation total (average)	17 in

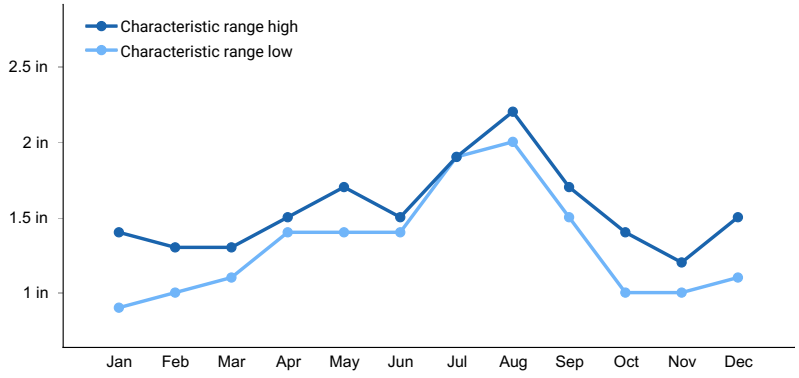


Figure 1. Monthly precipitation range

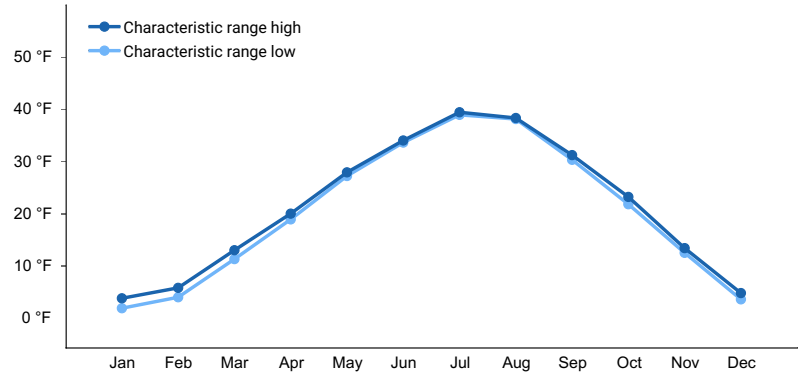


Figure 2. Monthly minimum temperature range

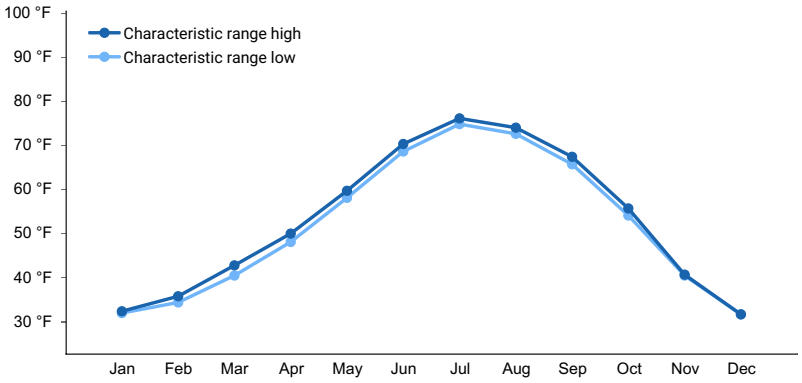


Figure 3. Monthly maximum temperature range

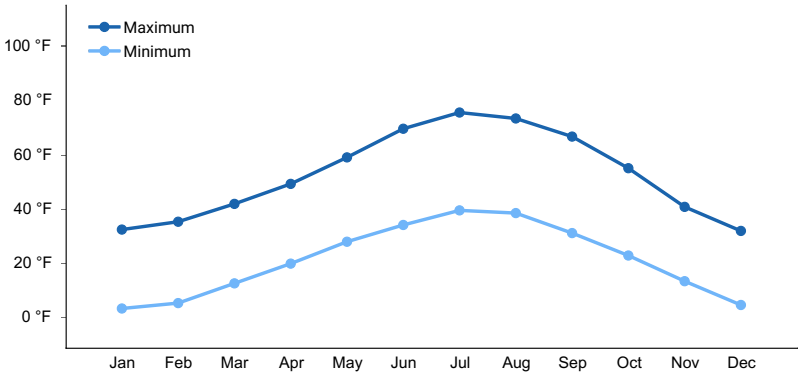


Figure 4. Monthly average minimum and maximum temperature

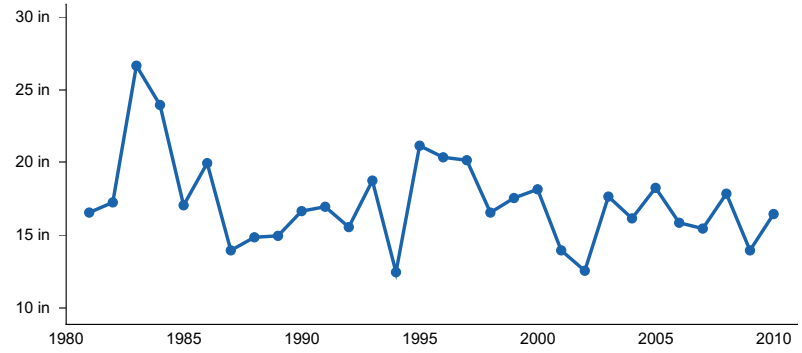


Figure 5. Annual precipitation pattern

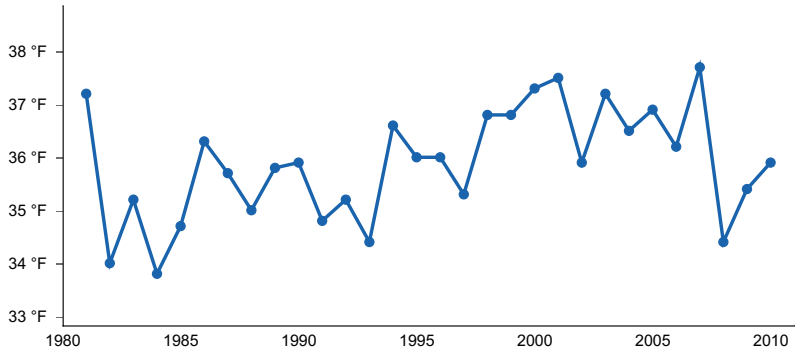


Figure 6. Annual average temperature pattern

Climate stations used

- (1) DILLON 1 E [USC00052281], Dillon, CO
- (2) GRAND LAKE 1 NW [USC00053496], Grand Lake, CO

Influencing water features

None are present on this site.

Wetland description

N/A

Soil features

Gravelly sandy loam to gravelly loam; light colored. Soils have a desert pavement-like rock cover. Fine to medium gravel to cobble on the surface. Topsoil is thin; subsoil is moderately to rapidly permeable. Low in fertility. All conditions contribute to restricted plant growth.

Soils in this site are:

Manburn

Table 4. Representative soil features

Parent material	(1) Alluvium–sedimentary rock
Surface texture	(1) Cobbly loam (2) Gravelly coarse sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderately rapid
Soil depth	5–20 in
Surface fragment cover <=3"	5–20%
Surface fragment cover >3"	3–20%
Available water capacity (Depth not specified)	1–2 in
Soil reaction (1:1 water) (Depth not specified)	6.1–7.8
Subsurface fragment volume <=3" (Depth not specified)	10–25%

Subsurface fragment volume >3" (Depth not specified)	3–20%

Ecological dynamics

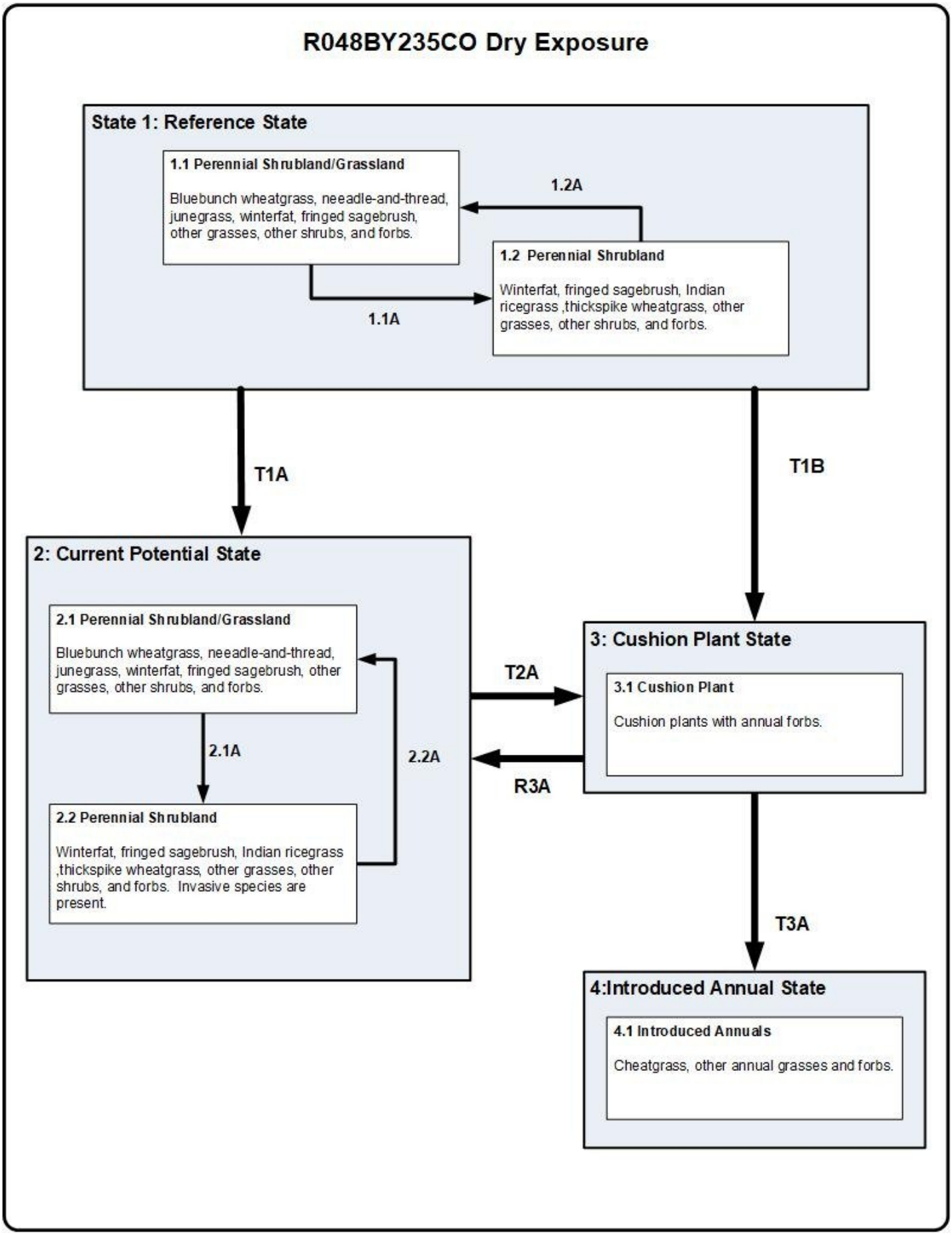
The "bald" appearance of this range site is because of the absence of large shrubs. Grasses and cushion type forbs characterize the aspect. Important grasses are bluebunch and streambank wheatgrass, needle-and-thread, Junegrass, Indian ricegrass and blue grama. Cushion type and mat forming forbs and shrubs include fringed sage, low rabbitbrush, buckwheat, daisy, phlox, globemallow, pussytoes, nailwort and loco (Astragalus) are prominent.

Percent ground cover for the plant community is approximately 25%.

Few species invade this site and it is sparsely vegetated to nearly barren following prolonged overgrazing or other severe disturbances.

State and transition model

R048BY235CO Dry Exposure



Legend

1.2A, 2.1A – Fire, proper grazing, wet climatic cycles, vegetative treatments, and/or small scale insect/pathogen outbreaks

1.1A, 2.1A – Extended improper grazing, lack of fire, extended drought, time without disturbance, and/or lack of insect/pathogen outbreaks

T1A – Establishment of invasive species

R3A – Vegetative treatments and seeding, wet climatic cycles, and/or proper grazing

T3A – repeated fire in short time spans

T1B,T2A – Disturbance (human, mechanic and/or animal), continuous grazing of perennial grasses and shrubs

State 1
Reference State

Community 1.1
Reference State

The "bald" appearance of this ecological site is due to the absence of large shrubs. Grasses and cushion type forbs characterize the site. This plant community is long-lived, stable and rarely experiences natural large scale disturbance. This plant community is represented by small scale disturbances which has removed patches of mature vegetation. Initially, disturbed areas are dominated by grasses and forbs. The grasses and forbs benefits from reduced competition from the absence of shrubs. Percent ground cover for the plant community is approximately 25 percent. Few species invade this site and it is sparsely vegetated to nearly barren following prolonged overgrazing or other severe disturbances. Total Annual Production: Favorable years 500 lbs/ac air dry Unfavorable years 200 lbs/ac air dry Median years 400 lbs/ac air dry

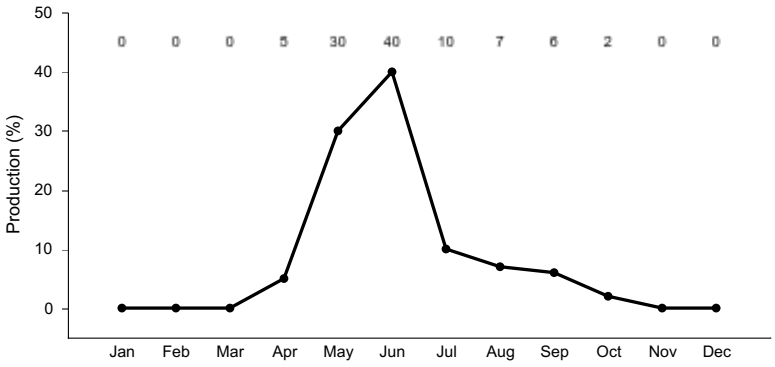


Figure 8. Plant community growth curve (percent production by month). CO0104, MLRA 48A & 34A - Foothill Frigid. MLRA 48A & 34A.

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Grasses**			112–280	
	needle and thread	HECO26	*Hesperostipa comata*	20–100	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	20–100	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	20–100	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	20–60	–
	blue grama	BOGR2	*Bouteloua gracilis*	10–30	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	10–30	–
	Grass, native	2GN	*Grass, native*	5–20	–
Forb					
2	**Forbs**			48–120	
	Forb, native	2FN	*Forb, native*	2–20	–
	nailwort	PARON	*Paronychia*	2–20	–
	spiny phlox	PHHO	*Phlox hoodii*	2–20	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	2–20	–
	pussytoes	ANTEN	*Antennaria*	2–20	–
	milkvetch	ASTRA	*Astragalus*	2–20	–
	buckwheat	ERIOG	*Eriogonum*	2–20	–
Shrub/Vine					
3	**Shrubs**			24–60	
	prairie sagewort	ARFR4	*Artemisia frigida*	10–30	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	10–30	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	10–30	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	1–10	–

Other references

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Approval

Kirt Walstad, 9/07/2023

Acknowledgments

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--Site Development and Testing Plan--:

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

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

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

Rangeland health reference sheet

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

Author(s)/participant(s)	
Contact for lead author	
Date	05/11/2025
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:**