USDA Natural Resources Conservation Service

Ecological site R048BY261CO
Salt Flats

Last updated: 4/09/2025
Accessed: 05/21/2025

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

R048BY261CO Salt Flats occurs on drainageways and stream terraces in Middle and North Park. Slopes are between 0 to 5 percent. Soils are very deep (60+ inches). Soils are derived from alluvium from sedimentary rock (Coalmont Formation). Soil surface texture is usually sandy loam with fine textured subsurface. Soils have a natric horizon and are strongly alkali and saline. It is a big sagebrush – greasewood – western wheatgrass – saltgrass community. It has an ustic aridic moisture regime. The effective precipitation ranges from 9 to 12 inches.

Associated sites

R048BY296CO	**Claypan** R048BY296CO Claypan occurs on hills, ridges, alluvial fans and terraces. Slopes is between 0 to 15%. Soils are moderately deep to deep (20 to 60 inches). Soils are derived from alluvium from sedimentary rock; colluvium from sandstone and shale; residuum from shale; or slope alluvium from sandstone and shale. Soil surface texture is usually loam or clay with fine textured subsurface. It is a little (low) sagebrush – western wheatgrass – pine needlegrass community. It has an aridic ustic moisture regime. The effective precipitation ranges from 12 to 16 inches.
R048BY265CO	**Salt Meadow** R048BY265CO Salt Meadow occurs on swales, drainageways. Flood plains, and valley floor. Slopes is between 0 to 5%. Soils are very deep (60+ inches). Soils are derived from alluvium. Soil surface texture is clay loam or silty clay loam with fine textured subsurface. It is a western wheatgrass – saltgrass community.
R048BY224CO	**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. It has an aridic ustic moisture regime. The effective precipitation ranges from 12 to 16 inches.

Similar sites

R048BY221CO	**Dry Salt Flat** R048BY221CO Dry Salt Flat occurs on flood-plain steps and alluvial flats. Slopes is between 0 to 5%. Soils are deep to very deep (40 to 80 inches). Soils are derived from colluvium or residuum from sandstone. Soil surface texture is usually loam with fine-loamy textured subsurface. It is a winterfat – alkali sacaton – western wheatgrass community. It has a aridic ustic moisture regime. The effective precipitation ranges from 12 to 16 inches.

R048BY224CO	**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. It has an aridic ustic moisture regime. The effective precipitation ranges from 12 to 16 inches.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata* (2) *Sarcobatus vermiculatus*
Herbaceous	(1) *Pascopyrum smithii* (2) *Distichlis spicata*

Physiographic features

This site occurs on flat to gently sloping drainageways in Middle and North Park. The slope is no more than 5 percent. The direction of this slope is not important.

Elevation ranges from 7300 feet to 8300 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Drainageway (2) Stream terrace
Runoff class	High
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to frequent
Ponding frequency	None
Elevation	7,300–8,300 ft
Slope	0–5%
Aspect	Aspect is not a significant factor

Climatic features

Average annual precipitation is about 9 to 12 inches. Of this, approximately 50 to 60 percent falls as snow, and 40 to 50 percent falls as rain between middle of June to 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 January and February. July and August are the wettest months.

The average annual total snowfall is 57.4 inches. The snow depth usually ranges from 1 to 8.5 inches during September thru May. The highest winter snowfall record in this area is 104.9 inches which occurred in 1985-1986. The lowest snowfall record is 23.5 inches during the 1962-1963 winter.

The frost-free period typically ranges from 13 to 60 days. The last spring frost is typically the third week of June to the middle of July. The first fall frost is usually the first part of August to the end of August.

Mean daily annual air temperature ranges from about 21.6 degrees F to 52.6 degrees F, averaging about 17.8 degrees F for the winter and 56.6 degrees F in the summer. Summer high temperatures of low-70 degrees F to high-70 degrees F are not unusual.

The coldest winter temperature recorded was -49 degrees F on February 1, 1951 and the warmest winter temperature recorded was 58 degrees F on December 10, 1939. The coldest summer temperature recorded was 17 degrees F on June 4, 1898 and the warmest was 96 degrees F on August 4, 1973.

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

This zone in MLRA 48B will need to be broken up into at least two or three land resources zones in future projects based on current knowledge of precipitation and temperature patterns based on North Park-Middle Park and South Park. All the parks are Cryic. Antero Reservoir is in South Park. Gore Pass Ranch and Kremmling are in Middle Park. Walden is in North Park.

North Park (Walden) is used in the write-up above. Climatic graphs and tables below were developed using the full range of climate data from the North to South Park, so a wider variability in climate is expressed graphically.

Middle Park (Gore Pass Ranch and Kremmling) has growing season of 50-90 days; August is the wettest month; and the driest months is December thru February.

South Park (Antero Reservoir) has a growing season of 30 to 70 days with August being the wettest months and November thru January is the driest months.

Table 3. Representative climatic features

Frost-free period (characteristic range)	15-40 days
Freeze-free period (characteristic range)	62-79 days
Precipitation total (characteristic range)	11-12 in
Frost-free period (actual range)	13-51 days
Freeze-free period (actual range)	60-85 days
Precipitation total (actual range)	9-12 in
Frost-free period (average)	28 days
Freeze-free period (average)	71 days
Precipitation total (average)	12 in

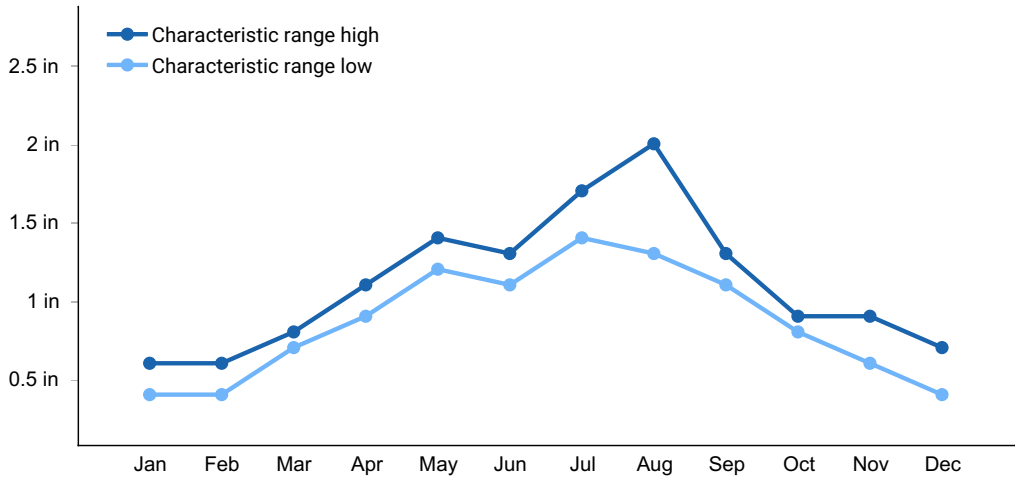


Figure 1. Monthly precipitation range

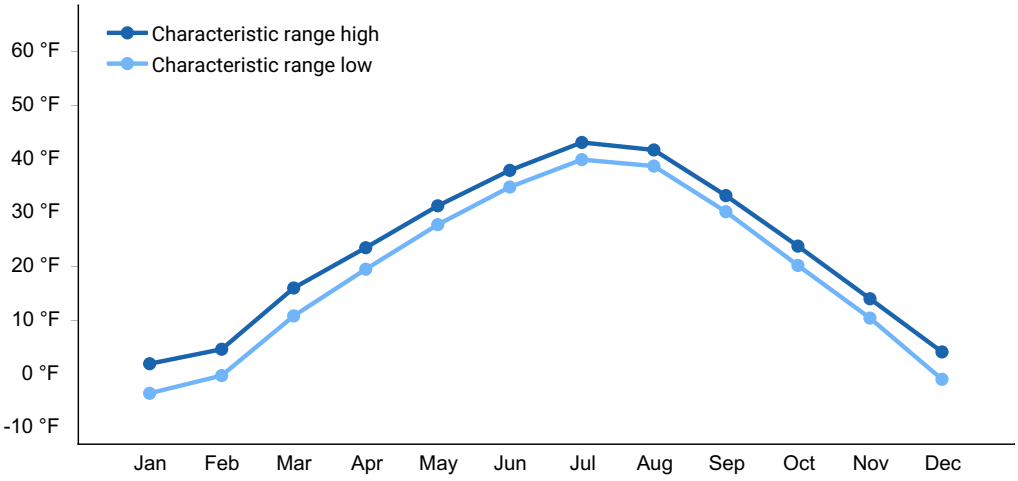


Figure 2. Monthly minimum temperature range

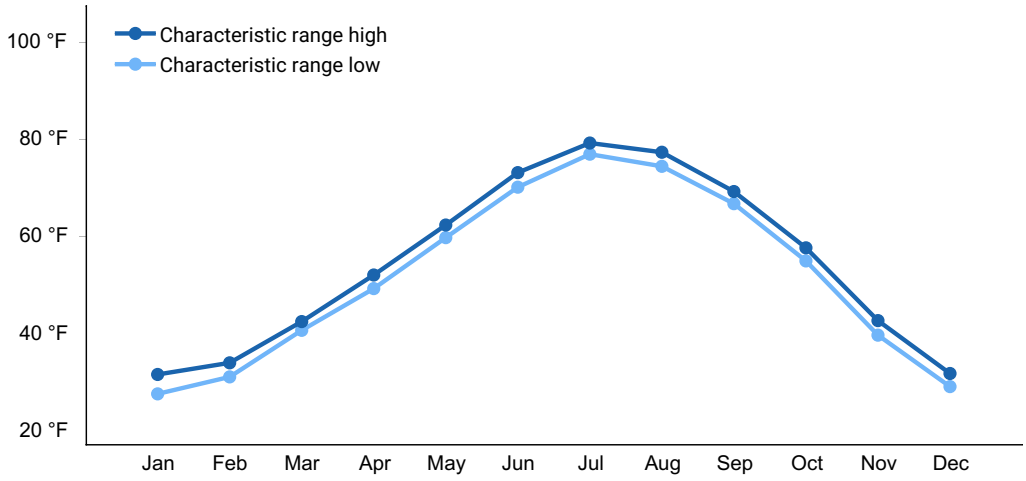


Figure 3. Monthly maximum temperature range

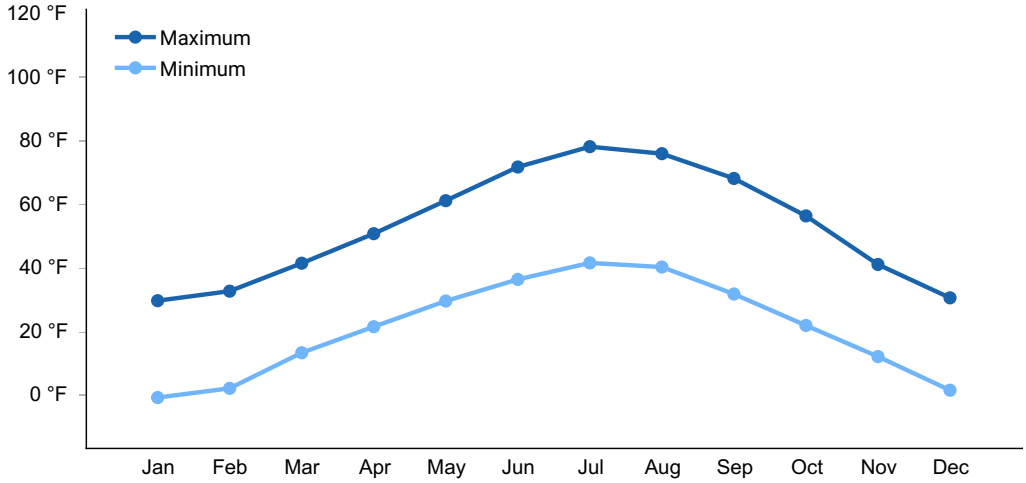


Figure 4. Monthly average minimum and maximum temperature

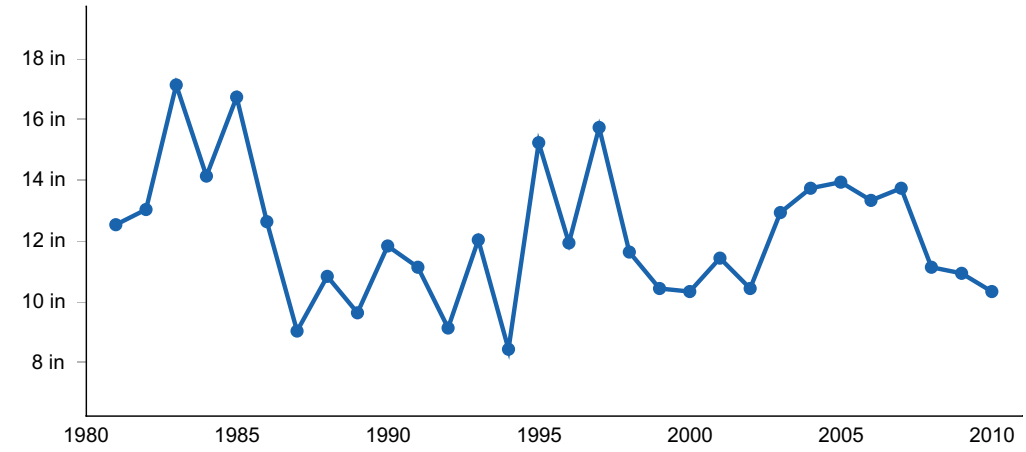


Figure 5. Annual precipitation pattern

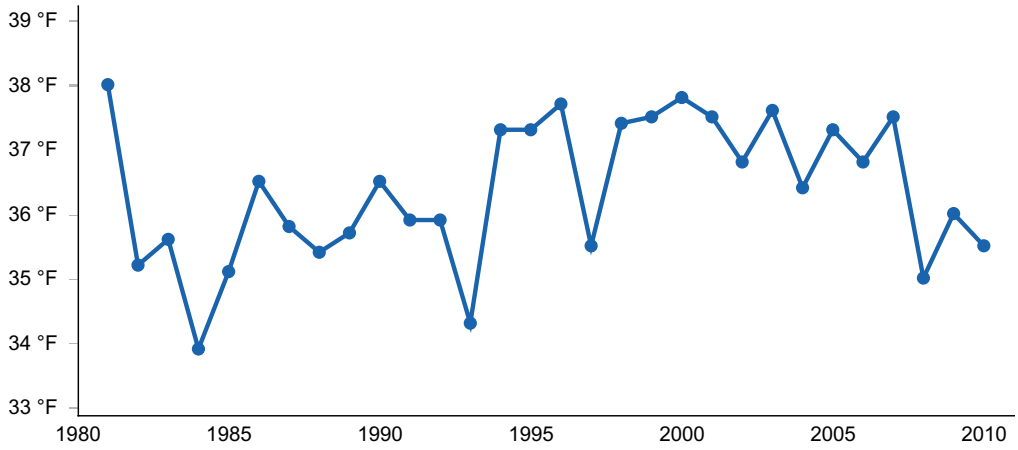


Figure 6. Annual average temperature pattern

Climate stations used

- (1) KREMMLING [USC00054664], Kremmling, CO
- (2) WALDEN [USC00058756], Walden, CO
- (3) ANTERO RSVR [USC00050263], Fairplay, CO

Influencing water features

This ecological site is located in drainageways. It receives extra moisture from surrounding uplands that drain into the area. Periodic flooding is brief as it is less than 7 days.

Wetland description

N/A

Soil features

Moderately well developed natric soils developing in strongly alkali, saline sediments, from Coalmont formation alluvium. Surface textures are usually a sandy loam. The subsurface textures include clay, silty clay loam, clay loam. The substratum materials have moderate accumulations of salt and lime. Generally low lying bottoms and drainageways subject to water accumulation. The combination of heavy soils and sodium salts are restrictive to plant growth.

Table 4. Representative soil features

Parent material	(1) Alluvium–sedimentary rock
Surface texture	(1) Sandy loam
Family particle size	(1) Fine

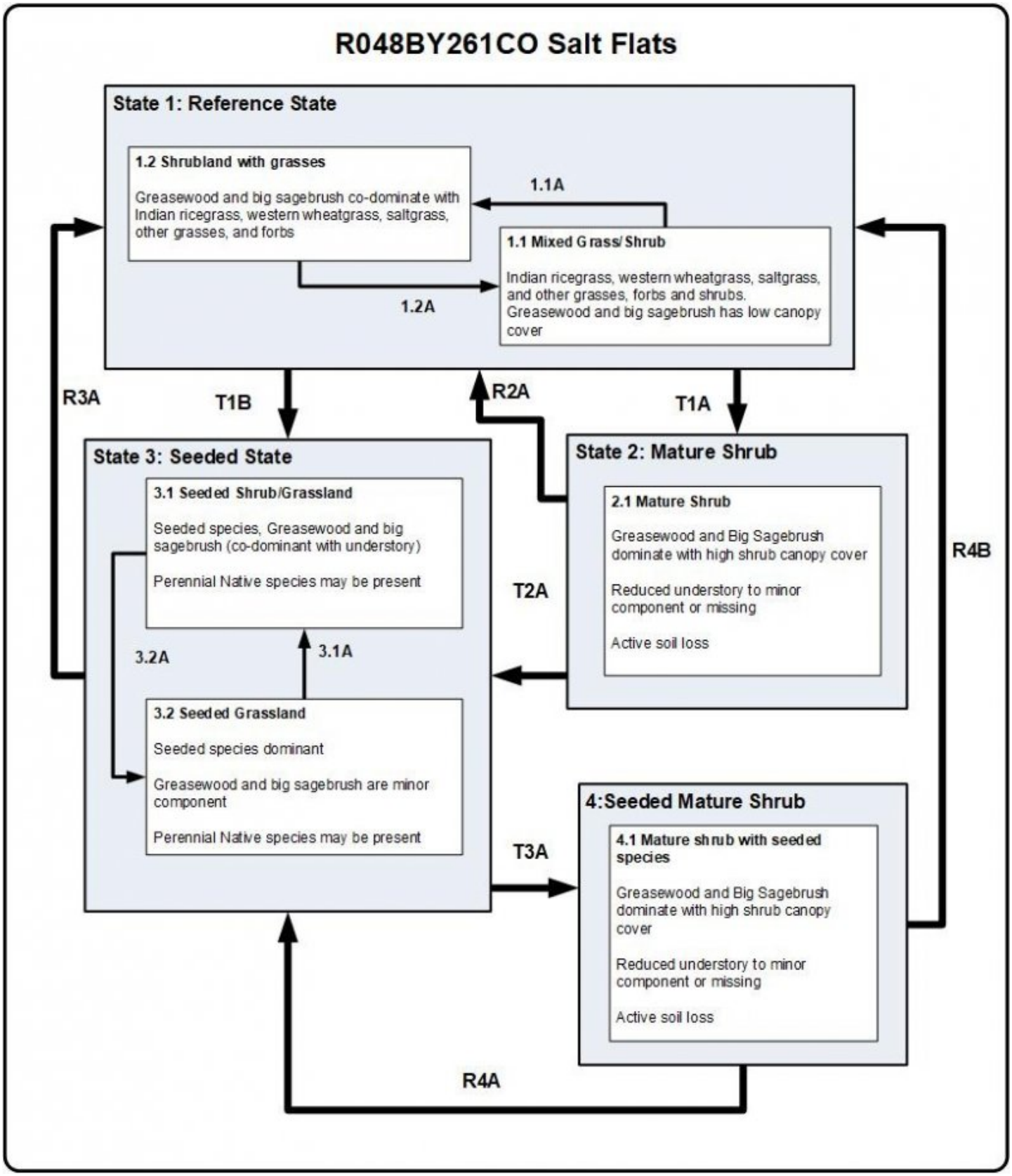
Drainage class	Moderately well drained to well drained
Permeability class	Slow
Soil depth	60–100 in
Surface fragment cover <=3"	0–15%
Available water capacity (Depth not specified)	3.5–5 in
Calcium carbonate equivalent (Depth not specified)	5–10%
Electrical conductivity (Depth not specified)	8–16 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0–15
Soil reaction (1:1 water) (Depth not specified)	8.5–9
Subsurface fragment volume <=3" (Depth not specified)	0–15%

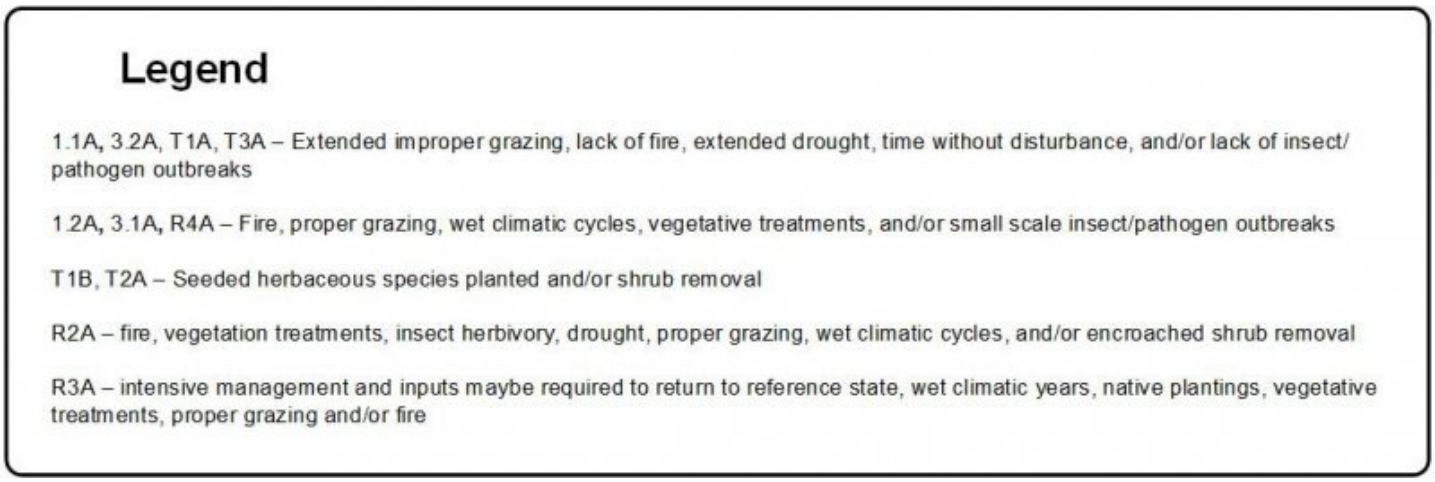
Ecological dynamics

The site has a salt tolerant grassland shrub aspect. Western wheatgrass and saltgrass are the dominant plants on the site making up nearly 75 percent of the vegetation. Other grasses and grass-likes which are native to the site are Indian ricegrass, alkali grass, rushes, sedges, and squirreltail. Forbs include owl clover and aster. Winterfat, rabbitbrush, alkali sagebrush, and greasewood are native shrubs.

This site is treeless. Optimum ground cover is 25 percent.

State and transition model


R048BY261CO Salt Flats
State 1: Reference State
1.2 Shrubland with grasses
Greasewood and big sagebrush co-dominate with Indian ricegrass, western wheatgrass, saltgrass, other grasses, and forbs
1.1A
1.1 Mixed Grass/Shrub
Indian ricegrass, western wheatgrass, saltgrass, and other grasses, forbs and shrubs. Greasewood and big sagebrush has low canopy cover
1.2A
R3A
T1B
R2A
T1A
State 3: Seeded State
3.1 Seeded Shrub/Grassland
Seeded species, Greasewood and big sagebrush (co-dominant with understory)
Perennial Native species may be present
3.2A
3.1A
3.2 Seeded Grassland
Seeded species dominant
Greasewood and big sagebrush are minor component
Perennial Native species may be present
State 2: Mature Shrub
2.1 Mature Shrub
Greasewood and Big Sagebrush dominate with high shrub canopy cover
Reduced understory to minor component or missing
Active soil loss
T2A
R4B
T3A
4:Seeded Mature Shrub
4.1 Mature shrub with seeded species
Greasewood and Big Sagebrush dominate with high shrub canopy cover
Reduced understory to minor component or missing
Active soil loss
R4A



State 1
Reference

This site is treeless. In most areas, it is covered by nearly barren spots interspersed with thin grass stands. Invaders on this site are snakeweed, foxtail barley, and introduced species. Total Annual Production: Favorable years 900 lbs/ac air dry Unfavorable years 500 lbs/ac air dry Median years 750 lbs/ac air dry

Community 1.1
Reference State

The plant list for this site was developed from information in the soil surveys which it occurs it and the NASIS plant tables.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	350	540	630
Shrub/Vine	125	175	225
Forb	25	35	45
Total	**500**	**750**	**900**

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**			400–600	
	western wheatgrass	PASM	*Pascopyrum smithii*	75–150	–
	saltgrass	DISP	*Distichlis spicata*	75–150	–
	Sandberg bluegrass	POSE	*Poa secunda*	50–90	–
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	50–90	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	50–90	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	25–50	–
Forb					
2	**Forbs**			25–50	
	Forb, native	2FN	*Forb, native*	5–50	–
Shrub/Vine					
3	**Shrubs**			100–250	
	big sagebrush	ARTR2	*Artemisia tridentata*	50–90	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	25–50	–
	mat saltbush	ATCO4	*Atriplex corrugata*	25–50	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	25–50	–

Animal community

Grazing:
This site has a high value rating for cattle and horses, and a low value rating for sheep.

Wildlife:
This site has a high value rating for cottontail, jackrabbit, and upland game birds. It has a medium value rating for antelope and bison. It has a low value rating for elk and waterfowl, and is not applicable for bison.

Hydrological functions

Watershed on this site has a low value rating due to small are of rapid runoff.

Recreational uses

This site has a medium value rating for recreation and natural beauty.

Wood products

Not applicable for this site.

Other information

Rare. Threatened or Endangered Plants and Animals:
None identified at this time.

Location of Typical Example of the Site:
John Mallon Ranch (Bureau of Land Management range) three miles southwest of Walden.

Field Offices in Colorado where the site occurs:
Kremmling
Walden

Inventory data references

This site is mapped in North Park.

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.

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

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Contributors

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Approval

Kirt Walstad, 4/09/2025

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	04/09/2025
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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

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

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

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

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

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

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:

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17. **Perennial plant reproductive capability:**
