

Ecological site R048BY272CO Sandy Bench

Last updated: 9/07/2023
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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

R048BY272CO Sandy Bench occurs on ridges, hill, dune, terraces, and outwash plains. Slopes is between 0 to 10%. Soils are very deep (60 inches or greater). Soils are derived from alluvium and eolian sands. Soil surface texture is usually sandy loam or fine sand with sandy or sandy-skeletal textured subsurface. It is a Wyoming big sagebrush – western wheatgrass – upland sedges. It has an aridic ustic moisture regime. The effective precipitation ranges from 12 to 16 inches.

Associated sites

R048BY270CO	Valley Bench R048BY270CO Valley Bench occurs on alluvial fans. Slopes is between 2 to 15%. Soils are moderately deep (20 to 40 inches). Soils are derived from colluvium from sandstone. Soil surface texture is usually sandy loam with fine-loamy textured subsurface. It is a Wyoming big sagebrush – pine needlegrass – prairie Junegrass community. It has an ustic aridic moisture regime. The effective precipitation ranges from 9 to 12 inches.
R048BY231CO	Dry Mountain Loam R048BY231CO Dry Mountain Loam occurs on alluvial fans, valley sides, mountainsides, fans, terraces, and outwash plains. Slopes is between 0 to 30%. Soils are moderately deep to very deep (20 to 60 inches). Soils are derived from alluvium from sedimentary rock; colluvium from basalt or sandstone; or outwash. Soil surface texture is usually loam or with fine-loamy textured subsurface. It is a Wyoming big sagebrush – needlegrass – bluebunch wheatgrass community.
R048BY241CO	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.
R048AY244CO	Mountain Shale R048AY244CO Mountain Shale occurs on valley sides, mountain sides and fans. Slopes is between 2 to 35%. Soils are moderately deep to deep (20 to 60+ inches). Soils are derived from alluvium from shale and mudstone, and/or residuum from shale and mudstone. Soil surface texture is clay loam, clay or stony clay with a 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

R048BY225CO	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.
R048BY270CO	Valley Bench R048BY270CO Valley Bench occurs on alluvial fans. Slopes is between 2 to 15%. Soils are moderately deep (20 to 40 inches). Soils are derived from colluvium from sandstone. Soil surface texture is usually sandy loam with fine-loamy textured subsurface. It is a Wyoming big sagebrush – pine needlegrass – prairie Junegrass community. It has an ustic aridic moisture regime. The effective precipitation ranges from 9 to 12 inches.
R048BY231CO	Dry Mountain Loam R048BY231CO Dry Mountain Loam occurs on alluvial fans, valley sides, mountainsides, fans, terraces, and outwash plains. Slopes is between 0 to 30%. Soils are moderately deep to very deep (20 to 60 inches). Soils are derived from alluvium from sedimentary rock; colluvium from basalt or sandstone; or outwash. Soil surface texture is usually loam or with fine-loamy textured subsurface. It is a Wyoming big sagebrush – needlegrass – bluebunch wheatgrass community.

Table 1. Dominant plant species

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

Physiographic features

The topography is gently sloping and undulating to moderately steep benches. Slopes range from level to 10 percent.

Elevation ranges from 7900 to 8500 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Ridge (2) Hill (3) Dune (4) Terrace (5) Outwash plain
Runoff class	Very low to low
Flooding frequency	None
Ponding frequency	None
Elevation	7,900–8,500 ft
Slope	0–10%
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 1 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 2 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.

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)	14-15 in
Frost-free period (actual range)	8-85 days
Freeze-free period (actual range)	50-96 days
Precipitation total (actual range)	12-16 in
Frost-free period (average)	41 days
Freeze-free period (average)	78 days
Precipitation total (average)	14 in

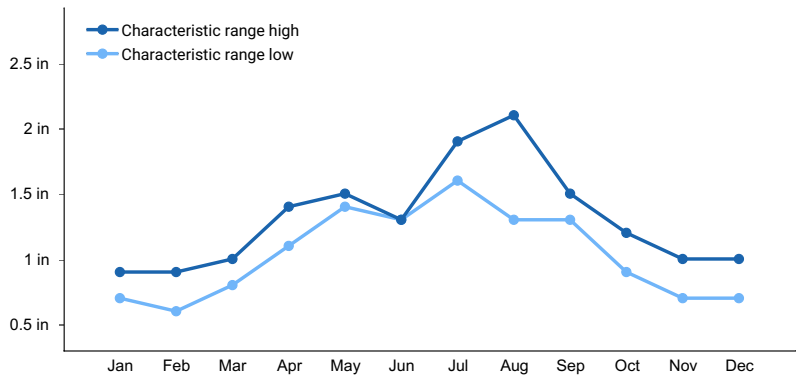


Figure 1. Monthly precipitation range

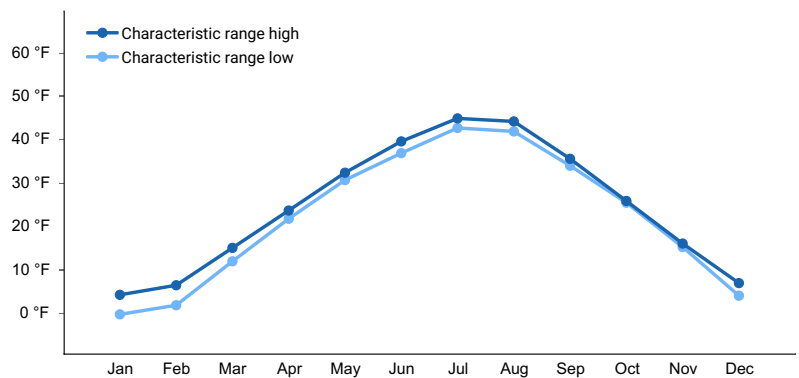


Figure 2. Monthly minimum temperature range

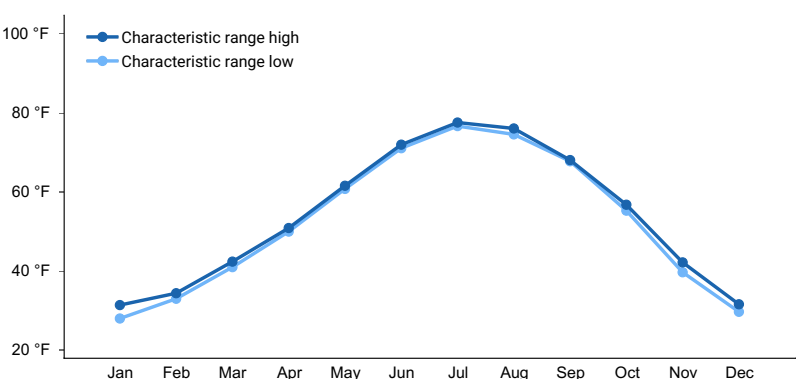


Figure 3. Monthly maximum temperature range

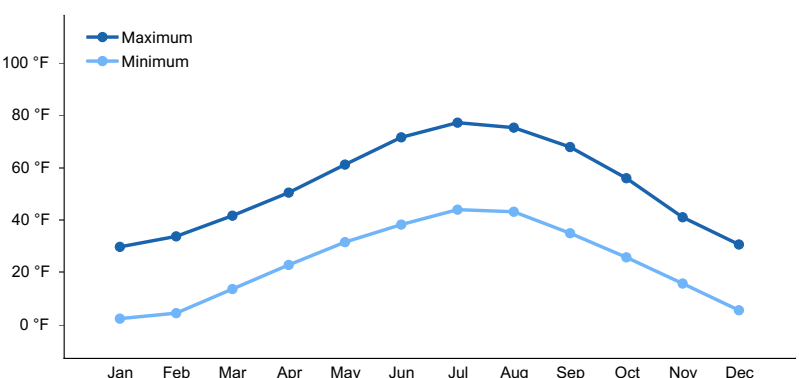


Figure 4. Monthly average minimum and maximum temperature

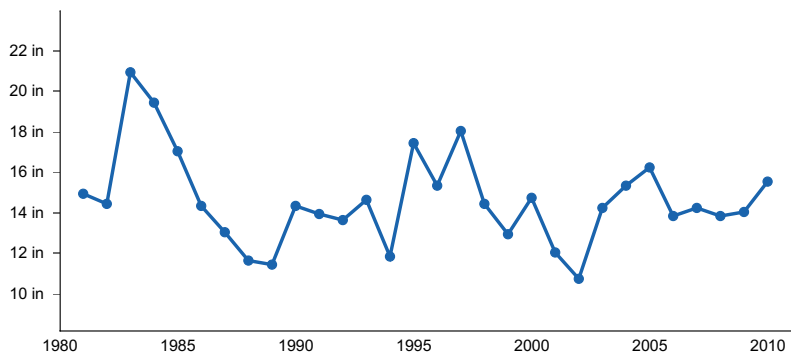


Figure 5. Annual precipitation pattern

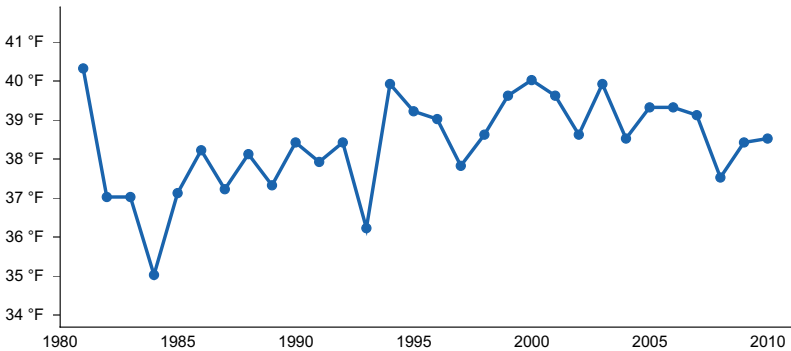


Figure 6. Annual average temperature pattern

Climate stations used

- (1) 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

None.

Wetland description

N/A

Soil features

Deep, somewhat excessively drained, dark colored loamy sands to fine sands developing in sandy and gravelly outwash materials or in non-calcareous fine sand of aeolian origin. Water intake rate is rapid and water holding capacity is low. Plant growth is directly related to amount and pattern of precipitation. Some wind erosion may occur, especially in the dune areas. Blowouts develop quickly in overgrazed areas.

Soils of this site are:

- Tine loamy sand
- Bangston fine sand

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Eolian sands
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Surface texture	(1) Sandy loam (2) Fine sand
Family particle size	(1) Sandy (2) Sandy-skeletal
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately rapid
Soil depth	60–100 in
Surface fragment cover ≤3"	0–10%
Surface fragment cover >3"	0–5%
Available water capacity (Depth not specified)	2–3 in
Soil reaction (1:1 water) (Depth not specified)	6.1–7.3
Subsurface fragment volume ≤3" (Depth not specified)	0–30%
Subsurface fragment volume >3" (Depth not specified)	0–5%

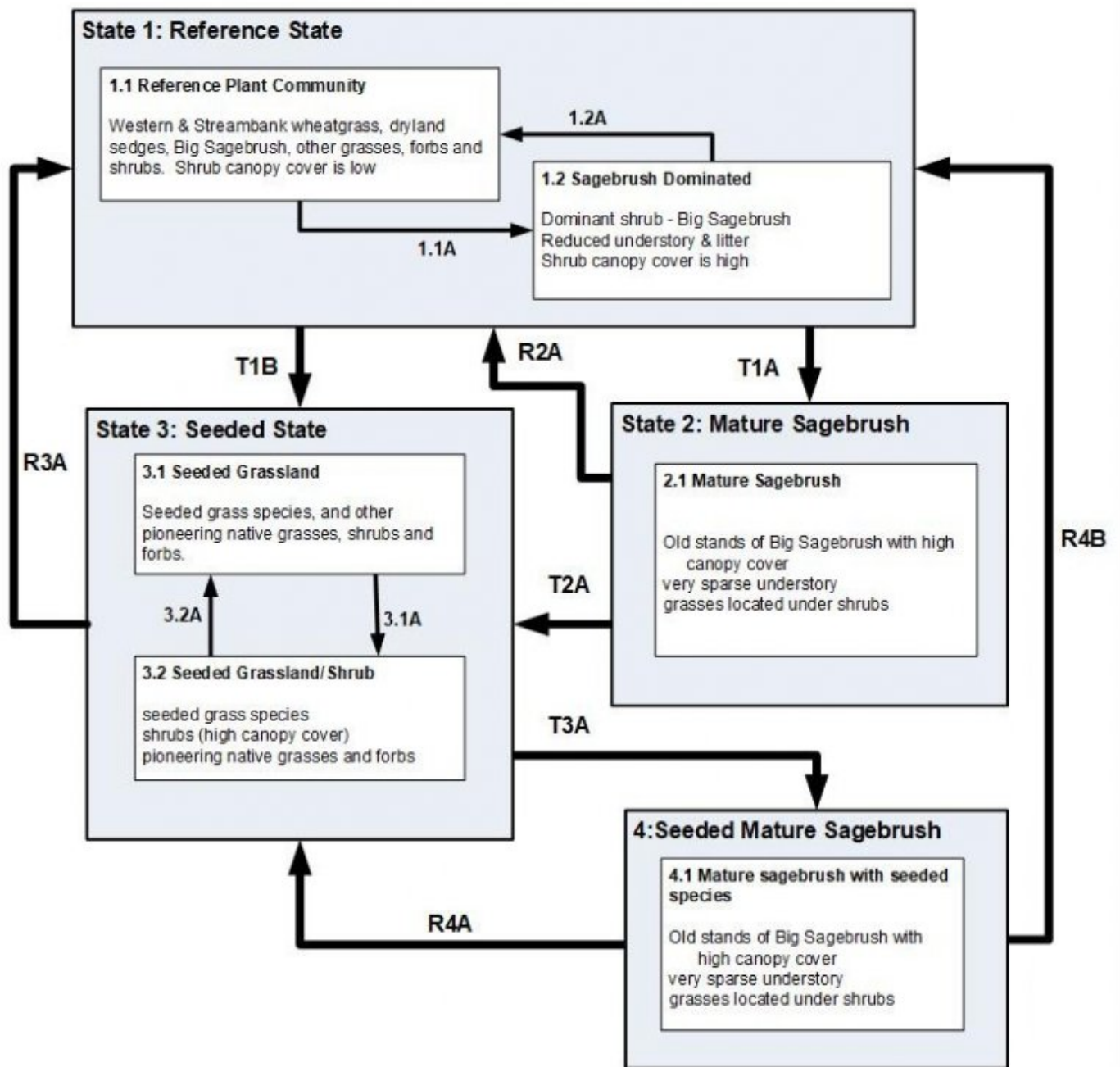
Ecological dynamics

This site has a slightly stunted sagebrush-grassland aspect. Western and streambank wheatgrass are dominant on the site. Lesser amounts of sedges, prairie Junegrass, muttongrass, needle and thread, Indian ricegrass, pine needlegrass, bluebunch wheatgrass, Nevada bluegrass, Sandberg bluegrass, nodding brome, plains reedgrass, bottlebrush squirreltail, blue grama, and slimstem muhly occur. Forbs include buckwheat, rose pussytoes, phlox, nailwort, pingue, groundsel, hairy goldaster, fringed sagewort, bluebells, wallflower, aster, Indian paintbrush, penstemon, lupine, gillia, and low larkspur. Shrubs include big sagebrush, rubber rabbitbrush, yellow rabbitbrush, chokecherry, Saskatoon serviceberry, and Wood's rose.

Trees do not grow naturally on this site.

State and transition model

R048BY272CO Sandy Bench



Legend

1.1A, 3.1A, T1A, T3A – Extended improper grazing, lack of fire, extended drought, time without disturbance, and/or lack of insect/pathogen outbreaks

1.2A, 3.2A – Fire, proper grazing, wet climatic cycles, vegetative treatments, and/or small scale insect/pathogen outbreaks

T1B, T2A – Seeded herbaceous species planted and/or shrub removal

R2A – fire, vegetation treatments, insect herbivory, drought, proper grazing, and/or encroached shrub removal

R3A, R4B – intensive management and inputs maybe required to return to reference state, wet climatic years, native plantings, vegetative treatments, proper grazing and/or fire

R4A – Fire, proper grazing, wet climatic cycles, small scale insect/pathogen outbreaks and/or seeding, vegetative treatments

State 1

Reference State

Ground cover is 20 percent. Total Annual Production Favorable years - 1,200 pounds per acre air dry Unfavorable years - 500 pounds per acre air dry Median years - 850 pounds per acre air dry

Community 1.1

Reference Plant Community

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	180	420	650
Shrub/Vine	240	300	375
Forb	80	130	175
Total	500	850	1200

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	Grasses			340–510	
	thickspike wheatgrass	ELLA3	<i>Elymus lanceolatus</i>	200–300	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	200–300	–
	sedge	CAREX	<i>Carex</i>	45–85	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	40–80	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	40–80	–
	muttongrass	POFE	<i>Poa fendleriana</i>	25–45	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	25–45	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	15–40	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	15–40	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	15–40	–
Forb					
2	Forbs			85–170	
	rosy pussytoes	ANRO2	<i>Antennaria rosea</i>	15–40	–
	buckwheat	ERIOG	<i>Eriogonum</i>	15–40	–
	mat penstemon	PECA4	<i>Penstemon caespitosus</i>	20–35	–
	phlox	PHLOX	<i>Phlox</i>	20–35	–
Shrub/Vine					
3	Shrubs			255–340	
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	85–170	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	45–85	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	45–85	–

Animal community

INTERPRETATIONS FOR GRAZING ANIMALS:

This site provides a medium value rating for cattle, sheep, and horses.

INTERPRETATIONS FOR WILDLIFE:

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

Hydrological functions

The site offers a medium value rating for watershed.

Recreational uses

The site offers a medium value rating for recreation and natural beauty.

Wood products

No wood products are produced on this site.

Other information

Rare, Threatened, or Endangered Plants and Animals:
(To be added when known)

Field offices where the site occurs:
Fort Collins and Walden

Other references

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Contributors

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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	05/12/2025
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:**
