USDA Natural Resources Conservation Service

Ecological site R048BY225CO
Mountain Loam 10-16 PZ South Park

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

R048BY225CO Mountain Loam 10 to 16 inches South Park occurs fan remnants, pediments and hills. Slopes is between one to 25 percent. Soils are deep to very deep (40 to 80 inches). Soils are derived from alluvium; slope alluvium from volcanic breccia, limestone, sandstone, and 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. It has an aridic ustic moisture regime. The effective precipitation ranges from 10 to 16 inches.

Associated sites

R048BY268CO	**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.
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.
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.
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.

R048BY227CO	**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.
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.
R048AY377CO	**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.
R048BY280CO	**Dry Mountain Swale** R048BY280CO Dry Mountain Swale occurs on alluvial flat, stream terraces, drainageways, flood plains and flood-plain steps. Slopes is between 0 to 5%. Soils are very deep (60+ inches). 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.
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. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.

Similar sites

R048BY227CO	**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.
R048BY222CO	**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.

R048AY228CO	**Mountain Loam** R048AY228CO Mountain Loam occurs mainly alluvial fans, mountain slopes, benches, terraces, or hills. Slopes average between 5 and 10% but can range from 0 to 30%. Soils are moderately deep to deep (20-60 inches) loamy soils derived from residuum from igneous and metamorphic rocks or sandstone and shale; slope alluvium from sandstone and shale, or igneous and metamorphic rocks; colluvium from igneous and metamorphic rocks or sandstone and shale, and/or alluvium from igneous and metamorphic rocks. Soil surface texture are loam, sandy loam or silt loam with loamy subsurface. It is a mountain big sagebrush -Arizona fescue community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 20 inches.
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	Not specified
Herbaceous	(1) *Festuca arizonica* (2) *Pascopyrum smithii*

Physiographic features

This site occurs on the broad flat tops of fan remnants, pediments and hills of the high inter-mountain parks. Elevation ranges from 8600 to 9600 feet. Slopes ranges from nearly level to 25 percent.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant (2) Pediment (3) Hill
Runoff class	Low to medium
Flooding frequency	None
Ponding frequency	None
Elevation	8,600–9,600 ft
Slope	1–25%

Climatic features

The climate is semi arid with precipitation averaging 10 to 16 inches (25 to 42 centimeters). The approximate growing season for the native plant community averages 60 to 80 days or from June to August. About 50 percent of the 16 inches (41 cm) of annual precipitation falls in the form of rain during the frost free season. There are 4 or 5 days per year the precipitation equals or exceeds one half inches (1.3 cm), and only one rain at or above one inch (2.6 cm).

The average annual temperature is 36 degrees F. (2.2 degrees C). Temperatures fall below the freezing mark much of the time in September thru May. Frosts can occur from September 1 through June 15th.

When sufficient moisture exists, cool-season grasses such as western wheatgrass bottlebrush squirreltail, and Arizona fescue begin rapid growth in May and June. Mountain muhly and slimstem muhly begin rapid growth during July. Warm-season grasses such as blue grama produce very little growth.

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. This

site only occurs in the Land Resource Unit covering the geographic area of South Park.

South Park has a growing season of 20 to 96 days with July and August being the wettest months and January is the driest month. Lake George 8 SW

Table 3. Representative climatic features

Frost-free period (characteristic range)	28-62 days
Freeze-free period (characteristic range)	67-90 days
Precipitation total (characteristic range)	12-14 in
Frost-free period (actual range)	20-70 days
Freeze-free period (actual range)	61-96 days
Precipitation total (actual range)	10-16 in
Frost-free period (average)	45 days
Freeze-free period (average)	79 days
Precipitation total (average)	13 in

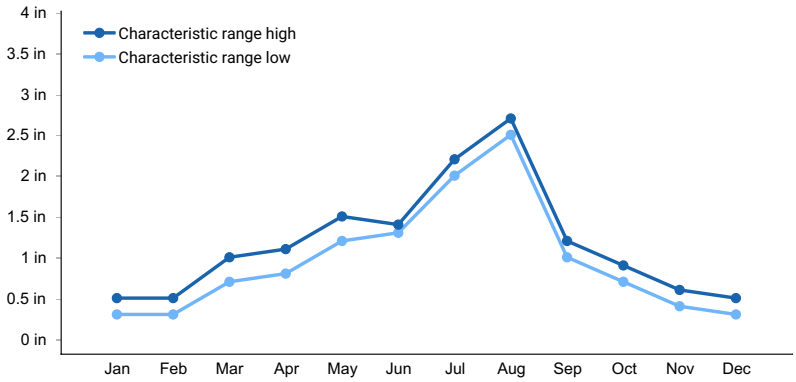


Figure 1. Monthly precipitation range

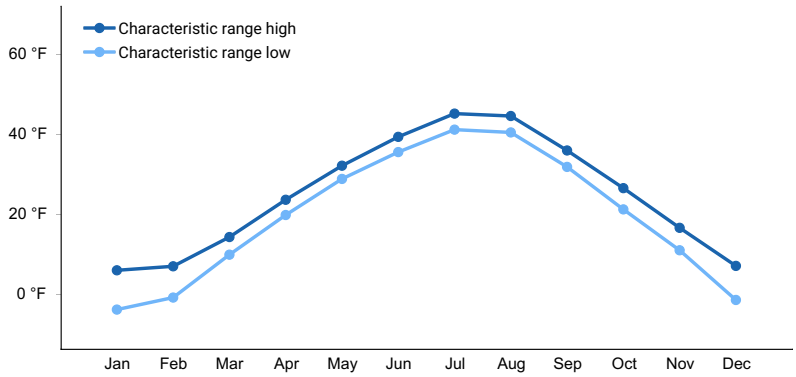


Figure 2. Monthly minimum temperature range

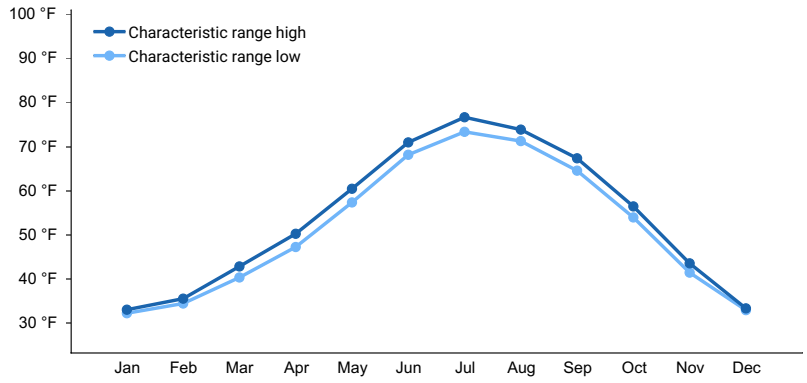


Figure 3. Monthly maximum temperature range

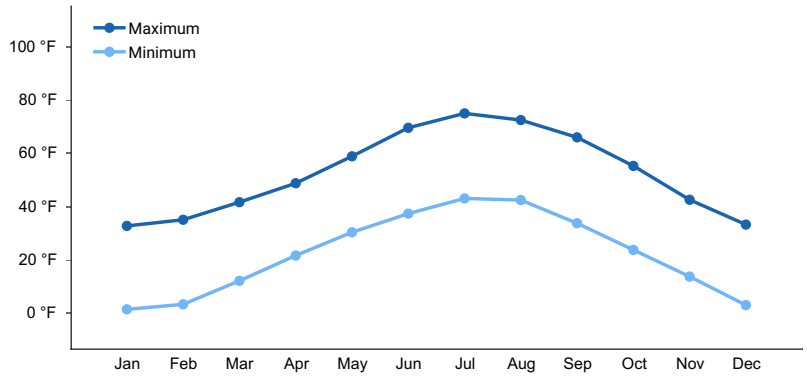


Figure 4. Monthly average minimum and maximum temperature

Climate stations used

- (1) ANTERO RSVR [USC00050263], Fairplay, CO
- (2) LAKE GEORGE 8 SW [USC00054742], Lake George, CO
- (3) FAIRPLAY S PARK RD [USC00052816], Fairplay, CO

Influencing water features

None

Wetland description

N/A

Soil features

This site occurs on moderately deep to very deep soils that have formed from alluvium, slope alluvium and outwash terraces. Typically the surface soils are loam or sandy loam wit only minor amounts of gravel or cobbles on the surface, Subsoils are gravelly or very gravelly sandy clay loam or sandy loam. Substratum vary from very gravelly sandy loam to extremely cobbly sandy clay loam.

Associated soils with this site included:

Fine-Loamy Soils: Gebsob, Glentivar and Kenosha

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Slope alluvium (3) Slope alluvium–limestone, sandstone, and shale (4) Slope alluvium–limestone and sandstone (5) Slope alluvium–volcanic breccia

Surface texture	(1) Loam (2) Sandy loam
Family particle size	(1) Fine-loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	20–100 in
Surface fragment cover <=3"	0–5%
Available water capacity (Depth not specified)	2–5 in
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)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–20%

Ecological dynamics

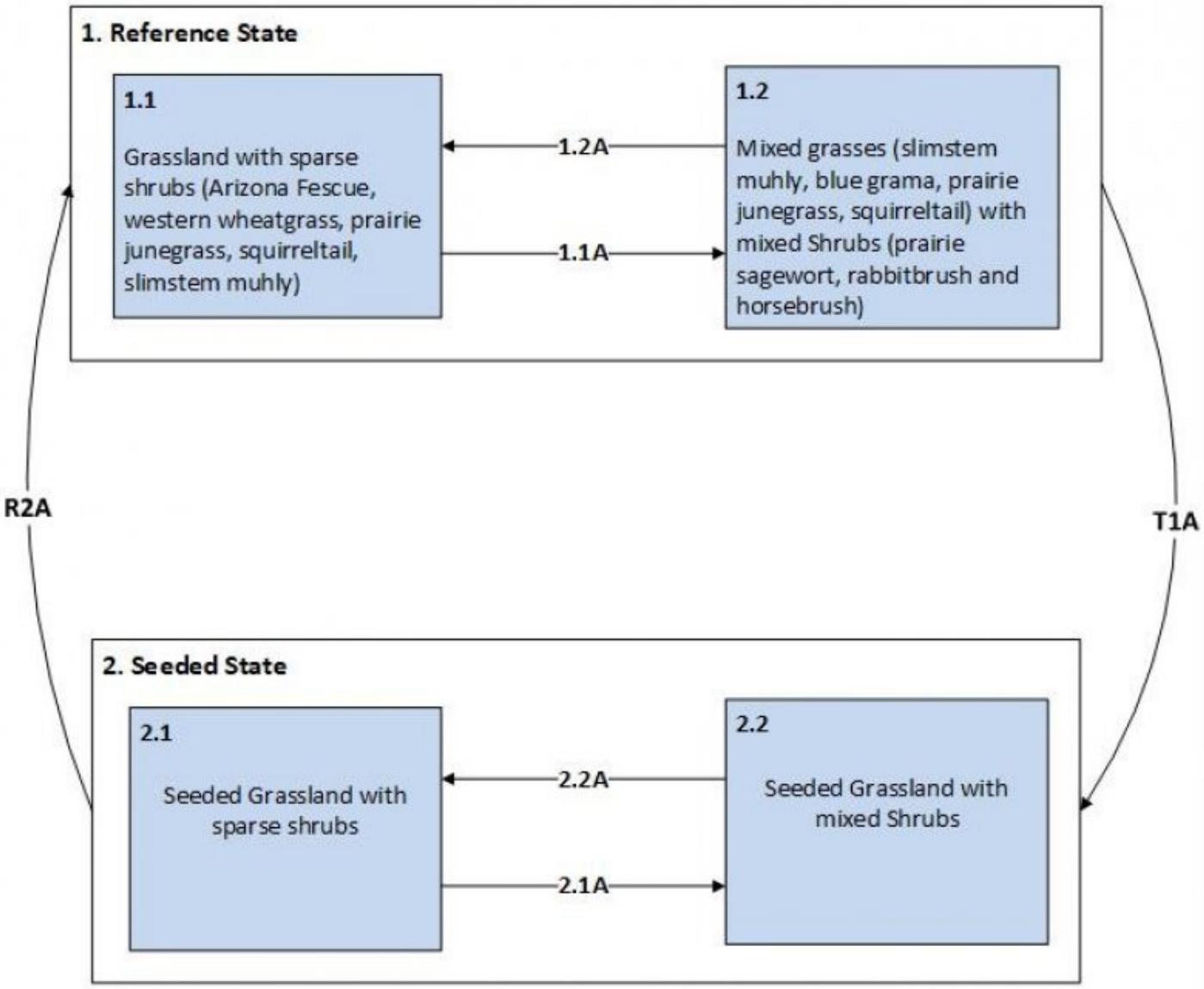
The plant community is about 85 percent grass, 5 percent forbs, and 10 percent half shrubs., air dry weight. Arizona fescue and western wheatgrass co-dominate this site with lesser amounts of prairie Junegrass, bottlebrush squirreltail, and needle and thread grass. Minor amounts of blue grama and· slimstem muhly are also present.

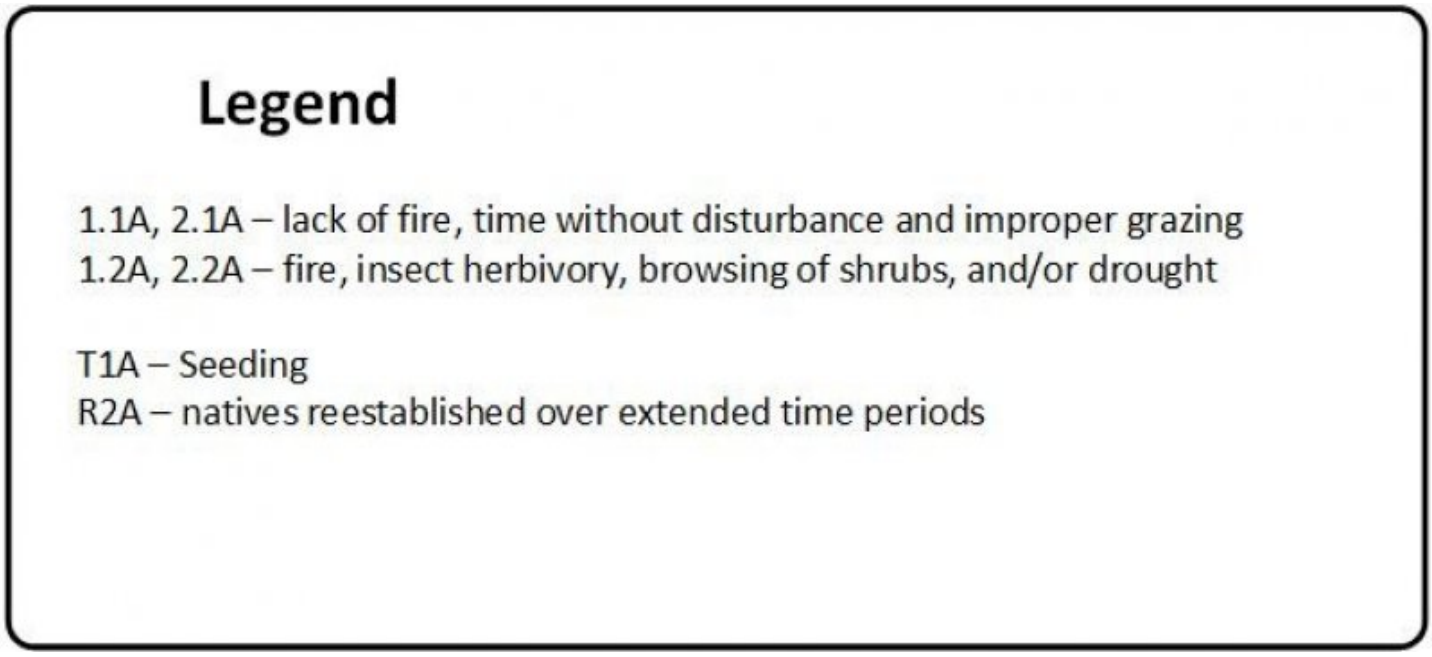
Forbs in the plant community include Oregon fleabane daisy, trailing fleabane, senecio spp., plains erysimum, wholeleaf paintedcup, shorts milkvetch, silky crazyweed, yellow eriogonum, and rose pussytoes.

Shrubs and half shrubs that occur on this site are desert low rabbitbrush, gray horsebrush, fringed sage, Howards rabbitbrush, and winterfat. Trace amounts of small soapweed (Yucca) and Snowball cactus also occur.

State and transition model

Mountain Loam 10-16"
R048BY225CO





State 1
Reference State

If ecological retrogression is cattle or elk induced desirable grasses decrease. Under continuous early spring grazing, western wheatgrass and Arizona Fescue will decrease relatively fast. Bottlebrush squirreltail, and prairie junegrass will initially increase, but with continued season long grazing, these too will decline giving room for slimstem muhly and blue grama to invade. With retrogression, shrubs and half shrubs, such as desert low rabbitbrush and gray horsebrush increase along with forbs such as Oregon townsend daisy, shorts milkvetch, senecio species, and yellow eriogonum. Basal area (the area of ground surface covered by the perennial vegetation measured one inch above the soil) is approximately 30 percent.

Community 1.1
Reference State

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	375	525	710
Shrub/Vine	100	140	190
Forb	25	35	50
Total	**500**	**700**	**950**

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**			400–650	
	Arizona fescue	FEAR2	*Festuca arizonica*	100–176	–
	western wheatgrass	PASM	*Pascopyrum smithii*	100–175	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	70–105	–
	squirreltail	ELEL5	*Elymus elymoides*	20–35	–
	slimstem muhly	MUFI	*Muhlenbergia filiculmis*	20–35	–
	blue grama	BOGR2	*Bouteloua gracilis*	5–30	–
	needle and thread	HECO26	*Hesperostipa comata*	0–20	–
Forb					
2	**Forbs**			25–75	
	trailing fleabane	ERFL	*Erigeron flagellaris*	0–19	–
	pingue rubberweed	HYRI	*Hymenoxys richardsonii*	0–19	–
	aspen fleabane	ERSP4	*Erigeron speciosus*	5–15	–
	white locoweed	OXSE	*Oxytropis sericea*	0–10	–
	Short's milkvetch	ASSH3	*Astragalus shortianus*	0–10	–
	wholeleaf Indian paintbrush	CAIN14	*Castilleja integra*	0–10	–
	western wallflower	ERAS2	*Erysimum asperum*	0–10	–
	James' buckwheat	ERJAX	*Eriogonum jamesii var. xanthum*	0–10	–
	annual buckwheat	ERAN4	*Eriogonum annuum*	0–10	–
	rosy pussytoes	ANRO2	*Antennaria rosea*	0–10	–
Shrub/Vine					
3	**Shrubs**			75–200	
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	25–45	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	20–35	–
	prairie sagewort	ARFR4	*Artemisia frigida*	20–35	–
	Parry's rabbitbrush	ERPAH	*Ericameria parryi var. howardii*	5–30	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	5–15	–
	mountain ball cactus	PESI	*Pediocactus simpsonii*	0–10	–
	soapweed yucca	YUGL	*Yucca glauca*	0–10	–

Animal community

This site provides excellent grazing value for livestock where adequate livestock water is available. Continuous, season long grazing by cattle causes more palatable grasses t be replaced by less desirable grasses like slimstem muhly. A system of grazing which encourages short periods of grazing followed by longer periods of rest id needed to prevent retrogression and loss of productivity. Deferments occurring in the spring benefits cool season plants, especially western wheatgrass and Arizona fescue.

This range site provides habitat for a resident animal community that is characterized by small mammals and birds, and pronghorn antelope. This site provides valuable winter forage for elk.

Inventory data references

Along the Badger Creek Road approximately one half mile north of Antelope Gulch, Sec. 11 R10E, T51N, in Fremont County.

Other references

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Approval

Kirt Walstad, 9/07/2023

Acknowledgments

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Those involved in developing earlier versions of this site description include: Bob Rayer, retired NRCS Soil Scientist; Herman Garcia, retired CO State RMS and NRCS MLRA Ecological Site Specialist-QA Phoenix, AZ.

--Site Development and Testing Plan--:

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

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

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

Rangeland health reference sheet

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

Author(s)/participant(s)	Ben Berlinger, Kim Diller, Mike Cassell, Stephanie Mendoza
Contact for lead author	
Date	05/22/2006
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Typically none

2. **Presence of water flow patterns:** None to minimal on gentle slopes. Flow paths should be broken, irregular in appearance with obstructions altering flow path.

3. **Number and height of erosional pedestals or terracettes:** None

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 5% or less bare ground, with bare patches generally less than 3 inches. Extended drought may increase bare ground up to 10%.

5. **Number of gullies and erosion associated with gullies:** None

6. **Extent of wind scoured, blowouts and/or depositional areas:** None

7. **Amount of litter movement (describe size and distance expected to travel):** Minimal and short. Litter movement is associated with water flow patterns.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Stability class rating anticipated to be 5-6 at soil surface. Soil surface is stabilized by decomposing organic matter.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil organic matter ranges from 2-4%. Soils are deep and well drained. Surface texture is a sandy loam to a gravelly loam A-horizon ranges from 0-5 inches in depth, dark brown and has a weak fine granular to a weak coarse platy structure. Surface soil may contain 5-10% gravel and up to 5% cobbles.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Cover from bunchgrasses, sod forming grasses, forbs, and shrubs reduce bare ground. Raindrop impact is reduced as well as overland flow, providing increased time for infiltration to occur. Extended drought may reduce mid bunchgrass basal cover resulting in decreased infiltration and increased runoff following intense storms.

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

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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: cool season bunchgrass

    Sub-dominant: cool season rhizomatous grass> shrubs

    Other: warm season bunchgrass > forbs grasslikes = legumes

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Typically minimal. Expect slightly more bunchgrass mortality during and following drought. Lack of disturbance will increase
occurrence of decadence.

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14. **Average percent litter cover (%) and depth (in):** 30-40% litter cover. Litter cover can range up to .25 inches in depth. Litter cover during and following extended drought decreases to 10-20%.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 400 lbs.lac. low precipitation years; 750 lbs.lac. average precipitation years; 1,000 lbs.lac. high precipitation years. After extended drought, production may be significantly reduced by 200-300 lbs./ac.

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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:** Invasive plants should not occur in the reference plant community. Species that become

dominant for only one to several years (e.g., short-term response to drought) are not invasive plants.

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17. **Perennial plant reproductive capability:** The only limitations are weather-related, natural disease, and insects that may temporarily reduce reproductive capability.
