USDA Natural Resources Conservation Service

Ecological site R048AY406UT
Mountain Loam (Shrub)

Last updated: 3/05/2024
Accessed: 05/10/2025

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): 048A–Southern Rocky Mountains

MLRA 48A makes up about 45,920 square miles (119,000 square kilometers) and is the southern part of the Rocky Mountains. The Southern Rocky Mountains lies east of the Colorado Plateau, south of the Wyoming Basin, west of the Great Plains, and north of the Rio Grande Rift. It is in western and central Colorado, southeastern Wyoming, eastern Utah, and northern New Mexico. The headwaters of major rivers such as the Colorado, Yampa, Arkansas, Rio Grande, North Platte and South Plate rivers are located here. This MLRA has numerous national forests, including the Medicine Bow National Forest in Wyoming; the Routt, Arapaho, Roosevelt, Pike, San Isabel, White River, Gunnison, Grand Mesa, Uncompahgre, Rio Grande, and San Juan National Forests in Colorado; the Carson National Forest and part of the Santa Fe National Forest in New Mexico. Rocky Mountain National Park also is in this MLRA.

MLRA 48A is the southern Rocky Mountains physiographic region. The Southern Rocky Mountains consist primarily of two belts of strongly sloping to precipitous mountain ranges trending north to south. Several basins, or parks, are between the belts. Some high mesas and plateaus are included. It is characterized by mountain ranges that were uplifted during the Laramide Orogeny and then had periods of glaciation. The ranges include the Sangre de Cristo Mountains, the Laramie Mountains, and the Front Range in the east and the San Juan Mountains and the Sawatch and Park Ranges in the west. The ranges are dissected by many narrow stream valleys having steep gradients. In some areas the upper mountain slopes and broad crests are covered by snowfields and glaciers. Elevation typically ranges from 6,500 to 14,400 feet (1,980 to 4,390 meters) in this area. The part of this MLRA in central Colorado includes the highest point in the Rockies, Mount Elbert, which reaches an elevation of 14,433 feet (4,400 meters). More than 50 peaks in the part of the MLRA in Colorado are at an elevation of more than 14,000 feet (4,270 meters). Many small glacial lakes are in the high mountains.

The mountains in this area were formed mainly by crustal uplifts during the late Cretaceous and early Tertiary periods. This large MLRA can be subdivided into at least 4 large general divisions. First is the Rockies on the east side of this area are called the “Front Range,” which is a fault block that has been tilted up on edge and uplifted and is largely igneous and metamorphic geology. It was tilted up on the east edge, so there is a steep front on the east and the west side is more gently sloping and in the south east there are rocks exposed in the mountains are mostly Precambrian igneous and metamorphic rocks. Second is the tertiary rocks, primarily basalt and andesitic lava flows, tuffs, breccias, and conglomerates, are throughout this area (San Juan Mountains Area). The third division is Northwest part of the MLRA is dominantly sedimentary rock from the cretaceous/tertiary and Permian/ Pennsylvanian periods. The fourth subset is the long and narrow Sangre de Cristos mountains uplifted in the Cenozoic are between the Rio Grande rift and the great plains. Many of the highest mountain ranges were reshaped by glaciation during the Pleistocene. Alluvial fans at the base of the mountains are recharge zones for local basin and valley fill aquifers. They also are important sources of sand and gravel.

The average annual precipitation ranges predominantly from 12 to 63 inches. Summer rainfall commonly occurs as high-intensity, convective thunderstorms. About half of the annual precipitation occurs as snow in winter; this proportion increases with elevation. In the mountains, deep snowpacks accumulate throughout the winter and

generally persist into spring or early summer, depending on elevation. Some permanent snowfields and small glaciers are on the highest mountain peaks. In the valleys at the lower elevations, snowfall is lighter and snowpacks can be intermittent. The average annual temperature is 26 to 54 degrees F (-3 to 12 degrees C). The freeze-free period averages 135 days and ranges from 45 to 230 days, decreasing in length with elevation. The climate of this area is strongly dependent upon elevation; precipitation is greater, and temperatures are cooler at the higher elevations. The plant communities vary with elevation, aspect and change in latitudes due to changing in precipitation kind and timing and temperature.

The dominant soil orders in this MLRA are Mollisols, Alfisols, Inceptisols, and Entisols. The soils in the area dominantly have a frigid or cryic soil temperature regime and an ustic or udic soil moisture regime. Mineralogy is typically mixed, smectitic, or paramicaceous. In areas with granite, gneiss, and schist bedrock, Glossocryalfs (Seitz, Granile, and Leadville series) and Haplocryolls (Rogert series) formed in colluvium on mountain slopes. Dystrocryepts (Leighcan and Mummy series) formed on mountain slopes and summits at the higher elevations. In areas of andesite and rhyolite bedrock, Dystrocryepts (Endlich and Whitecross series) formed in colluvium on mountain slopes. In areas of sedimentary bedrock, Haplustolls (Towave series) formed on mountain slopes at low elevations and with low precipitation. Haplocryolls (Lamphier and Razorba series), Argicryolls (Cochetopa series), and Haplocryalfs (Needleton series) formed in colluvium on mountain slopes at high elevations.

Ecological site concept

This site is located in the areas just under the lip/edge of the top of draws and canyons where snow will drift and acumulate. It has a plant community of (noted in desending order for each group) Shrubs: alderleaf mountain mahogany, mountain snowberry, mountain big sagebrush, and Oregon grape; Grasses: Salina wildrye, muttongrass, bluebunch wheatgrass, Indian ricegrass, and a needlegrass; Forbs: aster, mat buckwheat, and scarlet gilla.

The soils of this site formed mostly in colluvium derived from sandstone and shale over residuum weathered from sandstone and shale. Surface soils are slit loam to gravelly fine sandy loam in texture. Rock fragments may be present on the soil surface and throughout the profile, but generally make up less than 35 percent of the soil volume. These soils are moderately deep, well-drained, and have moderately slow permeability. Available water-holding capacity ranges from 3 to 6 inches of water in the upper 40 inches of soil. The soil moisture regime is mostly ustic and the soil temperature regime is frigid. Precipitation ranges from 16 to 22 inches annually.

Associated sites

R048AY409UT	**Mountain Loam (Salina Wildrye)** These sites often occur adjacent to each other.

Similar sites

R048AY405UT	**Mountain Loam (Mountain Big Sagebrush)** These two sites have very similar woody and herbaceous components, however this site tends to have more deciduous shrubs.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Cercocarpus montanus* (2) *Symphoricarpos oreophilus*
Herbaceous	(1) *Elymus salinus*

Physiographic features

This site occurs at elevations between 7,000 and 9,200 feet. It is found on mountain slopes with slopes ranging from 15 to 50 percent. Flooding and ponding do not occur on this site.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Runoff class	Very high
Flooding frequency	None
Ponding frequency	None
Elevation	7,000–9,200 ft
Slope	10–50%
Aspect	Aspect is not a significant factor

Climatic features

The climate of this site is dry subhumid and semiarid. It is characterized by cold, snowy winters and warm, dry summers. The average annual precipitation ranges from 12 to 16 inches. July, August, and October are typically the wettest months with June being the driest. The most reliable sources of moisture for plant growth are the snow that accumulates over the winter and spring rains. Summer thunderstorms are intermittent and sporadic in nature, and thus, are not reliable sources of moisture to support vegetative growth on this site. The soil moisture regime is mostly ustic and the soil temperature regime is frigid.

Table 3. Representative climatic features

Frost-free period (characteristic range)	
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	16-22 in

Influencing water features

Due to its landscape position, this site is not influenced by streams or wetlands.

Soil features

The soils of this site formed mostly in colluvium derived from sandstone and shale over residuum weathered from sandstone and shale. Surface soils are slit loam to gravelly fine sandy loam in texture. Rock fragments may be present on the soil surface and throughout the profile, but generally make up less than 35 percent of the soil volume. These soils are moderately deep, well-drained, and have moderately slow permeability. Available water-holding capacity ranges from 3 to 6 inches of water in the upper 40 inches of soil. The soil moisture regime is mostly ustic and the soil temperature regime is frigid. Precipitation ranges from 16-22 inches annually.

Table 4. Representative soil features

Parent material	(1) Colluvium–sandstone and shale (2) Residuum–sandstone and shale
Surface texture	(1) Silt loam (2) Gravelly fine sandy loam
Family particle size	(1) Fine-loamy
Drainage class	Well drained
Permeability class	Moderately slow
Depth to restrictive layer	20–40 in
Soil depth	20–40 in
Surface fragment cover <=3"	5–30%
Surface fragment cover >3"	0%

Available water capacity (Depth not specified)	3–6 in
Calcium carbonate equivalent (Depth not specified)	Not specified
Electrical conductivity (Depth not specified)	Not specified
Sodium adsorption ratio (Depth not specified)	Not specified
Soil reaction (1:1 water) (Depth not specified)	Not specified
Subsurface fragment volume <=3" (Depth not specified)	0–29%
Subsurface fragment volume >3" (Depth not specified)	0–2%

Ecological dynamics

It is impossible to determine in any quantitative detail the historic climax plant community (HCPC) for this ecological site because of the lack of direct historical documentation preceding all human influence. In some areas, the earliest reports of dominant plants include the cadastral survey conducted by the General Land Office, which began in the late 19th century for this area (Galatowitsch 1990). However, up to the 1870s the Shoshone Indians, prevalent in northern Utah and neighboring states, grazed horses and set fires to alter the vegetation for their needs (Parson 1996). In the 1860s, Europeans brought cattle and horses to the area, grazing large numbers of them on unfenced parcels year-long (Parson 1996). Itinerant and local sheep flocks followed, largely replacing cattle as the browse component increased.

Below is a State and Transition Model diagram to illustrate the “phases” (common plant communities), and “states” (aggregations of those plant communities) that can occur on the site. Differences between phases and states depend primarily upon observations of a range of disturbance histories in areas where this ESD is represented. These situations include grazing gradients to water sources, fence-line contrasts, patches with differing dates of fire, herbicide treatment, tillage, etc. Reference State 1 illustrates the common plant communities that probably existed just prior to European settlement.

The major successional pathways within states, (“community pathways”) are indicated by arrows between phases. “Transitions” are indicated by arrows between states. The drivers of these changes are indicated in codes decipherable by referring to the legend at the bottom of the page and by reading the detailed narratives that follow the diagram. The transition between Reference State 1 and State 2 is considered irreversible because of the naturalization of exotic species of both flora and fauna, possible extinction of native species, and climate change. There may have also been accelerated soil erosion.

The plant communities shown in this State and Transition Model may not represent every possibility, but are probably the most prevalent and recurring plant communities. As more monitoring data are collected, some phases or states may be revised, removed, and/or new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities.” According to the USDA NRCS National Range & Pasture Handbook (USDA-NRCS 2003), Desired Plant Communities (DPC’s) will be determined by the decision-makers and will meet minimum quality criteria established by the NRCS. The main purpose for including descriptions of a plant community is to capture the current knowledge at the time of this revision.

State 1: Reference State:
The Reference State is a description of this ecological site just prior to Euro-American settlement but long after the arrival of Native Americans. The description of the Reference State was determined by NRCS Soil Survey Type Site Location information and familiarity with rangeland relict areas where they exist. The least modified plant community (1.1) within the Reference State would have been a sagebrush co-dominated stand with alderleaf mountain mahogany (*Cercocarpus montanus*), mountain snowberry (*Symphoricarpos oreophilus*), and mountain big sagebrush (Artemisia tridentate spp. vaseyana), and associated bunch grasses such as Salina wildrye (*Leymus salinus* ssp. salinus), bluebunch wheatgrass (*Pseudoroegneria spicata*), and muttongrass (*Poa fendleriana*). Forbs

such as aster, mat buckwheat, and scarlet gilla would be present. Fire is believed to be the dominant disturbance force in natural big sagebrush communities. The reference plant community (1.1) would have been relatively stable with occasional use by wildlife. Following a natural fire (1.1a) and depending on the severity, would have killed most if not all of the sagebrush favoring the sprouting shrubs and bunchgrasses (1.2). Over time and without any further disturbances (1.2a) sagebrush and other non-sprouting shrubs would slowly come back into the site (1.3), however the sprouting shrubs and bunch grasses would still dominate the site. If there were another fire to occur on the site (1.3a) the site would return to community phase 1.2. If community phase 1.3 continued to experience no disturbances over a longer period of time (1.3b) it would eventually show a co-dominace between mountain big sagebrush and the other shrubs on the site. A more complete list of species by lifeform for the Reference State is available in the accompanying tables in the “Plant Community Composition by Weight and Percentage” section of this document.

Community Phase 1.1 Mountain big sagebrush with perennial grasses and deciduous shrubs.
The least modified plant community within the Reference State would have been a mountain big sagebrush-dominated with associated deciduous shrubs such as mountain snowberry, and alderleaf mountain mahogany, and associated perennial grasses such as bluebunch wheatgrass and Salina wildrye. Aster, mat buckwheat, and scarlet gilla would have been the commonly associated forbs.

Community Pathway 1.1a
A naturally occurring fire would have killed all the non-sprouting shrubs like mountain big sagebrush. As the site recovered, it would be converted to the sprouting shrubs with perennial bunchgrasses community.

Community Phase 1.2 Sprouting shrubs with perennial bunch grasses.
Fire is a naturally occurring disturbance on this site and would have kept shrubs like mountain big sagebrush less dominant. Sprouting shrubs like mountain snowberry adn alderleaf mountain mahogany and perennial grasses would have become the dominant aspect of this site.

Community Pathway 1.2a
Over time and without the occurrence of a natural disturbance, such as fire, non-sprouting shrubs like mountain big sagebrush, and alderleaf mountain mahogany would become re-established on the site.

Community Phase 1.3 Non-sprouting shrubs start becoming re-established.
Non-sprouting shrubs start becoming re-established from seed over time. Sprouting shrubs and perennial grasses are still the dominant aspect of this site.

Community Pathway 1.3a
In the event that there is another natural disturbance, like a fire, the site would return to the sprouting shrubs with perennial bunch grasses community.

Community Pathway 1.3b
Over time and with the absence of a natural disturbance, like fire, the non-sprouting shrubs will continue becoming more abundant to a point where they are co-dominant with the sprouting shrubs.

T1a: Transition from State 1 to State 2 (Reference State to Current Potential/ Introduced Non-natives State)
The simultaneous introduction of exotic species, both plants and animals, and possible extinctions of native flora and fauna, along with climate change, will cause State 1 to transition to State 2. A return pathway back to State 1 would be impracticable because of these issues.

State 2: Current Potential/Introduced Non-Natives State.
State 2 is identical to State 1 in form and function, with the exception of the presence of non-native plants and animals, possible extinctions of native species, and a different climate. State 2 is a description of the ecological site shortly following Euro-American settlement, which can be regarded as the current potential. The least modified plant community (2.1) within State 2 is a sagebrush (Artemisia tridentate spp. vaseyana) dominated state with alderleaf mountain mahogany (*Cercocarpus montanus*), mountain snowberry (*Symphoricarpos oreophilus*), and associated bunch grasses such as bluebunch wheatgrass (*Pseudoroegneria spicata*), Salina wildrye (*Leymus salinus* ssp. salinus), and muttongrass (*Poa fendleriana*). Forbs such as Aster, mat buckwheat, and scarlet gilla would be present. A common non-native species in this state is cheatgrass. Fire is believed to be the dominant disturbance

force in natural big sagebrush communities. Following brush management or fire (2.1a) and depending on the severity, would have killed most if not all of the sagebrush, and other non-sprouting shrubs, favoring the sprouting shrubs and bunchgrasses (2.2). This plant community is relatively stable under mixed use by wildlife and livestock. However, heavy utilization by bison, elk, horses, and domestic cattle on these sites during the growing season (2.1b) would deplete the grasses and deciduous shrubs creating site that is dominated by mountain big sagebrush (2.3). In community 2.2, when management, such as prescribed grazing, can be combined with time (2.2a) to allow the site to recover returning to community 2.1. However if the community continues to be over utilized by both wildlife and domestic livestock, and possibly in combination with a natural or man caused disturbance (2.2b) this community (2.2) can be degraded to community 2.4 which is dominated by rhizomatous grasses with unpalatable sprouting shrubs and forbs. In community 2.3 when management, such as prescribed grazing coupled with time, (2.3a) the sprouting shrubs and perennial grasses can have an opportunity to recover and recolonize the site and return to community 2.1. In community 2.3, when it experiences a disturbance such as brush management or fire, coupled with management like prescribed grazing (2.3b) it can drive the site to a more stable and diverse community 2.2. However, when community 2.3 continues to be over utilized and this is coupled with a disturbance such as brush management or fire (2.3c) it can drive the site to an undesirable community 2.4.

Community Phase 2.1: Mountain big sagebrush with perennial grasses and deciduous shrubs. Introduced annual species present.
The least modified community within the mountain big sagebrush/deciduous shrub/introduced state. This is a mountain big sagebrush dominated community with an abundance of deciduous shrubs such as mountain snowberry. Community is also characterized by an abundance of native perennial grasses such as, Salina wildrye, bluebunch wheatgrass, and muttongrass. Associated forbs on this site may consist of aster, mat buckwheat, and scarlet gilla. Introduced species likely to occur on this site are cheatgrass, annual forbs, milkweed and stickseed.

Community Pathway 2.1a
This pathway is characterized by the implementation of brush management, prescribed or natural fire. This will reduce the abundance of non-sprouting shrubs giving the competitive advantage to sprouting shrubs and native perennial grasses (2.2).

Community Pathway 2.1b
Heavy continuous grazing and browsing by wildlife and domestic animals would deplete resources of the deciduous shrubs and native perennial grasses (2.3).

Community Phase 2.2: Sprouting shrubs with perennial grasses with introduced annuals present.
This community represents what the site would look like following brush management or a natural or prescribed fire. Depending on the severity of the fire/management practice, some or all of the non-sprouting shrubs would be killed. This would open up resources for the sprouting shrubs and native perennial grasses subsequently they would be the dominant aspect of the site.

Community Pathway 2.2a
This pathway represents that over time and under normal climatic conditions, along with prescribed grazing, this community would return to the previous community (2.1).

Community Pathway 2.2b
This pathway represents when the community experiences heavy continuous grazing and browsing by wildlife and domestic animals. Natural disturbances such as fire could also occur simultaneously in this pathway (2.4).

Community Phase 2.3: Depauperate sagebrush with conifers possibly present.
This community represents what the site would look like following a long period of over grazing and browsing. The more palatable species would be heavily utilized giving a competitive advantage to species such as mountain big sagebrush. Over time sagebrush would be the dominant aspect of the site with a low diversity of the other native species that normally occur on the site.

Community Pathway 2.3a
This pathway represents that over time and under normal climatic conditions, along with prescribe grazing, this community would return to the previous community (2.1).

Community Pathway 2.3b

This pathway represents that over time and under normal climatic conditions, along with prescribe grazing along with a natural or prescribed fire or brush management mountain big sagebrush/conifers would be killed. This would stimulate the sprouting shrubs and perennial native grasses moving the site to community 2.2.

Community Pathway 2.3c
This pathway represents the occurrence when the site continues to be overgrazed and there is a disturbance like a fire. Non-sprouting shrubs and conifers, if present, would be killed. Deciduous shrubs and native perennial grasses are already at low diversity and stressed, giving the competitive advantage to rhizomatous grasses and unpalatable sprouting shrubs like rabbitbrush (2.4).

Community Phase 2.4: Rhizomatous grasses with unpalatable sprouting shrubs and forbs with low growing grasses.
This community represents the site when there has been continued overgrazing/browsing for an extended period of time, followed by a disturbance such as a brush management treatment or natural/prescribed fire. Species diversity was already low (2.3). The overutilization of the desirable native vegetation coupled with the fire has reduced the site to unpalatable sprouting shrubs and forbs along with low growing grasses.

Community Pathway 2.4a
This pathway represents that over time, along with prescribed grazing that the sprouting shrubs and native perennial grasses would eventually re-establish and return the site back to community 2.2.

T2a: Transition from State 2 to State 3 (Current Potential to Seeded State)
When land managers or landowners have made the decision that the herbaceous understory species are so depleted and/or undesirable, and the biological, hydrological and soil resources are at risk, introduced and native perennial grasses are utilized in a range seeding. This often occurs in combination with a natural/prescribed fire or other brush management treatment.

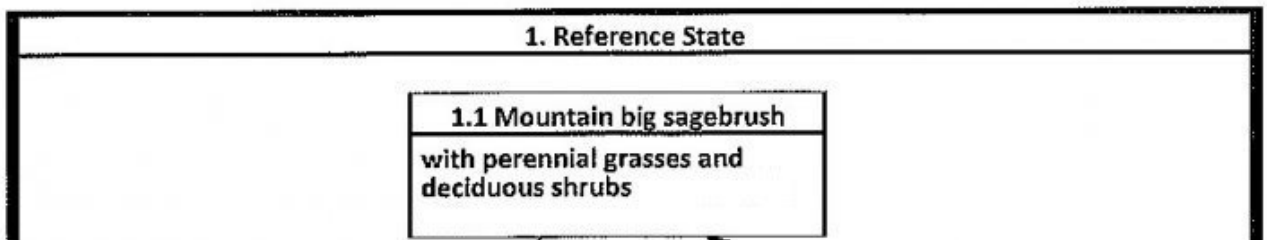
State 4: Seeded State:
This State occurs where historic excessive livestock grazing reduced canopy cover, and in an attempt to prevent any additional excessive erosion it was intentionally seeded with species such as smooth brome and/or crested wheatgrass. Do to the decreased canopy cover and increased erosion, and rangeland seeding is utilized, either rangeland drilled or aerial application with predominately introduced species.

Community Phase 3.1: Range seeding with perennial introduced species.
This community represents a time shortly following a brush management treatment/fire in addition to the range seeding. Non-sprouting shrubs have been greatly reduced and sprouting shrubs have not had adequate time to become re-established. Introduced and native grass species with a few sprouting shrubs dominate the site.

Community Pathway 3.1a
Over an extended period of time and in combination with prescribed grazing, the native desirable sprouting shrubs begin to become well established.

Community Phase 3.2: Sprouting shrubs becoming co-dominant with perennial grasses.
This community phase represents the site over a 5-10 year period of time under normal climatic conditions. The desirable sprouting shrubs have had adequate time to re-establish and become co-dominant with the perennial grasses. Non-sprouting shrubs have also started to re-establish on the site as well. It is imperative that prescribed grazing must be implemented in order for this community to be persist.

State and transition model



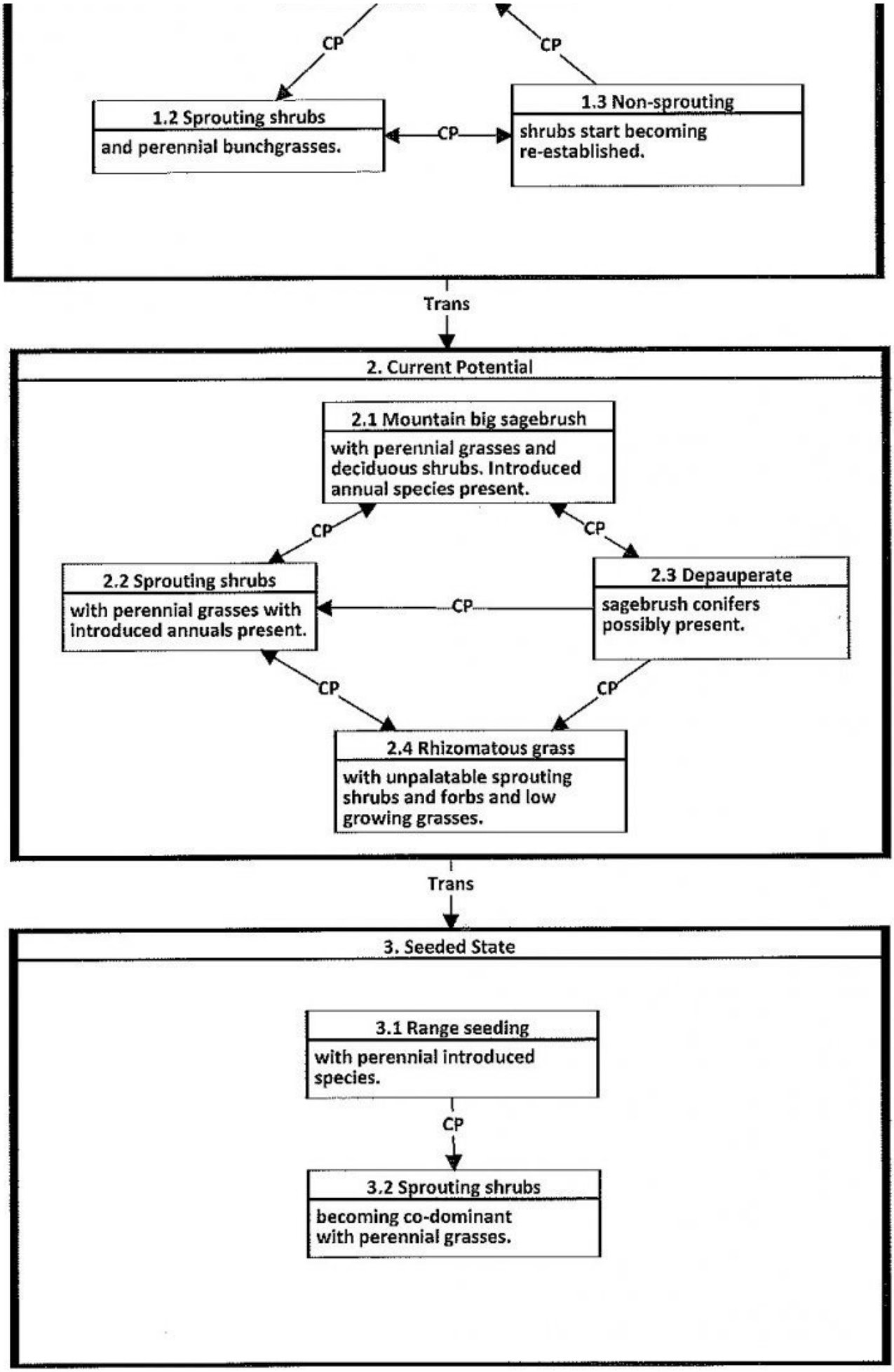

CP
CP
1.2 Sprouting shrubs
and perennial bunchgrasses.
CP
1.3 Non-sprouting
shrubs start becoming re-established.
Trans
2. Current Potential
2.1 Mountain big sagebrush
with perennial grasses and deciduous shrubs. Introduced annual species present.
CP
CP
2.2 Sprouting shrubs
with perennial grasses with introduced annuals present.
CP
2.3 Depauperate
sagebrush conifers possibly present.
CP
CP
2.4 Rhizomatous grass
with unpalatable sprouting shrubs and forbs and low growing grasses.
Trans
3. Seeded State
3.1 Range seeding
with perennial introduced species.
CP
3.2 Sprouting shrubs
becoming co-dominant with perennial grasses.

Diagram Legend

T 1-2	Introduced species.
T 2-3	Disturbance with range seeding.
CP 1.1-1.2	Natural disturbance such as fire.
CP 1.2-1.3	Time
CP 1.3-1.1	Time and lack of disturbance.
CP 1.3-1.2	Natural disturbance such as fire.
CP 2.1-2.2	Fire or brush management.
CP 2.1-2.3	Historic over grazing/browsing.
CP 2.2-2.1	Time and with prescribed grazing.
CP 2.2-2.4	Over grazing/browsing with a disturbance like fire.
CP 2.3-2.1	Time with prescribed grazing.
CP 2.3-2.2	Disturbance with prescribed grazing.
CP 2.3-2.4	Continued overgrazing and a disturbance like fire.
CP 2.4-2.2	Time with prescribed grazing.
CP 3.1-3.2	Time with prescribed grazing.

Inventory data references

When available, monitoring data (of various types) were employed to validate more subjective inferences made in this diagram. See the complete files in the office of the State Range Conservationist for more detail.

Other references

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Contributors

Dean Stacy

Approval

Kirt Walstad, 3/05/2024

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	05/10/2025
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):

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

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

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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):**

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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:

    Sub-dominant:

    Other:

    Additional:

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

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

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

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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:**

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17. **Perennial plant reproductive capability:**
