USDA Natural Resources
Conservation Service

Ecological site R048AY306UT
Upland Loam (Wyoming Big Sagebrush)

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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): 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

The soils on this site were formed in eolian deposits over slope alluvium or alluvium derived from sandstone, limestone, siltstone and shale. The soil is well drained with moderately slow to moderate permeability. The soil is deep with no restrictive layer in the top 60 inches of soil, except for the Winteridge (228) soil component that has a lithic bedrock restrictive layer between 20 and 60 inches. The pre-dominant soil textures are fine sandy loam, loam and gravelly loam. Available water capacity is between 3 and 7 inches in the top 60 inches of soil. The soil is slightly to strongly alkaline. The soil temperature and moisture regimes are frigid and aridic bordering on ustic, respectively.

Associated sites

R034BY329UT	**Upland Silt Loam (Fourwing saltbush/Winterfat)**
R034BY330UT	**Upland Stony Loam (Pinyon-Utah Juniper)**

Similar sites

R048AY308UT	**Upland Loam (Bonneville Big Sagebrush)** Similar plant community however this one has a higher aspect of Bonneville big sagebrush.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. wyomingensis*
Herbaceous	(1) *Achnatherum hymenoides*

Physiographic features

This site occurs at elevations between 5,800 and 8,500 feet. It is found on ridges and mountain slopes with slopes ranging from 3-30 percent. Flooding and ponding do not occur on this site.

Table 2. Representative physiographic features

Landforms	(1) Pediment (2) Fan remnant (3) Structural bench
Runoff class	Medium to high
Flooding frequency	None

Ponding frequency	None
Elevation	5,800–8,500 ft
Slope	3–30%
Aspect	Aspect is not a significant factor

Climatic features

Average annual precipitation is 12 to 16 inches. Approximately 60 percent occurs as rain from March through October. Much of this summer precipitation occurs as convection thunderstorms.

On the average, November through February are the driest months and July though October are the wettest months. In average years, plants begin growth around March and April and end growth in October. Plants usually remain green until frost in October except in drier than average years. There is usually an active greenup period in the fall. The most rapid growth occurs during April, May and June.

Table 3. Representative climatic features

Frost-free period (characteristic range)	75-120 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	12-16 in

Influencing water features

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

Soil features

The soils on this site were formed in eolian deposits or slope alluvium from sedimentary rock over residuum derived from sandstone and shale. The soil is well drained with moderately slow to moderate permeability. The soil is deep with no restrictive layer in the top 60 inches of soil, except for the Winteridge (228) soil component that has a lithic bedrock restrictive layer between 20 and 60 inches. The pre-dominant soil textures are fine sandy loam, loam and gravelly loam. Available water capacity is between 3 and 7 inches in the top 60 inches of soil. The soil is slightly to strongly alkaline. The soil temperature and moisture regimes are frigid and aridic bordering on ustic, respectively.

Soils associated with this site:
Soil Survey Area: Soil Components (Map Units in parentheses)

Uintah Area: Bigpack (21, 83, 140); Winteridge (228, 274)

Modal Soil: Winteridge L 1-8% — fine-silty, mixed Typic Eutroboralfs

Table 4. Representative soil features

Parent material	(1) Eolian deposits–sedimentary rock (2) Slope alluvium–sedimentary rock (3) Residuum–sandstone and shale
Surface texture	(1) Gravelly loam (2) Loam (3) Fine sandy loam
Family particle size	(1) Fine-loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Depth to restrictive layer	20–80 in

Soil depth	20–80 in
Surface fragment cover <=3"	0–20%
Surface fragment cover >3"	0–3%
Available water capacity (Depth not specified)	3–7 in
Calcium carbonate equivalent (Depth not specified)	0–30%
Electrical conductivity (Depth not specified)	0–8 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0–15
Soil reaction (1:1 water) (Depth not specified)	7.4–9
Subsurface fragment volume <=3" (Depth not specified)	0–25%
Subsurface fragment volume >3" (Depth not specified)	0–5%

Ecological dynamics

It is impossible to determine in any quantitative detail the historic plant community for this ecological site because of the lack of historical documentation. 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). Although there is evidence of Native Americans passing through southern extent of this ecological site, there has been no evidence of permanent inhabitance. The northern extent of this ecological site did have signs of permanent inhabitants for a short time (Spangler 1995), then became similar to the southern extent of this site. The first Europeans came to eastern Utah in 1765 as a Spanish expedition, however it wasn't until approximately 1870 that Europeans brought livestock to the area (Watt 1997). 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. 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, not to imply what the desired plant community should be.

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 Reference State for this site would have been a shrub semi-desert characterized by Wyoming big sagebrush and associated native perennial forbs and grasses. 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: Wyoming big sagebrush with native perennial grasses and forbs
This community is dominated by Wyoming big sagebrush, Indian ricegrass and galleta. Shadscale and winterfat are also commonly present in the shrub layer. Indian ricegrass and galleta are the principle perennial grasses. Bottlebrush squirreltail is also commonly present. Abundant forbs including longleaf phlox and scarlet globemallow. Natural fire frequency is estimated to be 10 to 70 years (USDA-FS, 2006).

Community Phase Pathway 1.1-1.2
Extended period of time without a major disturbance such as fire or insect. This allows Wyoming big sagebrush to dominate the plant community and suppress the understory species. Fire frequency extends well beyond the 10 to 70 year average for the site.

Community Phase Pathway 1.1-1.3
Recent fire occurrence, lightning or human caused, eliminating sagebrush and other non-sprouting species from the community. Site is properly grazed.

Community Phase 1.2: Wyoming big sagebrush and juniper
Wyoming big sagebrush increases significantly in percent composition. Winterfat, shadscale and yellow rabbitbrush may increase also. Shrubs become decadent due to age. Perennial grasses and forbs lose vigor, due to competition for available resources, and juniper may have begun to encroach on the site. With the plant interspaces becoming larger from the reduction of the understory, soil erosion may accelerate. Water flow patterns and pedestals become more abundant. Although the overall functionality of the site is still intact, it is at risk of further degradation.

Community Phase 1.3: Perennial grasses with sprouting shrubs and scattered annual species.
Native perennial bunchgrasses dominate this community phase. Wyoming big sagebrush and shadscale decrease in the community. Winterfat has the ability to re-sprout and re-establish following a fire. Yellow rabbitbrush and horsebrush species may increase significantly following fire and much of the excess fine fuel accumulation is removed. Fire tolerant shrubs typically persist as dominant shrubs in the community for 30 years or longer. Indian ricegrass and other perennial grasses flourish.

Community Phase Pathway 1.2-1.3
This pathway occurs with natural or human induced fire. Site is properly grazed.

Community Phase Pathway 1.3-1.1
This represents the time following a fire with a normal fire return interval of 10-70 years. Site is properly grazed.

Transition 1-2
A threshold is crossed when there is an introduction of non-native species, primarily cheatgrass and various annual forbs, that become established in the community.

State 2: Current Potential
This state includes plant communities dominated by a diverse mixture of perennial grasses, a mixture of Wyoming big sagebrush and perennial grasses, and a community dominated by Wyoming big sagebrush. These community phases occur depending on the time since a disturbance that kills Wyoming big sagebrush has occurred, such as fire, insects, or drought, and grazing that provides adequate duration, timing, and intensity that maintain plant vigor and health of the plant community.

Plant communities in this state can include native, acclimatized, naturalized and invasive non-native species. This state is irreversibly changed from the reference state because these non-native species will now remain a permanent part of the community.

This plant community has the composition, structure and cover present that facilitates the capture, storage, and safe release of precipitation. Nutrients are being cycled through deep rooted perennial grasses, forbs, and evergreen shrubs, and energy capture throughout the entire growing season (March to October) such that this plant

community and site resiliency is maintained. With a lengthened fire return interval (greater than 70 years), an increase in sagebrush canopy occurs until sagebrush dominates available resources. This results in a decrease in vigor, cover and reproduction of perennial grasses, and an increase in invasive annuals such as cheatgrass. Once junipers become a dominant feature, they are a permanent part of the plant community until a fire or management action removes them. The understory is depleted (lack of both living plants and seed bank) so that a return to state 2 is not possible.

Community Phase 2.1: Wyoming big sagebrush/perennial native herbs with minor component of exotic species
This community is dominated by Wyoming big sagebrush, Indian ricegrass and galleta. Shadscale and winterfat are also commonly present in the shrub layer. Indian ricegrass and galleta are the principle perennial grasses. Bottlebrush squirreltail is also commonly present. Abundant forbs include longleaf phlox and scarlet globemallow. Naturalized and invasive non-native species are also present. Natural fire frequency is estimated to be 10 to 70 years.

Community Phase Pathway 2.1-2.2
Fire or brush management or excessive browsing removes non-sprouting shrubs from the community.

Community Phase Pathway 2.1-2.3
Improper grazing (including season long, overstocking, wrong season, etc.) and/or drought remove annual and perennial fine fuels from the site decreasing the potential for fire to occur. Fire frequency extends beyond the 10 – 70 year average for the site. Utah juniper may begin to invade the site if a seed source is available.

Community Phase 2.2: Perennial grasses and sprouting shrubs and scattered annual species.
Wyoming big sagebrush and shadscale decrease in the community. Winterfat resprouts following the fire. Yellow rabbitbrush and horsebrush may increase significantly in the community following fire. Several native grasses dominate the understory. Fire tolerant shrubs typically persist as dominants shrubs in the community for 30 years or longer. The abundance of invasive annuals prior to the disturbance will dictate their abundance post disturbance.

Community Phase Pathway 2.2-2.1
Site is properly grazed for an extended period of time without disturbance. Plant community succession results in an increase of non-sprouting shrubs such as sagebrush.

Community Phase 2.3: Wyoming big sagebrush with scattered juniper and depleted herbaceous understory and annuals.

Wyoming big sagebrush and/or shadscale increase significantly in percent composition. Winterfat and yellow rabbitbrush may increase also. Shrubs become decadent due to age. Indian ricegrass, needleandthread and other grasses begin to lose vigor because of improper grazing (including, season long overstocking, wrong season, etc.) and/or increased shrub competition. This community is dominated by native species, but may include acclimatized, naturalized and invasive non-native species. Utah Juniper may begin to encroach in this community phase but is small and low in cover.

Community Phase Pathway 2.3-2.2
Fire, brush management or excessive browsing removes non-sprouting shrubs from the community. Yellow rabbitbrush and/or horsebrush species may become dominant.

Transition 2-3
Sustained, long-term improper grazing (including season long, overstocking, wrong season, etc.); and/or prolonged drought. Lengthening of the fire return interval.

Transition 2-4
Long-term improper grazing (including season long, overstocking, wrong season, etc.) and/or prolonged drought; shortened fire frequency.

Transition 2-5.1
Disturbance such as a fire or brush management followed by a rangeland seeding.

Transition 2-6

Sustained, long-term improper grazing and/or the lack of fire.

State 3: Juniper Invasion
Native shrubs such as Wyoming big sagebrush or rabbitbrush dominate the site. The occurrence of fire extends well beyond the normal period for the site. Wyoming big sagebrush is non-sprouting and will be killed by fire. Rabbitbrush can sprout after a fire and can become the dominant shrub. This state typically has invasive grasses and/or forbs as the dominant understory species. There may be a few native species remaining, but they do not dominate. Utah junipers may increase to occupy a significant portion of the over story, if a seed source is present. Wyoming big sagebrush dominates the shrub layer and may be decadent due to age. Indian ricegrass and other native bunchgrasses are significantly reduced due to increased shrub and tree competition and/or heavy grazing pressure. Galleta may increase.

Community Phase 3.1: Wyoming big sagebrush and/or Utah juniper, invasive annuals
Wyoming sagebrush is typically the dominant shrub in this community phase. Where Utah juniper has invaded, Wyoming big sagebrush and other shrubs decline, otherwise they dominate the community. Winterfat is dead or dying. Remaining perennial herbaceous vegetation is mostly found only in protected locations under shrubs. Invasive, non-native grasses and weeds including cheatgrass, annual mustards, redstem storksbill, etc. typically dominate the understory.

Community Phase Pathway 3.1-3.2
Lengthening of the fire return interval.

Community Phase 3.2: Juniper near monoculture
The number and size of trees
has increased with the absence of fire. The understory shrub and herbaceous vegetation has become very decadent or absent. A few scattered shrubs may still exist with the herbaceous component nearly nonexistent. Exposed soil results in increased runoff and erosion.

Transition 3-4
Fire, with long-term improper grazing (including season long, overstocking, wrong season, etc.) and/or prolonged drought.

Restoration Pathway 3-5
Fire or brush management with the seeding of introduced species with prescribed grazing.

State 4: Invasive Annuals
Invasive grasses and forbs dominate this state. This may occur under a shortened fire return cycle which excludes native non sprouting shrubs by frequent burning or this may occur with repeated improper grazing, or a combination of the two. Indian ricegrass and other native bunchgrasses are significantly reduced due to competition from invasive annuals and/or improper grazing and shortened fire return interval. Only remnant perennial species remain. Highly combustible fine fuels from invasive annuals dominate the community. Reoccurring fire is common. Fire frequency is 5 – 30 years. Cheatgrass dominance prevents reestablishment of sagebrush due to competition.

Community Phase 4.1: Invasive annuals dominated community with sprouting shrubs.
Invasive annuals dominate this community phase. If shrubs are present, yellow rabbitbrush dominates the shrub layer. Remaining Winterfat is mostly dead. Horsebrush species can also be plentiful if conditions are right. Fire tolerant shrubs may persist as dominants with fire periods reoccurring at intervals of 5 - 30 years. Broom snakeweed may be a dominant episodic species when conditions are favorable. Only remnant perennial bunchgrasses remain, if any; invasive annuals including cheatgrass, annual mustards, redstem storksbill, etc. dominate the understory

Restoration Pathway 4-5
Seeding of introduced species with prescribed grazing.

State 5: Seeded State
This state is seeded to rangeland species that are composed of mostly introduced species. Trees and/or shrubs are initially reduced but they will eventually re-occupy the site through natural succession. Invasive annual grasses and weedy forb species primarily, cheatgrass and various annual mustards, may be present in the seeding, but do not

dominate. The introduced perennial grasses prevent the reestablishment of native herbaceous species due to competition, and can persist indefinitely.

Community Phase 5.1: Introduced Perennial Grasses
This plant community is the result of a seeding of introduced grasses. Although there may be some native species present, however the introduced species will dominate the site. Shrubs are sparse to absent. Range seedings, when healthy, are usually resistant to fire.

Community Phase Pathway 5.1-5.2
Over time Wyoming big sagebrush and other shrubs gradually move back into the site. The rate of this re-colonization may depend on factors such as climate, management and grazing (both domestic and wildlife). Re-colonization of non-sprouting shrubs requires 10-70 years without fire.

Community Phase 5.2: Wyoming big sagebrush, introduced perennial grasses
This community shows where sagebrush and other shrubs have slowly reestablished in the area and have become dominate or codominant with the herbaceous component.

Community Phase Pathway 5.2-5.1
Site receives good grazing management. Mechanical, chemical, biological or fire disturbances reduce the woody vegetation components of the community. Perennial herbaceous vegetation becomes dominant.

Transition 5.2-3
Invasion of the site by junipers, long-term improper grazing (including season long, overstocking, wrong season, etc.) and/or prolonged drought; lengthened fire frequency allows the site to be invaded by juniper.

Transition 5-4
Long-term improper grazing (including season long, overstocking, wrong season, etc.) and/or prolonged drought; shortened fire frequency allows the understory vegetation on the site to be dominated by invasive annuals.

State 6: Sagebrush with cheatgrass understory
This state is characterized by a decadent sagebrush overstory with scattered other shrubs and the understory that is dominated by cheatgrass with scattered native grasses and forbs, caused by long-term improper grazing (including season long, overstocking, wrong season, etc.). Sagebrush and native herbaceous species cannot reestablish due to competition from cheatgrass.

Community Phase 6.1: Sagebrush with invasive annual understory
Cheatgrass and other invasive annuals dominate the understory of a decadent stand of Wyoming big sagebrush. A component of other shrubs is typically present and remnant populations of native grasses and forbs may still be present. This community phase is very susceptible to wildfire due to the high amounts of fine fuels produced from the invasive annuals.

Transition 6-4
Fire, with long-term improper grazing (including season long, overstocking, wrong season, etc.) and/or prolonged drought.

Restoration Pathway 6-5.1
Disturbance such as a fire or brush management followed by a rangeland seeding.

State and transition model

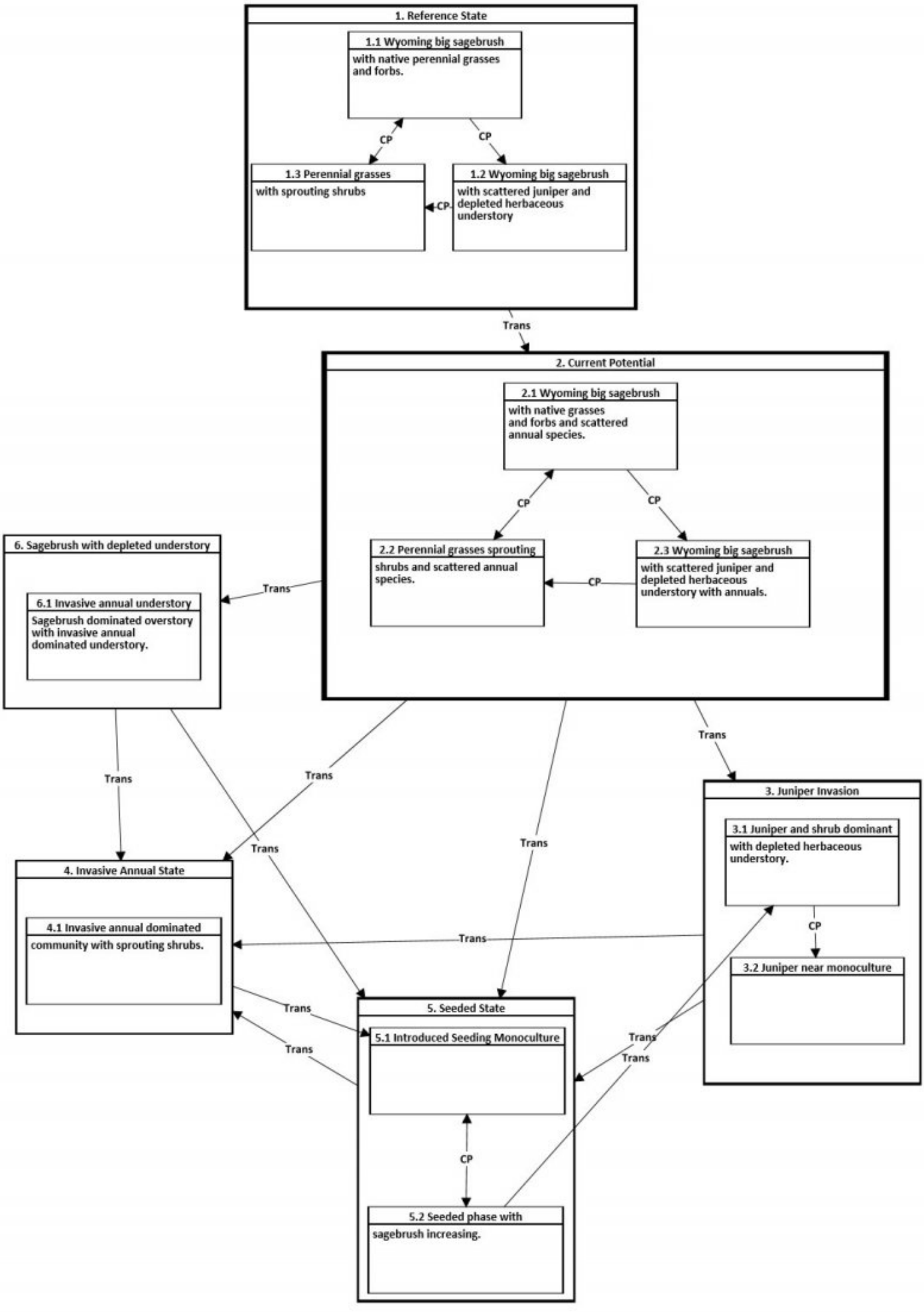
1. Reference State
1.1 Wyoming big sagebrush
with native perennial grasses and forbs.
CP
CP
1.3 Perennial grasses
with sprouting shrubs
CP
1.2 Wyoming big sagebrush
with scattered juniper and depleted herbaceous understory
Trans
2. Current Potential
2.1 Wyoming big sagebrush
with native grasses and forbs and scattered annual species.
CP
CP
2.2 Perennial grasses sprouting
shrubs and scattered annual species.
CP
2.3 Wyoming big sagebrush
with scattered juniper and depleted herbaceous understory with annuals.
6. Sagebrush with depleted understory
Trans
6.1 Invasive annual understory
Sagebrush dominated overstory with invasive annual dominated understory.
Trans
Trans
Trans
Trans
Trans
Trans
3. Juniper Invasion
3.1 Juniper and shrub dominant
with depleted herbaceous understory.
CP
3.2 Juniper near monoculture
4. Invasive Annual State
4.1 Invasive annual dominated
community with sprouting shrubs.
Trans
Trans
Trans
5. Seeded State
5.1 Introduced Seeding Monoculture
CP
5.2 Seeded phase with
sagebrush increasing.
Trans
Trans

Diagram Legend

T 1-2	Introduction of exotic species.
T 2-3	Poor grazing management and/or lengthened fire return interval.
T 2-4	Poor grazing management and/or drought with increased fire return interval.
T 2-5	Disturbance such as fire or brush management followed by a rangeland seeding.
T 2-6	Improper grazing and/or lack of fire.
T 3-4	Poor grazing management and/or drought and a shortened fire return interval.
T 3-5	Disturbance such as brush management or fire and range seeding.
T 4-5.1	Seeding of introduced species with prescribed grazing.
T 5.2-3.1	Long-term improper grazing (including season long, overstocking, wrong season, etc.) and/or lengthened fire frequency.
T 5-4	Long-term improper grazing (including season long, overstocking, wrong season, etc.) and/or prolonged drought; shortened fire frequency allows the understory vegetation on the site to become dominated by invasive annuals.
T 6-4	Fire without a rangeland seeding.
T 6-5	Brush management and/or fire followed by rangeland seeding with primarily introduced species.
CP 1.1-1.2	Increased time since disturbance/fire.
CP 1.1-1.3	Fire.
CP 1.2-1.3	Fire.
CP 1.3-1.1	Time after fire with prescribed grazing.
CP 2.1-2.2	Fire, brush management or heavy browse use.
CP 2.1-2.3	Poor grazing management and/or drought.
CP 2.2-2.1	Time after fire with prescribed grazing.
CP 2.3-2.2	Fire, brush management or heavy browse use.
CP 3.1-3.2	Continued poor grazing management and/or drought and lengthened fire return interval.
CP 5.1-5.2	Overgrazing and/or drought.
CP 5.2-5.1	Prescribed grazing with brush management or fire.

State 1
Reference State

Community 1.1

Reference State

The dominant aspect of the plant community is basin big sagebrush. The composition by air-dry weight is approximately 60 percent perennial grasses, 10 percent forbs and 30 percent shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	390	630	750
Shrub/Vine	195	315	375
Forb	7	11	13
Total	**592**	**956**	**1138**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	14-16%
Grass/grasslike foliar cover	44-46%
Forb foliar cover	4-6%
Non-vascular plants	0%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	–	–
>0.5 <= 1	–	–	–	4-6%
>1 <= 2	–	–	44-46%	–
>2 <= 4.5	–	–	–	–
>4.5 <= 13	–	14-16%	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Additional community tables

Animal community

This site provides proper grazing for cattle and sheep during spring, summer, and fall.

This site produces food and cover for wildlife. Wildlife using this site include jackrabbit, coyote, mule deer, and elk.

Hydrological functions

The soil is in hydrologic group B. The runoff curve numbers are 61 through 79 depending on the condition of the watershed.

Recreational uses

Recreation values are hiking and hunting.

Wood products

None

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 details.

Other references

Alexander, R. R. 1985. Major habitat types, community types, and plant communities in the Rocky Mountains. USDA- Forest Service Rocky Mountain Forest and Range Experiment Station. General technical report RM-123. 105p.

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Contributors

J. Lee Broadbent
M. 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	04/20/2024
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):**

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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:**
