

Ecological site R034BY213UT Semidesert Alkali Loam (Black Greasewood/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): 034B–Warm Central Desertic Basins and Plateaus

MLRA 34B occurs in is in Utah (70 percent) and Colorado (30 percent). It makes up about 12,850 square miles (33,290 square kilometers). A small part of the area is in the High Plateaus of Utah Section of the Colorado Plateaus Province of the Intermontane Plateaus. The northern part of the MLRA occurs in the Uinta Basin Section, which is bounded by the Uinta Mountains to the north, the Wasatch Range to the west, the Roan Plateau to the south, and the Rabbit Hills to the east. The southern part of the MLRA occurs in the northern third of the Canyon Lands Section. This section is bounded by the Roan Plateau to the north, the Wasatch Plateau to the west, the southern end of the San Rafael Swell to the south, and the western slope of the Rocky Mountains to the east. Elevation ranges from 4,100 feet (1,250 meters) near Green River, Utah, to 7,500 feet (2,285 meters) at the base of the Wasatch Range and the Roan Plateau.

Most of this area is covered by residual basin-floor materials and materials washed in from the surrounding mountains and plateaus. Shale and sandstone are the dominant rock types. The Tertiary-age Green River, Uinta, and Duchesne Formations dominate the northern part of the MLRA. The southern part is dominated by Cretaceous-age materials with lesser amounts of Jurassic and Triassic materials. The dominant Cretaceous formations are Mancos Shale, Dakota Sandstone, and the members of the Mesa Verde Group. The dominant Jurassic formations are the Morrison, Entrada, and Navajo. The dominant Triassic formations are the Chinle and Moenkopi. Quaternary alluvial, eolian, and glacial deposits occur in both parts of the MLRA.

The average annual precipitation in most of this area ranges from 6 to 10 inches (150 to 255 millimeters). A small part of this area receives as much as 24 inches of annual precipitation.

Much of the precipitation occurs as high-intensity, convective thunderstorms during the period July through September. May and June are usually the drier months. Precipitation is more evenly distributed throughout the year in the northern part of the MLRA than in the southern part, where there is a significant peak in late summer. The northern part of the MLRA receives more precipitation as snow during winter than the southern part. The average annual temperature ranges from 41 to 54 degrees F (5 to 12 degrees C). The freeze-free period averages 170 days and ranges from 110 to 235 days.

The dominant soil orders in this MLRA are Aridisols and Entisols. Mollisols occur at the higher elevations, particularly in the northern part of the MLRA. The dominant soil temperature regime is mesic, and the dominant soil moisture regime is aridic. The soils receiving less than 8 inches (205 millimeters) of precipitation annually have an aridic soil moisture regime. The soils receiving 8 to 12 inches (205 to 305 millimeters) have an aridic soil moisture regime that borders on ustic. The soils receiving 12 to 16 inches (305 to 405 millimeters) generally have an ustic soil moisture regime that borders on aridic. The dominant soil mineralogy is mixed and soils are formed in slope alluvium or residuum derived from shale or sandstone. Many of the soils are shallow or moderately deep to shale or sandstone bedrock. The soils at the lower elevations generally have significant amounts of calcium carbonate, salts, and gypsum.

Ecological site concept

This site has a dominant look of a mix of greasewood and Wyoming big sagebrush. The area will in fair to good condition have an understory of squirreltail, thickspike and/or Western wheatgrass, Indian ricegrass, needle-and-thread, Salina wildrye, fleabaine daisy, scarlet globemallow, Hood phlox, shadscale, prickly pear, thrifty goldenweed, Mormon tea.

This site is in the 8 to 12 inch precipitation zone.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Sarcobatus vermiculatus</i> (2) <i>Artemisia tridentata ssp. wyomingensis</i>
Herbaceous	Not specified

Physiographic features

This site occurs on stream terraces, alluvial fans and fan remnants. Slope is general 1-8%.

Table 2. Representative physiographic features

Landforms	(1) Stream terrace (2) Alluvial fan (3) Fan remnant
Runoff class	Low to high
Flooding frequency	None
Ponding frequency	None
Elevation	1,585–2,286 m
Slope	1–8%
Ponding depth	Not specified
Water table depth	Not specified
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

The average annual precipitation is 8 to 12 inches. Approximately 65 percent occurs as rain from March through September. On the average, November through February are the driest months and July through October are the wettest months. The mean annual air temperature is 75 degrees F (10 degrees C) and the soil temperatures are in the mesic regime. Much of the moisture that falls on this site runs off. In average years, plants begin growth around March 30 and end growth around September 30.

Table 3. Representative climatic features

Frost-free period (characteristic range)	
Freeze-free period (characteristic range)	110-140 days
Precipitation total (characteristic range)	203-305 mm

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 slope alluvium from sedimentary rock and quartzite. Surface soils are loam, silty clay loam to sandy clay loam in texture. Rock fragments may be present on the soil surface and throughout the profile, but make up less than 35 percent of the soil volume. These soils are deep to very deep, well-drained, and have slow to moderately slow permeability. pH is moderately to strongly alkaline.. Available water-holding capacity ranges from 5.5 to 7.4 inches of water in the upper 60 inches of soil. The soil moisture regime is mostly ustic and the soil temperature regime is mesic. Precipitation ranges from 8-12 inches annually.

Table 4. Representative soil features

Parent material	(1) Slope alluvium–metamorphic and sedimentary rock
Surface texture	(1) Sandy clay loam (2) Silty clay loam (3) Loam
Drainage class	Well drained
Permeability class	Slow to moderately slow
Depth to restrictive layer	152 cm
Soil depth	152 cm
Surface fragment cover <=3"	0–3%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	13.97–18.8 cm
Calcium carbonate equivalent (Depth not specified)	1–25%
Electrical conductivity (Depth not specified)	1–8 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0–20
Soil reaction (1:1 water) (Depth not specified)	7.9–9
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

State 1: Reference State

The reference state represents the plant communities and ecological dynamics of the greasewood and Wyoming big sagebrush site. This state includes the biotic communities that become established on the ecological site if all successional sequences are completed under the natural disturbance regime. The reference state is self sustaining and resistant to change due to high resistance to natural disturbances and high resilience following natural disturbances. When natural disturbances occur, the rate of recovery is variable due to disturbance intensity. Once invasive plants establish, return to the reference state may not be possible.

Reference State: Greasewood/sagebrush state with fluctuations form a greasewood shrubland to a grassland and a grassland/shrubland community.

Indicators: A community dominated by greasewood with Wyoming big sagebrush or perennial grasses.

Feedbacks: Continuous season long grazing of perennial grasses, frequent fire, or other disturbance that may allow for the establishment of invasive species.

At-risk Community Phase: This state is at risk when native plants are stressed and nutrients become available for

invasive plants to establish.

Trigger: The establishment of invasive plant species.

Community Phase 1.1: Perennial Shrubland

This community is characterized by a greasewood/Wyoming big sagebrush shrub canopy, where some perennial grasses are present. Commonly seen grasses include Indian ricegrass and squirreltail. As grass cover increases, shrub interspaces are filled. Other perennial grasses, shrubs, and forbs may or may not be present and cover is variable.

Community Phase Pathway 1.1a

Fire, insect herbivory and drought can reduce the greasewood and Wyoming big sagebrush dominance of this site and result in a grass dominated community.

Community Phase Pathway 1.1b

Less severe fire, insect herbivory, and drought can reduce the dominance of greasewood and Wyoming big sagebrush. This transition has occurred when shrub production is reduced, but greasewood and Wyoming big sagebrush remains a dominant species.

Community Phase 1.2: Perennial Grassland

This community is characterized by a perennial grassland, where some minimal amounts of shrubs are present. Commonly seen grasses include Indian ricegrass and squirreltail. Other perennial grasses, shrubs, and forbs may or may not be present and cover is variable.

Community Phase Pathway 1.2a

Time without disturbance and continuous season long grazing of perennial grasses results in a reduction of perennial grasses, and an increase in greasewood and Wyoming big sagebrush.

Community Phase 1.3: Perennial Grassland / Shrubland

This community is characterized by a perennial grassland and shrubland. In this phase, greasewood and Wyoming big sagebrush are co-dominant with perennial grasses. Commonly seen grasses include Indian ricegrass and squirreltail. Other perennial grasses, shrubs, and forbs may or may not be present and cover is variable.

Community Phase Pathway 1.3a

Time without disturbance and continuous season long grazing of perennial grasses results in a reduction of perennial grasses, and an increase in greasewood and Wyoming big sagebrush.

Community Phase Pathway 1.3b

Fire that reduces only some of the greasewood and Wyoming big sagebrush.

T1a – This transition is from the native perennial warm and cool season grass understory in the reference state to a state that contains invasive species. Events include establishment of invasive plant species, intense continuous grazing of perennial grasses, prolonged drought, and surface disturbances, etc. However, invasive species such as cheatgrass have been known to invade intact perennial plant communities with little to no disturbance. Once invasive species are found in the plant community a threshold has been crossed.

State 2: Current Potential State

Community Phase 2.1: Perennial Shrubland

This community is characterized by a greasewood shrub canopy, where some perennial grasses are present but contribute no more than 10 percent of total annual production. Commonly seen grasses include Indian ricegrass and squirreltail. As grass cover increases, shrub interspaces are filled. Other perennial grasses, shrubs, and forbs may or may not be present. Invasive species are present. Bare ground is variable (15-25%) depending on the amount of biological crusts (10 to 55).

Community Phase Pathway 2.1a

Fire, insect herbivory, and drought can reduce the greasewood dominance of this site and result in a grass dominated community.

Community Phase Pathway 2.1b

Less severe fire, insect herbivory, and drought can reduce the dominance of greasewood. This transition has occurred when greasewood production is reduced, but greasewood remains a dominant species.

Community Phase 2.2: Perennial Grassland

This community phase is characterized by a perennial grassland where some minimal amounts of shrubs are present. Commonly seen grasses include Indian ricegrass and squirreltail. Other perennial grasses, shrubs, and forbs may or may not be present. Invasive species are present.

Community Phase Pathway 2.2a

Time without disturbance and continuous season long grazing of perennial grasses results in a reduction of perennial grasses, and an increase in greasewood.

Community Phase 2.3: Perennial Grassland / Shrubland

This community is characterized by a perennial grassland and shrubland. In this phase, greasewood and Wyoming big sagebrush are co-dominant with perennial grasses. Commonly seen grasses include Indian ricegrass and squirreltail. Other perennial grasses, shrubs, and forbs may or may not be present. Invasive species are present.

Community Phase Pathway 2.3a

Time without disturbance and continuous season long grazing of perennial grasses results in a reduction of perennial grasses, and an increase in greasewood and Wyoming big sagebrush.

Community Phase Pathway 2.3b

Fire that reduces only some of the greasewood and Wyoming big sagebrush.

Transition T2A

This transition is from the current potential state into a state dominated by annual invasive plants. This transition occurs as events favor the increased establishment and dominance of annual invasive plants. Typically this occurs as a series of fires which lead to an increase in cheatgrass and a subsequent decrease in the fire return interval. Once invasive plant species drive the ecological dynamics of the site a threshold has been crossed.

State 3: Annual Grassland State

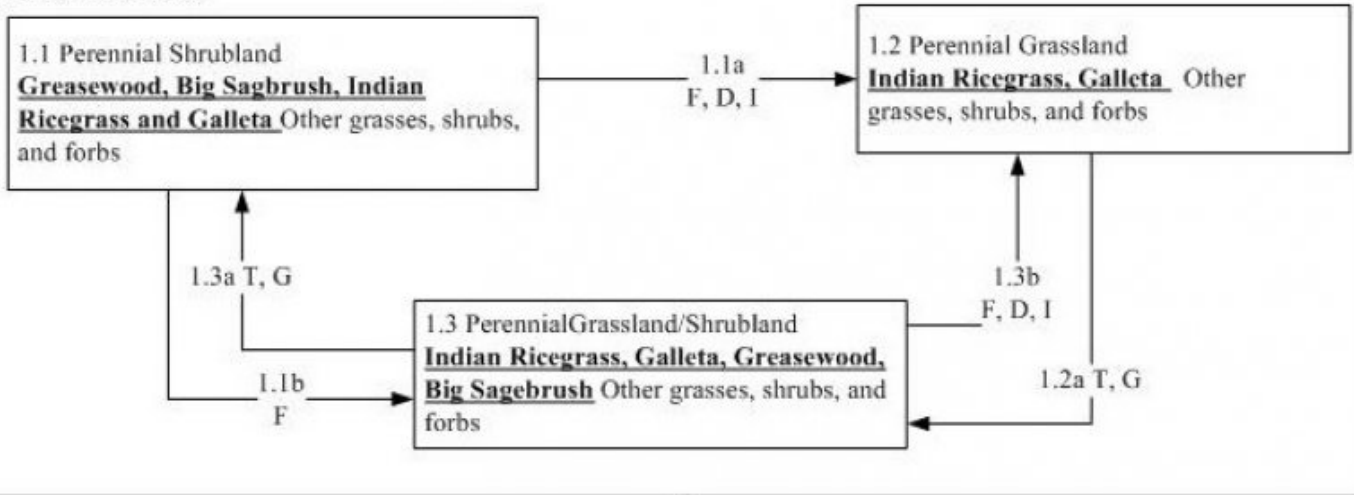
This community is characterized by the establishment and persistence of invasive annual grasses and forbs. The species of forbs and annual grasses present are a result of the area and seed sources. Due to the low number of sites currently in this state, the ability for this state to convert back to a shrubland is not well understood.

Community Phase 3.1: Cheatgrass Dominated

This community phase is characterized by the establishment and persistence of invasive annual grasses and forbs. The species of forbs and annual grasses present are a result of the area and seed sources.

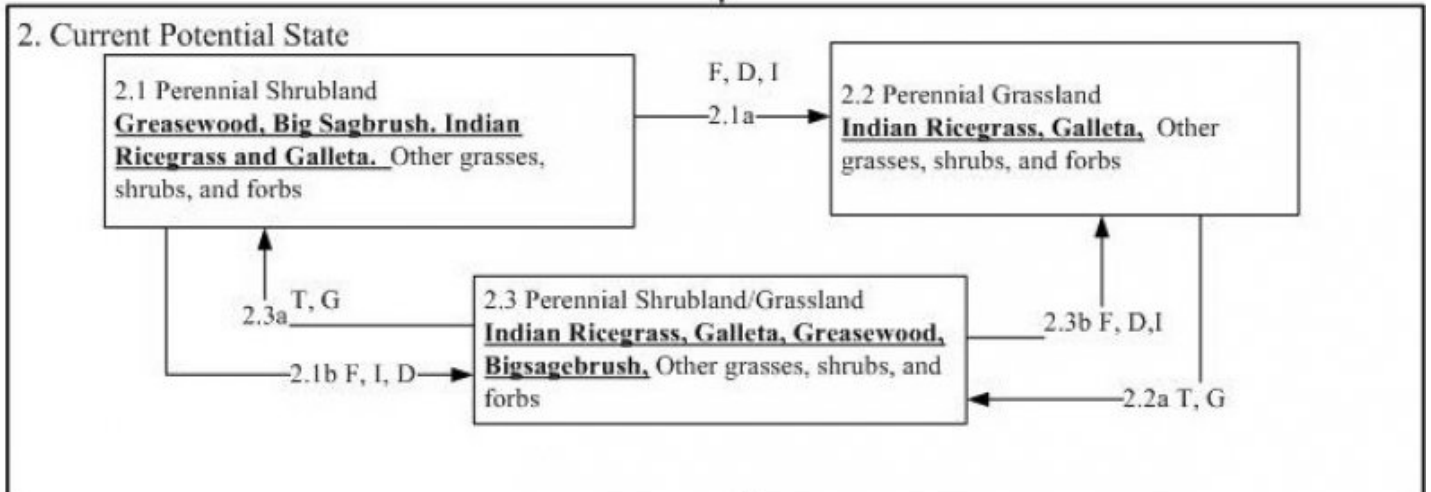
State and transition model

1. Reference State



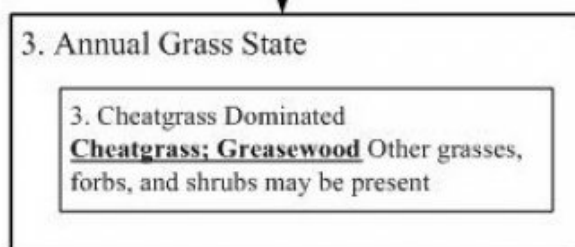
T1a E

2. Current Potential State



T2A RF

3. Annual Grass State



Legend

D = Drought
 F = Fire
 G = Continuous grazing of perennial grasses
 I = Insect Herbivory
 E = Establishment of Non-native Species
 T = Time without Disturbance
 RF = Reoccurring Fire

Approval

Kirt Walstad, 3/05/2022

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	05/04/2024
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:

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

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

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

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**
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17. **Perennial plant reproductive capability:**
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