

## Ecological site R034BY130UT Desert Shallow Sandy Loam (Shadscale)

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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

The soils of this site formed mostly in slope alluvium over residuum weathered from calcareous sandstone. Surface soils are very cobbly fine sandy loam, channery fine sandy 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 50 percent of the soil volume. These soils are shallow, well to somewhat excessively drained, and have a moderate to moderately rapid permeability. pH is slightly to strongly alkaline. Available water-holding capacity ranges from 0.5 to 1 inches of water in the upper 20 inches of soil. The soil moisture regime is typic aridic and the soil temperature regime is mesic. Precipitation ranges from 5-8 inches annually.

**Table 1. Dominant plant species**

|            |                                   |
|------------|-----------------------------------|
| Tree       | Not specified                     |
| Shrub      | (1) <i>Atriplex confertifolia</i> |
| Herbaceous | Not specified                     |

## Physiographic features

This site is found on benches and ridges with 3-30% slopes.

**Table 2. Representative physiographic features**

|                    |                                   |
|--------------------|-----------------------------------|
| Landforms          | (1) Ridge<br>(2) Structural bench |
| Runoff class       | High to very high                 |
| Flooding frequency | None                              |
| Ponding frequency  | None                              |
| Elevation          | 1,311–1,890 m                     |
| Slope              | 3–30%                             |
| Ponding depth      | Not specified                     |
| Water table depth  | Not specified                     |
| Aspect             | W, NW, N, NE, E, SE, S, SW        |

## Climatic features

Average annual precipitation is 5 to 8 inches. Approximately 60 to 70 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 8.4 degrees Celsius and the soil temperatures are in the mesic regime. The average freeze-free period is 110 to 140 days. In average years, plants begin growth around March 15 and end growth around October 15.

**Table 3. Representative climatic features**

|  |              |
|--|--------------|
| Frost-free period (characteristic range)   |              |
| Freeze-free period (characteristic range)  | 110-140 days |
| Precipitation total (characteristic range) | 127-203 mm   |

## Influencing water features

None.

## Soil features

The soils of this site formed mostly in slope alluvium over residuum weathered from calcareous sandstone. Surface soils are very cobbly fine sandy loam, channery fine sandy 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 50 percent of the soil volume. These soils are shallow, well to somewhat excessively drained, and have a moderate to moderately rapid permeability. pH is slightly to strongly alkaline. Available water-holding capacity ranges from 0.5 to 1 inches of water in the upper 20 inches of soil. The soil moisture regime is typic aridic and the soil temperature regime is mesic. Precipitation ranges from 5-8 inches annually.

**Table 4. Representative soil features**

|   |  |
|---|--|
| Parent material   | (1) Slope alluvium–calcareous sandstone<br>(2) Residuum–calcareous sandstone |
| Surface texture   | (1) Gravelly, channery, very cobbly fine sandy loam                          |
| Drainage class  | Well drained to somewhat excessively drained                                 |
| Permeability class                                      | Moderately rapid   |
| Depth to restrictive layer                              | 10–51 cm   |
| Soil depth  | 10–51 cm   |
| Surface fragment cover ≤3"                              | 13–30%   |
| Surface fragment cover >3"                              | 1–35%  |
| Available water capacity<br>(Depth not specified)       | 1.27–2.54 cm   |
| Calcium carbonate equivalent<br>(Depth not specified)   | 1–20%  |
| Electrical conductivity<br>(Depth not specified)        | 0–2 mmhos/cm   |
| Sodium adsorption ratio<br>(Depth not specified)        | 0–4  |
| Soil reaction (1:1 water)<br>(Depth not specified)      | 7.4–8.8  |
| Subsurface fragment volume ≤3"<br>(Depth not specified) | 0–42%  |
| Subsurface fragment volume >3"<br>(Depth not specified) | 0–22%  |

## Ecological dynamics

### State 1: Reference State

The reference state was determined by study of rangeland relic areas, areas protected from excessive disturbance and outside influences, such as grazing and recreation. Literature reviews, trends in plant community dynamics, and historical accounts are also considered.

The reference state represents the historic plant communities and ecological dynamics of the desert shallow sandy loam, shadscale site. This state includes the biotic communities that become established on the ecological site if all successional sequences are completed under current climatic conditions; natural disturbances are inherent in its development. This state is dominated by perennial grasses and shadscale. The primary disturbance mechanism is climate fluctuations. 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 relatively rapid due to niches being filled with highly adapted native vegetation.

Reference State: Community phases disturbed by climate fluctuations and insect herbivory.

Indicators: A site dominated by shadscale with bunchgrasses. Indian ricegrass and sand dropseed may or may not be present.

Feedbacks: Extended periods of above average precipitation resulting in an increase in the native perennial plant vigor. Insect herbivory that reduces shrub vigor and allows grass production to increase.

At-risk Community Phase: All communities are at risk when nutrients are available for invasive plants to establish. Plant community 1.2 is especially at risk due to limited production and cover of understory grasses.

Trigger: Introduction of invasive plants to fill available niches.

#### Community Phase 1.1: Shrubland with Grasses

This plant community phase is dominated by shadscale, and perennial grasses. Grasses may include but are not limited to, Indian ricegrass and galleta. Other perennial grasses may or may not be present. Other perennial shrubs, and forbs may be present and cover is variable.

#### Community Phase Pathway 1.1a

This pathway occurs when climatic events, such as drought disfavor the establishment and persistence of perennial grasses.

#### Community Phase 1.2: Shrubland

This plant community phase is dominated by shadscale and other various shrubs, where warm and cool season perennial grasses are minimally present. Grasses may include but are not limited to, Indian ricegrass and galleta. Other perennial grasses, shrubs, and forbs may or may not be present and cover is variable.

#### Community Phase Pathway 1.2a

This pathway occurs when climatic events, such as years with normal to above average precipitation favor the establishment of perennial grasses.

#### Transition T1a

This transition occurs as invasive species become established in the plant community. Common invasive species include cheatgrass, halogeton, and Russian thistle. Disturbances that may accelerate this transition include improper livestock grazing and extended drought. Invasive species such as cheatgrass have also been known to invade intact perennial plant community where no disturbance has occurred.

#### State 2: Current Potential State

This state is similar to state one, however there are invasive species established in the understory—cheatgrass and halogeton being the most common. The primary disturbance mechanism is climate fluctuations; however livestock grazing may influence the ecological dynamics of the site.

Current Potential State: Plant communities disturbed by fluctuating climatic conditions insect herbivory, and livestock grazing.

Indicators: A site dominated by shadscale and bunchgrasses, where Indian ricegrass and galleta dropseed may or may not be present. Invasive species are present.

Feedbacks: Fluctuations in climate allow for the maintenance of both shrubs and perennial grasses.

#### Community Phase 2.1: Shrubland with grasses

This plant community phase is dominated by shadscale, and perennial grasses. Grasses may include but are not limited to, Indian ricegrass and galleta. Other perennial or invasive grasses, shrubs, and forbs may or may not be present and cover is variable. This plant community is very similar to plant community 1.1 in production and cover. The main difference is that invasive species are present in this phase.

#### Community Phase Pathway 2.1a

This pathway occurs when events, such as drought or continuous season long grazing of perennial grasses, disfavor the persistence of perennial grasses.

#### Community Phase 2.2: Shrubland

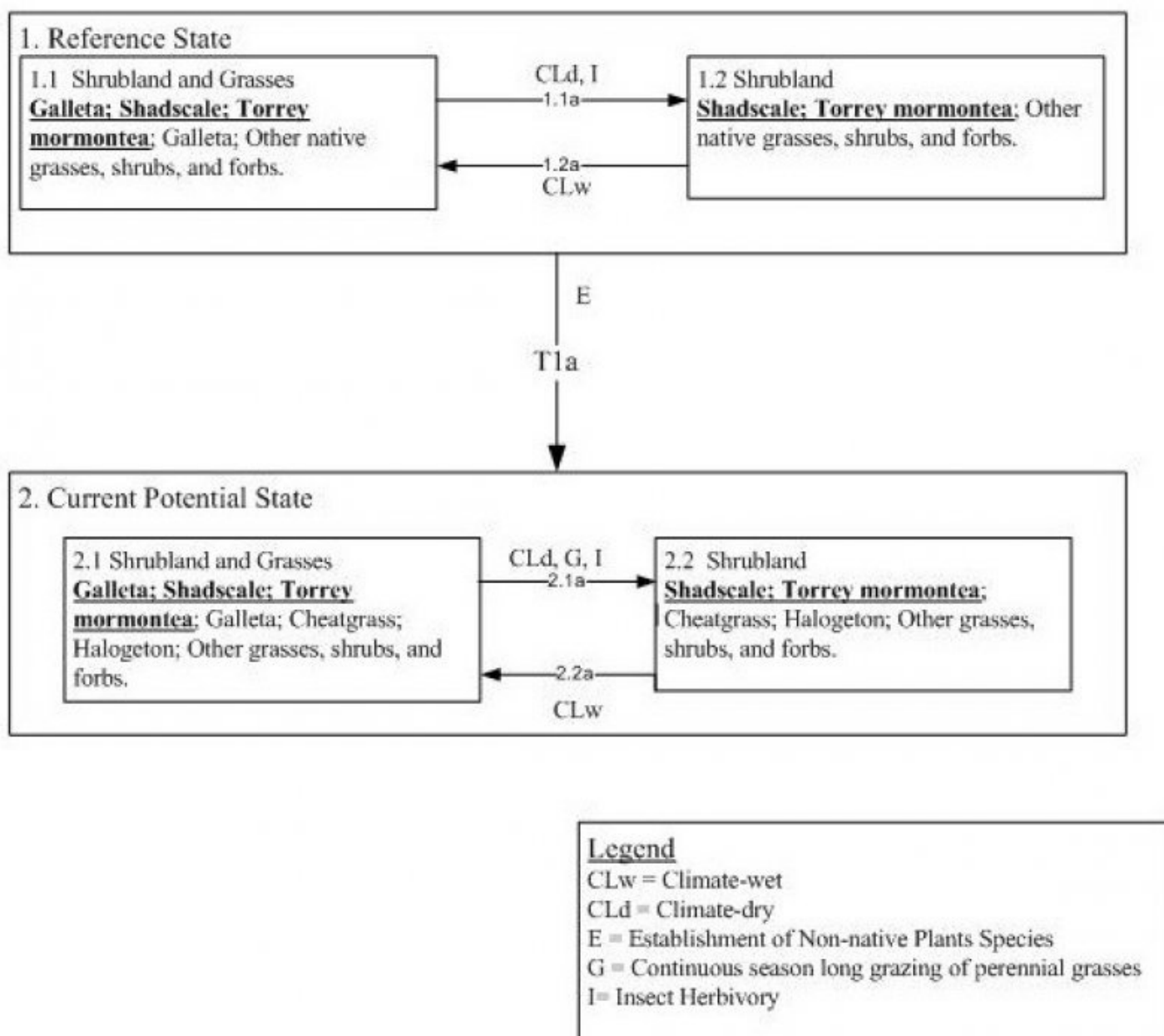
This plant community phase is dominated by shadscale and other various shrubs, where warm and cool season

perennial grasses are minimally present. Grasses may include but are not limited to, Indian ricegrass and galleta. Other perennial or invasive grasses, shrubs, and forbs may or may not be present and cover is variable. This plant community is very similar to plant community 1.2 in production and cover. The main difference is that invasive species are present in this phase.

### Community Phase Pathway 2.2a

This pathway occurs when events, such as years with normal to above average precipitation favor the establishment of perennial grasses, and when grazing regimes are used that promote the establishment and persistence of perennial grasses.

## State and transition model



## 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  | 05/05/2024        |
| Approved by                                 | Kirt Walstad      |
| Approval date                               |                   |
| Composition (Indicators 10 and 12) based on | Annual Production |

## Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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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:**

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