# Ecological site R034BY251UT
# Semidesert Very Steep Loam (Wyoming big sagebrush)

Last updated: 3/05/2022
Accessed: 04/17/2026

## 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

Characteristic soils in this site are 20 to 40 inches deep formed in colluvium and/or residuum weathered from sandstone and shale and well-drained. The soils commonly have a very stony loam surface. The underlying material is silty clay loam, which overlies soft weathered shale. Hard shale is at depths of 20 to 40 inches. Permeability is moderate to slow. Water supplying capacity is 3.3 to 3.9 inches and depends to a large extent on the depth to soft weathered shale. Effective rooting depth is generally 20 to 40 inches but may range to 10 inches. Runoff is very high and the hazard of water erosion is high and very high. The soil moisture regime is mostly ustic aridic and the soil temperature regime is mesic. Precipitation ranges from 8-12 inches annually.

## Associated sites

| | |
|---|---|
| **R034BY250UT** | **Semidesert Very Steep Loam (Salina Wildrye)**<br>Semidesert Very Steep Loam (Salina wildrye) |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | Not specified |
| Shrub | (1) *Artemisia tridentata ssp. wyomingensis* |
| Herbaceous | (1) *Leymus salinus ssp. salinus* |

## Physiographic features

This site occurs on canyon escarpments. Slopes are 50 to 70 percent. Elevations range from 4,000 to 7,000 feet on all aspects.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Escarpment |
| Runoff class | Very high |
| Flooding frequency | None |
| Ponding frequency | None |
| Elevation | 1,220 – 2,130 m |
| Slope | 50 – 70 % |
| Ponding depth | Not specified |
| Water table depth | Not specified |

## Climatic features

Average annual precipitation is 8 to 12 inches. Approximately 35% occurs as snow from November through February. On the average, May through June are the driest months and August through October are the wettest months. The climate of this ecosystem is semidesert with about 45 to 50 percent of the precipitation occuring during the plant growth period, March through October. Precipitation is extremely variable, generally, the driest month is June and the wettest month is July or October. Due to steepness of slope, occurance of surface rock fragments, and slow soil permeability associated with this site, a substantial amount of water leaves the site as runoff. The high intensity and limited duration of most summer rainstorms enhances runoff and reduces water available for plant growth. Yearly average plant growth begins around March 1 and ends around October 30.

**Table 3 Representative climatic features**

| | |
|---|---|
| Frost-free period (characteristic range) | |
| Freeze-free period (characteristic range) | 90-150 days |

| | |
|---|---|
| Precipitation total (characteristic range) | 200-310 mm |

### Influencing water features

None.

### Soil features

Characteristic soils in this site are 20 to 40 inches deep formed in colluvium and/or residuum weathered from sandstone and shale and well-drained. The soils commonly have a very stony loam surface. The underlying material is silty clay loam, which overlies soft weathered shale. Hard shale is at depths of 20 to 40 inches. Permeability is moderate to slow. Water supplying capacity is 3.3 to 3.9 inches and depends to a large extent on the depth to soft weathered shale. Effective rooting depth is generally 20 to 40 inches but may range to 10 inches. Runoff is very high and the hazard of water erosion is high and very high. The soil moisture regime is mostly ustic aridic and the soil temperature regime is mesic. Precipitation ranges from 8-12 inches annually.

Modal Soil: Thedalund Family Cool — fine-loamy, mixed calcareous, mesic Ustic Torriorthents

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Colluvium – sandstone and shale<br>(2) Residuum – sandstone and shale |
| Surface texture | (1) Very stony loam |
| Family particle size | (1) Fine-loamy |
| Drainage class | Well drained |
| Permeability class | Slow to moderate |
| Depth to restrictive layer | 50 – 100 cm |
| Soil depth | 50 – 100 cm |
| Surface fragment cover <=3" | 20 % |
| Surface fragment cover >3" | 20 % |
| Available water capacity<br>(Depth not specified) | 8.38 – 9.91 cm |

| | |
|---|---|
| Calcium carbonate equivalent<br>(Depth not specified) | Not specified |
| Electrical conductivity<br>(Depth not specified) | Not specified |
| Sodium adsorption ratio<br>(Depth not specified) | Not specified |
| Soil reaction (1:1 water)<br>(Depth not specified) | 7.9 – 10 |
| Subsurface fragment volume <=3"<br>(Depth not specified) | 10 % |
| Subsurface fragment volume >3"<br>(Depth not specified) | Not specified |

**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. 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.

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, Salina wildrye, Indian ricegrass and galleta. Shadscale and winterfat are also commonly present in the shrub layer.
Bottlebrush squirreltail and needle-and-thread are also commonly present. Abundant forbs including sego lily and tufted milkvetch. 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, Salina wildrye, Indian ricegrass and galleta. Shadscale and winterfat are also commonly present in the shrub layer.
Bottlebrush squirreltail and needle-and-thread are also commonly present. Abundant forbs including sego lily and tufted milkvetch.

Natural fire frequency is estimated to be 10 to 70 years (USDA-FS, 2006). 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. Yellow rabbitbrush may increase also. Shrubs become decadent due to age. Indian ricegrass, needle-and-thread 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 (i.e. African Mustard (Malcolmia africana)), 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 co-dominant 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

**Figure 1. STM**

**Figure 2. Legend**

## Additional community tables

**Table 5. Community 1.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production () | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Shrub/Vine** | | | | | |
| 0 | **Dominant Shrubs** | | | 215-252 | |
| | Wyoming big sagebrush | ARTRW8 | *Artemisia tridentata ssp. wyomingensis* | 101-135 | – |
| | shadscale saltbush | ATCO | *Atriplex confertifolia* | 67-101 | – |
| | yellow rabbitbrush | CHVI8 | *Chrysothamnus viscidiflorus* | 34-67 | – |
| | broom snakeweed | GUSA2 | *Gutierrezia sarothrae* | 7-20 | – |
| | winterfat | KRLA2 | *Krascheninnikovia lanata* | 7-20 | – |
| 3 | **Sub-Dominant Shrubs** | | | 81-208 | |
| | Shrub (>.5m) | 2SHRUB | *Shrub (>.5m)* | 34-67 | – |
| | Gardner's saltbush | ATGA | *Atriplex gardneri* | 7-20 | – |
| | Torrey's jointfir | EPTO | *Ephedra torreyana* | 7-20 | – |
| | rubber rabbitbrush | ERNA10 | *Ericameria nauseosa* | 7-20 | – |
| | cushion buckwheat | EROV | *Eriogonum ovalifolium* | 7-20 | – |
| | bud sagebrush | PIDE4 | *Picrothamnus desertorum* | 7-20 | – |
| | shortspine horsebrush | TESP2 | *Tetradymia spinosa* | 7-20 | – |
| | Spanish bayonet | YUHA | *Yucca harrimaniae* | 7-20 | – |
| **Grass/Grasslike** | | | | | |
| 0 | **Dominant Grasses** | | | 229-370 | |
| | saline wildrye | LESAS | *Leymus salinus ssp. salinus* | 202-235 | – |
| | Indian ricegrass | ACHY | *Achnatherum hymenoides* | 7-34 | – |
| | squirreltail | ELEL5 | *Elymus elymoides* | 7-34 | – |
| | needle and thread | HECO26 | *Hesperostipa comata* | 7-34 | – |
| | James' galleta | PLJA | *Pleuraphis jamesii* | 7-34 | – |
| 1 | **Sub-Dominant Grasses** | | | 13-67 | |
| | Grass, annual | 2GA | *Grass, annual* | 7-34 | – |
| | Grass, perennial | 2GP | *Grass, perennial* | 7-34 | – |
| **Forb** | | | | | |
| 2 | **Sub-Dominant Forbs** | | | 94-215 | |
| | Forb, annual | 2FA | *Forb, annual* | 34-67 | – |

| | | | | | |
|---|---|---|---|---|---|
| | Forb, perennial | 2FP | *Forb, perennial* | 34-67 | – |
| | tufted milkvetch | ASSP6 | *Astragalus spatulatus* | 7-20 | – |
| | sego lily | CANU3 | *Calochortus nuttallii* | 7-20 | – |
| | flatspine stickseed | LAOC3 | *Lappula occidentalis* | 7-20 | – |

### Animal community

Because of steep slopes this site is seldom used by livestock. This site provides food and cover for wildlife. Wildlife using this site include jackrabbit, hawk, coyote, and mule deer.

### Hydrological functions

The soil is in hydrologic group c. The runoff curve numbers are 74 through 86 depending on the condition of the watershed.

### Recreational uses

Because of steep slopes this site has very limited recreation potential.

### Wood products

Invasion of Utah juniper may produce firewood.

### Inventory data references

Type Location: Consult the Grand County Soil Survey Report.

### Contributors

George Cook

### 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.

| | |
|---|---|
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| Date | 04/09/2012 |
| Approved by | |
| Approval date | |

| | |
|---|---|
| Composition (Indicators 10 and 12) based on | Annual Production |

### Indicators

1. **Number and extent of rills:** **Rills are common. Their expression may be less defined where coarse fragments (i.e., gravels and/or channers) dominate the soil surface. Rill occurrence may increase slightly on areas located below exposed bedrock or other water shedding areas where increased runoff may occur. Rills should be <1 inches deep, somewhat long (8 to 16 feet) and somewhat widely spaced (8-12 feet). An increase in rill development may be observed immediately following major thunderstorm or spring runoff events.**

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2. **Presence of water flow patterns:** **Sinuous flow patterns are common and wind around perennial plants and surface rock. Evidence of flow patterns is expected to increase somewhat as slopes approach 80%. Water flow patterns are long (20 to 30 feet), somewhat narrow (1 to 2 feet wide), and spaced widely (5 to 10 yards) and more closely spaced(3 to 6 yards) on slopes nearing 70 to 80%.**

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3. **Number and height of erosional pedestals or terracettes:** **Small pedestals will form at the base of plants that occur on the edge of water flow patterns, 2 to 4% of plants show minor exposed roots. Terracettes are fairly common, forming behind debris dams of small to medium sized litter (up to 2 inches in diameter) in water flow patterns. These debris dams may accumulate smaller litter (leaves, grass and forb stems) and sediment.**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** **20–25%. (Soil surface is typically covered by 30-75% surface fragments). Most bare ground is associated with water flow patterns, rills, and gullies. Bare ground spaces not associated with flow patterns should not be greater than 1 to 2 feet in diameter.**

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5. **Number of gullies and erosion associated with gullies:** **A few gullies may occur. Any gullies preaent may extend down the length of the site until they reach a stream or other area where water and sediment is deverted or accumulates. Gullies show slightly more indication of erosion as slopes approach 80%, or where the site occurs adjacent to watershed areas with concentrated flow patterns.**

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6. **Extent of wind scoured, blowouts and/or depositional areas:** **None. Perennial shrubs along with surface coarse fragments on this site help break the wind and reduce the potential for wind erosion.**

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7. **Amount of litter movement (describe size and distance expected to travel):** **Because of the sites very steep slopes, some litter redistribution downslope caused by water movement is normal. Some litter removal may occur in flow channels with deposition occurring within 3 to 5 feet at points of obstruction. The majority of litter still accumulates at the base of plants. Some grass leaves, stems and small woody twigs may accumulate in soil depressions adjacent to plants. Woody stems are likely to move 1 to 2 feet. A slight increase in litter movement is expected following runoff resulting from heavy spring runoff or thunderstorms.**

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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):** **This site should have an erosion rating of 4 or 5 under the plant canopies, and a rating of 3 to 4 in the interspaces. The average should be a 4. Vegetation cover, litter, biological soil crusts and surface rock reduce erosion.**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): (Thedalund Family, Cool, 50-80% slopes) Soil surface A horizon is typically 0 to 2 inches deep. Structure is moderate thin platy. Color is pale olive (5YR 6/3). Use the specific information for the soil you are assessing found in the published soil survey to supplement this description.**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: Good spatial distribution of well developed biological soil crusts (where present) intercept raindrops, reducing splash erosion and providing areas of increased surface detention to store water, allowing additional time for infiltration.**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site): None. Weathered shale bedrock occurs at about 22 inches.**

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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: Non-sprouting shrubs (Wyoming big sagebrush, shadscale > cool season perennial grasses (Salina wildrye, Indian ricegrass) >> warm season rhizomatous grasses (James galleta).**

    **Sub-dominant: Sprouting shrubs (green rabbitbrush) > cool season perennial grasses (bottlebrush squirreltail, needle-and-thread) = > forbs (tufted milkvetch, grassy rock goldenrod) > biological soil crusts (where present).**

    **Other: Functional/structural groups may appropriately contain non-native species if their ecological function is the same as the native species in the reference state. Biological soil crust is variable in its expression where present on this site and is measured as a component of ground cover. Forbs can be expected to vary widely in their expression in the plant community based upon departures from average growing conditions.**

    **Additional: Factors contributing to temporal variability include insects and other pathogens (mistletoe), drought, extreme precipitation events, etc. Factors contributing to spatial variability include slope, amount of rock fragments, aspect, etc. Following a recent disturbance such as fire, drought or insects, that may remove the woody vegetation, forbs and perennial grasses (herbaceous species) may become more dominate in the community. These conditions may reflect a different functional community phase within the reference state.**

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence): During years with average to above-average precipitation, there should be very little recent mortality or decadence apparent on shrubs, or grasses. There may be partial mortality on individual bunchgrasses and shrubs during drought periods, and complete mortality of individual plants during severe drought periods.**

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14. **Average percent litter cover (%) and depth ( in): Cover should be composed mostly of fine litter. Depth should vary from a 1 to 2 leaf thickness in the interspaces, to up to 1/2" under herbaceous canopies, and up to 1" under shrub canopies. Litter cover may increase to 30% on some years due to increased production of plants.**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production): Annual production in air-dry herbage should be approximately 550 - 600#/acre on an average year, but could range from 350 to 800#/acre during periods of prolonged drought or above average precipitation.**

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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:** Few invasive species are capable of dominating this site. When invasion does occur, cheatgrass, alyssum, and mustard species are the most likely species to invade.

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17. **Perennial plant reproductive capability:** All perennial plants should have the ability to reproduce in all years, except in extreme drought years. There are no restrictions on either seed or vegetative reproduction. Some seedling recruitment of major species is present during average and above average growing years.

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