

Ecological site R025XY415UT **Mountain Shallow Gravelly Ridge (Black Sagebrush)**

Accessed: 05/11/2025

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.



Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

Associated sites

R025XY412UT	Mountain Gravelly Loam (Mountain Big Sagebrush) This site is also a similar site with <i>Differentiae</i> .
-------------	---

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia nova</i>
Herbaceous	Not specified

Physiographic features

This site can be found on mountain slopes on steep to very steep slopes. It can occur at elevations between 6,200 to 7,800 feet. Flooding and ponding do not occur on this site.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Flooding frequency	None

Ponding frequency	None
Elevation	6,200–7,800 ft
Slope	30–60%

Climatic features

The climate is cold and snowy in the winter and warm and dry in the summer. Approximately 40 percent of the precipitation comes as rain from June through September. On the average July and August are the driest months and December through March are the wettest months.

Mean Annual Air Temperature: 40-44

Mean Annual Soil Temperature: 42-47

Table 3. Representative climatic features

Frost-free period (average)	0 days
Freeze-free period (average)	80 days
Precipitation total (average)	22 in

Influencing water features

Soil features

The soils on this site were formed in colluvium derived from limestone and chert. The soil is well drained with moderate permeability in the upper 10 inches of soil. The soil is also deep with bedrock greater than 20 inches beneath the soil surface. The soil texture at the surface is very gravelly loam and surface gravels are 35% by cover and subsurface gravels are 24% by volume. Surface and subsurface rocks over 3 inches in diameter are 11% and 29% by cover and volume, respectively. Available water capacity is between 1.9 and 3.0 in the upper 40 inches of soil. The soil pH is between 7.9 and 8.4. The soil temperature regime is frigid.

Soils associated with this site:

Box Elder Co. UT601 – Ridgecrest (70)

Table 4. Representative soil features

Surface texture	(1) Very gravelly loam
Drainage class	Well drained
Permeability class	Moderate
Soil depth	40–60 in
Surface fragment cover ≤3"	35%
Surface fragment cover >3"	11%
Available water capacity (0-40in)	1.9–3 in
Calcium carbonate equivalent (0-40in)	15–25%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	7.9–8.4

Subsurface fragment volume <=3" (Depth not specified)	24%
Subsurface fragment volume >3" (Depth not specified)	29%

Ecological dynamics

As this site deteriorates due to grazing pressure Thurber needlegrass, bluebunch wheatgrass, and Indian ricegrass decrease while black sagebrush, low rabbitbrush, and bluegrass increase. When the potential natural plant community is burned, Thurber needlegrass, longleaf hawksbeard, and bitterbrush decrease while low rabbitbrush, balsamroot, and milkvetch increase. Cheatgrass, halogeton, and annual forbs are most likely to invade this site.

State and transition model

Ecosystem states

1. Reference State

State 1 submodel, plant communities

1.1. Reference State

State 1 Reference State

Community 1.1 Reference State

The general view of this site is black sagebrush and grass. The composition by air-dry weight is approximately 45 percent perennial grasses, 15 percent forbs, and 40 percent shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	90	203	360
Shrub/Vine	80	180	320
Forb	30	68	120
Total	200	451	800

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	15-30%
Grass/grasslike foliar cover	10-30%
Forb foliar cover	5-10%
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	—	—	—	5-15%
>1 <= 2	—	25-35%	25-35%	—
>2 <= 4.5	—	—	—	—
>4.5 <= 13	—	—	—	—
>13 <= 40	—	—	—	—
>40 <= 80	—	—	—	—
>80 <= 120	—	—	—	—
>120	—	—	—	—

Figure 3. Plant community growth curve (percent production by month).
UT4151, PNC. Excellent Condition0.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1	9	17	22	19	13	8	5	3	1	1

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
0	Primary Shrub			125–150	
	black sagebrush	ARNO4	<i>Artemisia nova</i>	125–150	–
3	Secondary Shrubs			50–75	
	yellow rabbitbrush	CHVIL4	<i>Chrysothamnus viscidiflorus ssp. lanceolatus</i>	15–25	–
	spiny hopsage	GRSP	<i>Grayia spinosa</i>	15–25	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	15–25	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	15–25	–
Grass/Grasslike					
0	Primary Grasses			165–225	
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	100–125	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	50–75	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	15–25	–
1	Secondary Grasses			15–25	
	squirreldail	ELEL5	<i>Elymus elymoides</i>	5–15	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	5–15	–
Forb					
0	Primary Forbs			30–50	
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	15–25	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	15–25	–
2	Secondary Forbs			15–25	
	cushion buckwheat	EROV	<i>Eriogonum ovalifolium</i>	5–15	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	5–15	–

Animal community

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

Wildlife using this site include blacktail jackrabbit, coyote, sage grouse, 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

Hunting and Hiking

Wood products

None

Other information

Threatened and endangered species include plants and animals.

Type locality

Location 1: Box Elder County, UT	
Township/Range/Section	T12N R18W S8
General legal description	2500 ft N 3800 ft W of SW corner of Section 8, Township 12N, Range 18W. Four miles North of Etna Reservoir

Contributors

GBB

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)	Brock Benson (NRCS), Shane A. Green (NRCS), Robert D. Stager (BLM), Mike Gates (BLM), Tyler Staggs (BLM), Alan Bass (BLM).
Contact for lead author	shane.green@ut.usda.gov
Date	03/30/2007
Approved by	Shane A. Green
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- 1. Number and extent of rills:** Few rills present. This site is subject to rilling even in reference condition due to slope, erodible soils, and percent bare ground. Rill development may increase following large storm events, but should begin to heal during the following growing season. Frost heaving will accelerate recovery. Rill development may increase when run inflow enters site from other sites that produce large amounts of runoff (i.e. steeper sites, slickrock, rock outcrop).
- 2. Presence of water flow patterns:** Water flow patterns are common. Some are long (15-20'). They are generally very widely spaced (about 20-30' apart). Flow patterns occur in low places associated with microtopography commonly occurring on this site.
- 3. Number and height of erosional pedestals or terracettes:** Plants may have small pedestals (1") where they are adjacent to water flow patterns, but without exposed roots. Terracettes should be few and stable. Terracettes should be small. Some plants may appear to have a pedestal but rather than be formed by erosion, they are the result of litter and soil accumulating at plant bases, forming the appearance of a pedestal.
- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not**

bare ground): 30-40% bare ground (soil with no protection from raindrop impact). Very few if any bare spaces of greater than 1 square foot. In general, bare ground increases as production decreases. As species composition of shrubs relative to grasses increases, bare ground is likely to increase. Poorly developed biological soil crust that is susceptible to erosion from raindrop impact should be recorded as bare ground.

5. **Number of gullies and erosion associated with gullies:** None to very few. Gullies should show only minor signs of active erosion and should be mostly stabilized with perennial vegetation and rock fragments. Gullies may show slightly more indication of erosion as slope steepens, or as the site occurs adjacent to steep areas with concentrated flow patterns.
6. **Extent of wind scoured, blowouts and/or depositional areas:** None. Wind scoured (blowouts) and depositional areas are not expected.
7. **Amount of litter movement (describe size and distance expected to travel):** Most litter resides in place but on steep slopes (>30%), at least half of the litter is likely to be transported downhill by wind or water short. Litter rarely moves more than 1-2' to next obstruction. Leaves, stems, and small twigs will accumulate at plant bases, against rocks, in soil depressions, or against larger woody litter. Woody litter is not likely to move.
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 to 5 under plant canopies and a rating of 3 to 4 in the interspaces with an average rating of 4 using the soil stability kit test.
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A1--0 to 5 cm; grayish brown (10YR 5/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; weak very thin platy structure parting to weak very fine granular; soft, very friable, slightly sticky and slightly plastic; many very fine interstitial pores; few calcium carbonate coats on bottom of rock fragments; 35 percent dark gray (N 4/) fine angular gravel; strongly effervescent; neutral (pH 7.0); clear smooth boundary.
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Shrubs and well-developed biological soil crusts provide most of the interception of rainfall that prevents erosion. Biological soil crusts are resistant to raindrop impact and splash erosion. Biological soil crusts also provide surface roughness that slows runoff, allowing time for infiltration. Bunchgrasses, if present, may contribute to slowing runoff, but canopy cover from bunchgrasses is too low to provide much rainfall interception. Interspaces between shrubs and biological soil crusts may serve as water flow paths during episodic runoff events, with natural erosion expected in severe storms.
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** A compaction layer is not expected.
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: Dominant: Non-sprouting shrubs (black sagebrush) = Perennial cool-season bunchgrasses (Thurber's needlegrass, Indian ricegrass, bluebunch wheatgrass)

Sub-dominant: Sub-dominant: Perennial forbs (arrowleaf balsamroot, tapertip hawksbeard)

Other: Other: Other shrubs > other perennial grasses = forbs

Additional: Disturbance regime includes drought, insects, and very infrequent fire.

Dominance by average annual production: perennial bunchgrasses > non-sprouting shrubs > native perennial and annual forbs > sprouting shrubs. Functional/structural groups may appropriately contain non-native species if their ecological function is the same as the native species in the reference state (e.g. Crested wheatgrass, intermediate wheatgrass, Siberian Wheatgrass etc.)

Following a recent disturbance such as drought, fire or insects that removes the woody vegetation, forbs and perennial grasses (herbaceous species) may dominate the community. If a disturbance has not occurred for an extended period of time, woody species may continue to increase crowding out the perennial herbaceous understory species. In either case, these conditions would reflect a functional community phase within the reference state.

-
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 in either the shrubs or grasses. Some mortality of bunchgrass and other shrubs may occur during very severe (long-term) droughts. There may be partial mortality of individual bunchgrasses and shrubs during less severe drought and toward the end of the fire cycle. Long-lived species dominate the site. Open spaces from disturbance are quickly filled by new plants through seedlings and asexual reproduction (tillering).
-
14. **Average percent litter cover (%) and depth (in):** Litter cover includes litter under plants. Most litter will be fine (herbaceous) litter. Litter will be concentrated under plant canopies and sparser between plant canopies, with an average cover of 5-15% and an average depth of 0.25-0.5 inches. Litter cover may increase following years with favorable growing conditions. Excess litter may accumulate in absence of disturbance. Vegetative production may be reduced if litter cover exceeds 40%.
-
15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 400-500 lbs/acre
Even the most stable communities exhibit a range of production values. Production will vary between communities and across the MRLA. Refer to the community descriptions in the ESD. Production will differ across the MLRA due to the naturally occurring variability in weather, soils, and aspect. The biological processes on this site are complex; therefore, representative values are presented in a land management context.
-
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:** Cheatgrass, Russian thistle, Utah juniper
-
17. **Perennial plant reproductive capability:** All perennial plants should have the ability to reproduce sexually or asexually, except in drought years. Density of plants indicates that plants reproduce at level sufficient to fill available resource.

Within capability of site there are no restrictions on seed or vegetative reproductive capacity.
