

# Ecological site R025XY416UT Mountain Shallow Loam (Low 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.

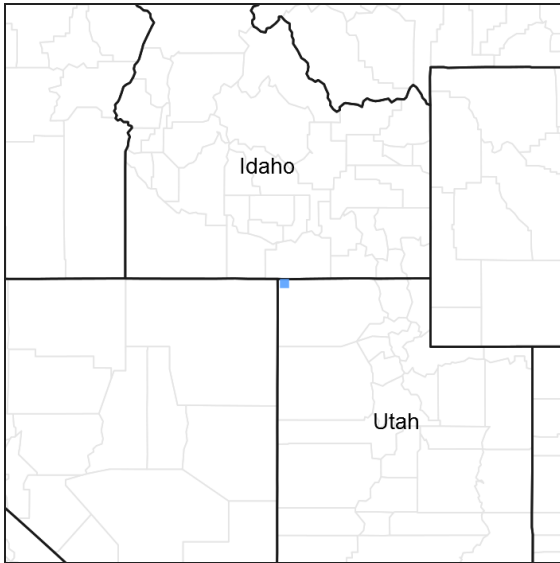


Figure 1. Mapped extent

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	<b>Mountain Gravelly Loam (Mountain Big Sagebrush)</b> This site is also a similar site with differentiae of soil and plants.
R025XY414UT	<b>Mountain Mahogany Thicket (Curl-leaf Mountain Mahogany)</b>

Table 1. Dominant plant species

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

## Physiographic features

This site can be found on ridges on gentle to steep slopes. It can occur at elevations between 6,200 to 7,200 feet. Flooding or ponding do not occur on this site.

Table 2. Representative physiographic features

Landforms	(1) Ridge
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Flooding frequency	None
Ponding frequency	None
Elevation	1,890–2,195 m
Slope	5–30%

## 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 though March are the wettest months. In average years, grasses begin growth around June 1 and end growth around September 30.

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)	90 days
Precipitation total (average)	559 mm

## Influencing water features

### Soil features

The soils on this site were formed in colluvium or alluvium derived from extrusive igneous rock. The soil is well drained with moderate permeability in the upper 10 inches of soil. The soil is also shallow with bedrock less than 20 inches beneath the soil surface. A lithic bedrock layer is found between 10 and 20 inches from the soil surface. The soil texture at the surface is loam and surface and subsurface rock fragments are less than 15% by cover and volume. Available water capacity is between 2.1 and 2.7 in the upper 40 inches of soil. The soil temperature regime is frigid.

Soils associated with this site:

Box Elder Co. UT601 – Bearskin (34)

**Table 4. Representative soil features**

Surface texture	(1) Loam
Drainage class	Well drained
Permeability class	Moderate
Soil depth	25–51 cm
Surface fragment cover <=3"	6%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	5.33–6.86 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0

Soil reaction (1:1 water) (0-101.6cm)	6.1–6.5
Subsurface fragment volume <=3" (Depth not specified)	5%
Subsurface fragment volume >3" (Depth not specified)	0%

## Ecological dynamics

As this site deteriorates due to grazing pressure Idaho fescue and bluebunch wheatgrass decrease while low sagebrush and low rabbitbrush increase. When the potential natural plant community is burned, low sagebrush decrease while low rabbitbrush and snowberry increase.

## State and transition model

### Ecosystem states

1. Reference State
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### State 1 submodel, plant communities

1.1. Reference State
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## State 1 Reference State

## Community 1.1 Reference State

The general view of this site is low sagebrush and grass. The composition by air-dry weight is approximately 30 percent perennial grasses, 10 percent forbs, and 60 percent shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	101	370	538
Shrub/Vine	202	370	538
Forb	34	62	90
<b>Total</b>	<b>337</b>	<b>802</b>	<b>1166</b>

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	20-40%
Grass/grasslike foliar cover	10-20%
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 (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	–
>0.15 <= 0.3	–	–	–	5-15%
>0.3 <= 0.6	–	35-45%	15-25%	–
>0.6 <= 1.4	–	–	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

**Figure 4. Plant community growth curve (percent production by month).  
UT4161, PNC. Excellent Condition.**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	20	50	5	10	5	5	0	0

## Additional community tables

**Table 8. Community 1.1 plant community composition**

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Shrub/Vine</b>					
0	<b>Primary Shrubs</b>			229–336	
	little sagebrush	ARAR8	<i>Artemisia arbuscula</i>	168–235	–
	yellow rabbitbrush	CHVIL4	<i>Chrysothamnus viscidiflorus</i> ssp. <i>lanceolatus</i>	20–34	–
	mountain snowberry	SYOR2	<i>Symphoricarpos oreophilus</i>	20–34	–
	Nuttall's horsebrush	TENU2	<i>Tetradymia nuttallii</i>	20–34	–
3	<b>Secondary Shrubs</b>			34–67	
	Saskatoon serviceberry	AMAL2	<i>Amelanchier alnifolia</i>	7–20	–
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	7–20	–
	curl-leaf mountain mahogany	CELE3	<i>Cercocarpus ledifolius</i>	7–20	–
<b>Grass/Grasslike</b>					
0	<b>Primary Grasses</b>			108–168	
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	67–101	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	20–34	–
1	<b>Secondary Grasses</b>			34–67	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	7–20	–
	Letterman's needlegrass	ACLE9	<i>Achnatherum lettermanii</i>	7–20	–
	Columbia needlegrass	ACNE9	<i>Achnatherum nelsonii</i>	7–20	–
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	7–20	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	7–20	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	7–20	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	7–20	–
<b>Forb</b>					
2	<b>Forbs</b>			34–67	
	low pussytoes	ANDI2	<i>Antennaria dimorpha</i>	7–20	–
	Torrey's milkvetch	ASCA9	<i>Astragalus calycosus</i>	7–20	–
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	7–20	–
	northwestern Indian paintbrush	CAAN7	<i>Castilleja angustifolia</i>	7–20	–
	sego lily	CANU3	<i>Calochortus nuttallii</i>	7–20	–
	cushion buckwheat	EROV	<i>Eriogonum ovalifolium</i>	7–20	–
	scarlet gilia	IPAGA3	<i>Ipomopsis aggregata</i> ssp. <i>aggregata</i>	7–20	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	7–20	–

## 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 D. The runoff curve numbers are 80 through 89 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	T14N R18W S28
General legal description	NE ¼, NE ¼, Section 28, Township 14N, Range 18W

## 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.

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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:** No rills present. Very minor rill development may occur in sparsely vegetated areas. If rills are present, they should be widely spaced and not connected. 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 adjacent sites that produce large amounts of runoff (i.e. steeper sites, slickrock, rock outcrop). Site is essentially level and rills do not form.

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- 2. Presence of water flow patterns:** Water flow patterns will be very short (1-3'), narrow (<1'), and meandering; interrupted by plants and exposed rocks. Slight to no evidence of erosion or deposition associated with flow patterns.

Where slopes exceed 5%, water flow patterns may be of medium length (5 –10 feet).

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3. **Number and height of erosional pedestals or terracettes:** Plants may have small pedestals (1-3") where they are adjacent to water flow patterns, but without exposed roots. Terracettes should be few and stable. Terracettes should be small (1-3") and show little sign of active erosion. 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.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 15-30% 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.

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5. **Number of gullies and erosion associated with gullies:** No gullies present.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Very minor evidence of active wind-generated soil movement. Wind scoured (blowouts) and depositional areas are rarely present. If present they have muted features and are mostly stabilized with vegetation and/or biological crust.

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7. **Amount of litter movement (describe size and distance expected to travel):** Most litter resides in place with some redistribution caused by water and wind movement. Very minor litter removal may occur in water flow paths with deposition occurring at points of obstruction. Where litter movement does occur, litter accumulates at plant bases. Some leaves, stems, and small twigs may accumulate in soil depressions adjacent to plants. Woody stems are not likely to move.

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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 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.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A--0 to 5 inches; dark grayish brown (10YR 4/2) coarse sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; few medium and fine roots; few fine tubular pores; slightly acid (pH 6.2); clear smooth boundary. (3 to 7 inches thick)

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Bunchgrasses and shrubs are equally important for increasing infiltration and reducing runoff. Plant litter and canopy cover from all functional groups intercept rainfall and prevent splash erosion. Bunchgrasses contribute organic matter directly to soil through root decay, and organic matter helps stabilize soil aggregates and maintain soil porosity. Shrubs hold snow and slow wind evaporation. Bunchgrass bases intercept litter and soil in water flow paths, reducing runoff. Biological soil crusts (where present) are resistant to raindrop impact and splash erosion. Spatial distribution of vascular plants and well-developed biological soil crusts (where present) provides

detention storage and surface roughness that slows runoff allowing time for infiltration. Interspaces between plants and any well-developed biological soil crusts (where present) may serve as water flow patterns during episodic runoff events, with natural erosion expected in severe storms.

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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):** A compaction layer is not expected.
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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: Dominant: Non-sprouting shrubs (low sagebrush) > perennial cool-season bunchgrasses (Idaho fescue, Sandberg bluegrass, bluebunch wheatgrass)

Sub-dominant:

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

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

Dominance by average annual production: Non-sprouting Shrubs > perennial bunchgrasses > sprouting shrubs > native perennial and annual forbs. 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, Smooth brome, 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.

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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 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).
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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 10-20% and an average depth of 0.5-0.75 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%.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 650-750 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.



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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: Cheatgrass, halogeton, kochia, Russian thistle, Utah juniper
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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.
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