

Ecological site R028AY208UT

Semidesert Bouldery Loam (Wyoming Big Sagebrush)

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General information

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

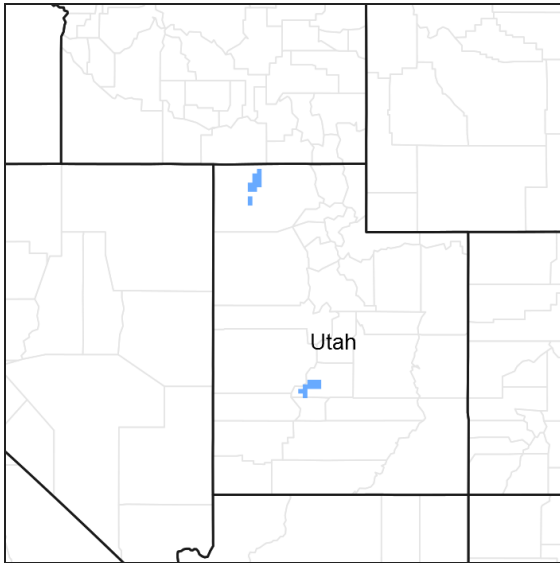


Figure 1. Mapped extent

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

R028AY124UT	Desert Loam (Shadscale)
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Similar sites

R028AY220UT	Semidesert Loam (Wyoming Big Sagebrush)
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Table 1. Dominant plant species

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

Physiographic features

This site occurs on hillsides and ridges of ancient basalt flows.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge
Elevation	1,372–1,676 m
Slope	10–50%

Climatic features

The climate is semi-arid and characterized by cold winters and warm dry summers. The average annual precipitation is 8 to 12 inches. Approximately 70 percent comes as rain from March through October. On the average, June through September are the driest months and March through May are the wettest months.

Mean Annual Air Temperature: 45-50
Mean Annual Soil Temperature: 48-52

Table 3. Representative climatic features

Frost-free period (average)	125 days
Freeze-free period (average)	0 days
Precipitation total (average)	254 mm

Influencing water features

Soil features

The characteristic soils in this site are 10 to 20 inches deep over basalt and well drained.

They formed in colluvium and residuum derived mainly from igneous parent materials. The surface horizon is extremely bouldery silt silt loam textures and 3 inches thick. About 60 percent of the soil surface is covered by rock fragments. The volume of rock fragments in the soil profile is 35 to 80 percent.

These soils are calcareous throughout. The permeability is moderate. Available water capacity is 1 to 2 inches.

The water supplying capacity is 1 to 4 inches. Natural geologic erosion in potential is approximately 1 tons/acre/year.

Table 4. Representative soil features

Drainage class	Well drained
Permeability class	Moderate
Soil depth	25–51 cm
Surface fragment cover <=3"	30%
Surface fragment cover >3"	30%
Available water capacity (0-101.6cm)	2.54–5.08 cm
Subsurface fragment volume <=3" (Depth not specified)	18–40%
Subsurface fragment volume >3" (Depth not specified)	18–40%

Ecological dynamics

As ecological condition deteriorates due to overgrazing, Indian ricegrass and squirreltail decrease while Wyoming big sagebrush increases.

When the potential natural plant community is burned, Wyoming big sagebrush decreases while low rabbitbrush increase.

Annual grasses 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 dominant aspect of the plant community is Wyoming big sagebrush. The composition by air-dry weight is approximately 30 percent perennial grasses, 5 percent forbs, and 65 percent shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	219	455	583
Grass/Grasslike	101	211	269
Forb	17	35	45
Total	337	701	897

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	20-40%
Grass/grasslike foliar cover	10-20%
Forb foliar cover	1-3%
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	–	–	–	–
>0.3 <= 0.6	–	–	15-25%	0-5%
>0.6 <= 1.4	–	35-45%	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 6. Plant community growth curve (percent production by month).
UT2081, PNC. Excellent Condition.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	15	40	30	5	5	0	0	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 (%)
Shrub/Vine					
0	Primary Shrubs			372–510	
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	256–328	–
	spiny hopsage	GRSP	<i>Grayia spinosa</i>	73–110	–
	shortspine horsebrush	TESP2	<i>Tetradymia spinosa</i>	22–37	–
	yellow rabbitbrush	CHV18	<i>Chrysothamnus viscidiflorus</i>	22–37	–
3	Secondary Shrubs			22–37	
Grass/Grasslike					
0	Primary Grasses			110–183	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	73–110	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	37–73	–
1	Secondary Grasses			22–37	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	22–37	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	22–37	–
	sixweeks fescue	VUOC	<i>Vulpia octoflora</i>	22–37	–
Forb					
2	Forbs			22–37	
	Utah milkvetch	ASUT	<i>Astragalus utahensis</i>	8–22	–
	quill cryptantha	CRAF	<i>Cryptantha affinis</i>	8–22	–
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	8–22	–
	cushion buckwheat	EROV	<i>Eriogonum ovalifolium</i>	8–22	–

Animal community

This site is suited for sheep and cattle grazing during fall, winter, and spring.

Wildlife using this site include rabbit, coyote, fox, badger, pronghorn antelope, mule deer and dove.

This is a short list of the more common species found. Many other species are present as well and migratory birds are present at times.

Hydrological functions

The soils are in hydrologic group D with runoff curves ranging from 80 to 89 depending on hydrologic condition.

Recreational uses

Resources that have special aesthetic and landscape value are wildflowers. Some recreation uses of this site are hiking and hunting.

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 R12W S36
General legal description	Southwest of Kelton, UT. NE ¼ Section 36, Township 12N, Range 12W.
Location 2: Box Elder County, UT	
Township/Range/Section	T11N R11W S6
General legal description	Center of Section 6, Township 11N, Range 11W.

Contributors

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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	02/08/2010
Approved by	Shane A. Green
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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).

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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.

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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, the only place litter accumulates and soil collects is at plant bases forming the appearance of a pedestal.

Well-developed biological crusts may appear pedestalled, but are actually a characteristic of the crust formation. Some plants may appear to have a pedestal but rather than be formed by erosion, the only place litter accumulates and soil collects is 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):** 20-35% bare ground (soil with no protection from raindrop impact). Herbaceous communities are most likely to have lower values. As species composition by shrubs increases, bare ground is likely to increase. Poorly developed biological soil crust that is susceptible to raindrop splash erosion should be recorded as bare ground. Very few if any bare spaces of greater than 1 square foot.
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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. Gravel or desert pavement protects the site from wind scour.
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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 flow patterns and rills with deposition occurring at points of obstruction. The majority of litter accumulates at the base of plants. Some leaves, stems, and small twigs may accumulate in soil depressions adjacent to plants. Woody stems are not likely to move. On steep slopes (>30%), litter will move downhill to next obstruction.
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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):** Soil surface is moderately stable (average soil stability score of 3.5 -5).
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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** This description is based on the modal soil (Saxby BYX-SiL, soil survey area: 601, West Box Elder). This site has 2 correlated soils, resulting in variation of each of these attributes. Unless working on a location with the modal soil, it is critical to supplement this description with the soil-specific information from the published soil survey.

Soil surface horizon is typically 4 to 10 inches deep. Structure is typically weak fine granular. Color is typically brownish gray (10YR 6/2) dark grayish brown (10YR 4/2) moist. An ochric horizon extends to a depth of 10 inches. An ochric horizon typically extends to a depth of 2 to 10 inches. The ochric horizon is a surface horizon lacking fine stratification and which is either light colored, or thin, or has a low organic carbon content, or is massive and (very) hard when dry. The A horizon would be expected to be more strongly developed under plant canopies. It is important if you are sampling to observe the A horizon under plant canopies as well as the interspaces.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Bunchgrasses and shrubs equally important for increasing infiltration and reducing runoff. Litter plays a role in increasing infiltration and decreasing runoff. Plants provide microhabitat for seedlings, catch litter and soil, and slow raindrops and runoff. Vascular plants and/or well-developed biological soil crusts (where present) will break raindrop impact and splash erosion. Spatial distribution of vascular plants and interspaces

between well-developed biological soil crusts (where present) provide 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. When perennial grasses decrease, reducing ground cover and increasing bare ground, runoff is expected to increase and any associated infiltration reduced. Shrubs catch snow, slow wind evaporation, and provide microhabitat for seedling establishment.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Some soils have lithic contact at 18". Naturally occurring soil horizons may be harder than the surface because of an accumulation of calcium carbonate and should not be considered as compaction layers.
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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: Wyoming big sagebrush

Sub-dominant: perennial grasses (Indian ricegrass > squirreltail)

Other: other grasses = other shrubs > forbs

Additional: 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 and Russian wildrye may substitute for mid stature cool season perennial native bunchgrasses.). Biological soil crust is variable in its expression 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.

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. Long-lived species dominate site. Open spaces from disturbance are quickly filled by new plants through seedlings and reproductive 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 litter. Depth should be 1-2 leaf thickness in the interspaces and up to 1/2" under canopies. Litter cover may increase to 15-25% 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):** 625#/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: Annual grasses and annual forbs
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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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