

## Ecological site R028AY334UT Upland Stony 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.

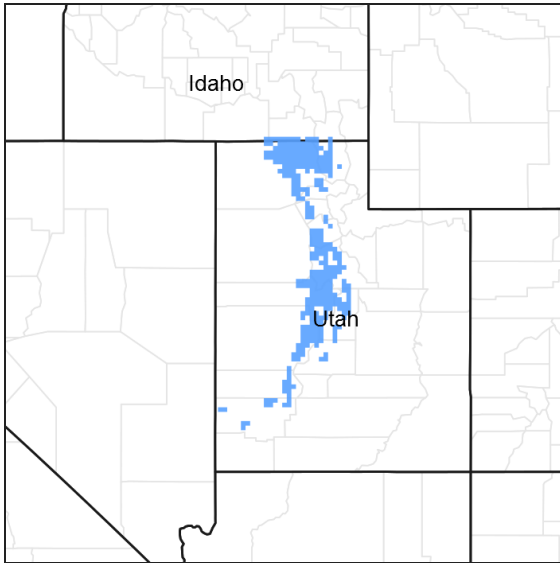


Figure 1. Mapped extent

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

R028AY310UT	Upland Loam (Bonneville Big Sagebrush) North
R028AY324UT	Upland Shallow Loam (Utah Juniper - Singleleaf Pinyon)
R028AY338UT	Upland Stony Loam (Pinyon-Utah Juniper)

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

### Physiographic features

This site occurs on alluvial fans, mountain slopes, lake terraces, fan remnants and escarpments at elevations between 4,300 and 6,500 feet. It may be found on all aspects and on slopes ranging from 2 to 50 percent. Flooding is rare on this site and of extremely brief duration. Ponding does not normally occur on this site. Runoff is low to medium.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Mountain slope (3) Lake terrace
Flooding duration	Extremely brief (0.1 to 4 hours)
Flooding frequency	None to rare
Ponding frequency	None
Elevation	1,311–1,981 m
Slope	2–50%
Aspect	Aspect is not a significant factor

## Climatic features

The climate of this site is characterized by cold, snowy winters and warm dry summers. The average annual precipitation is mostly 11 to 16 inches. June and July are commonly the driest months. Annual distribution varies from 40 to 50 percent during plant growth period, May to October. Precipitation during the growing season is not always effective because it comes as small intermittent showers which do not wet the soil deeply, especially in the hottest months of July and August. The most effective moisture for plant growth is the portion that falls as snow during the plant dormant period and enters the soil during the growing season.

Ranges in values for precipitation reported here incorporate variability across the geographic extent of this ecological site and variability between years using 25 and 75 percent quartiles.

**Table 3. Representative climatic features**

Frost-free period (average)	157 days
Freeze-free period (average)	187 days
Precipitation total (average)	406 mm

## Influencing water features

Due to its landscape position, this site is not typically influenced by streams or wetlands.

## Soil features

The characteristic soils in this site are greater than 20 inches deep and well-drained. They formed in alluvium, colluvium and residuum derived from various parent materials. The surface horizon has gravelly, cobbly, or stony loam textures. Rock fragments commonly occur on the soil surface and make up greater than 35 percent of the soil volume. Permeability is moderately slow to moderately rapid. Available water capacity ranges from 2.8 to 5.5 inches of water in the upper 40 inches of soil. These soils are neutral to alkaline and may or may not be calcareous. The soil moisture regime is xeric and the soil temperature regime is usually mesic, though occasionally frigid.

Soil Survey Area; Soil Components (Map Units in parentheses)

Box Elder County, Eastern Part (UT602) Abela (ABE, AEE); Blue Star (BgE, BLG); Hupp (HpB, HpD, HuC, HuD); Munk (MuE, PmD, PmE); Ridd (RrE, RrG); Sanpete (SIB, SID, SIE, SIG); Sterling (SsB, SsD, SsF, SsG, StE, SuE);

Cache Valley Area (UT603) Green Canyon (GrA, GrB); Hyrum (HuC, HuE, HyC); Steed (SvA, SvB, SvC); Sterling (SwC, SwD, SwF2);

Davis - Weber Area (UT607) Barton (BaE, BrG); Ridd (RdD, RkE2); Sterling (SfD, SgE, ShF2);

Fairfield-Nephi Area (UT608) Bezzant (BeD, BeF); Donnardo (DdC, DdE, DdF, DeF); Hupp (HfC, HfD); Mountainville (MpB, MrB); Pharo (PgC); Pober (PmD, PnD); Renol (RbC, RcD); Rofiss (RpD); Sumine (SrE, SsE, SsF);

Tooele Area (UT611) Ridd (49, 50);

Salt Lake Area (UT612) Bingham (BkC); Butterfield (BFF, BuE, BVF);

Millard County (UT618) Collard (31, 38, 71); Current Spring (33, 34, 35); Donnardo (38, 39, 66); Jardal (20, 21, 66); Kapod (39, 70, 71, 72, 107); Lonjon (88); Sterling (109);

Utah County (UT621) Sterling (HOF, SgB, SgC, SgD, SNG);

Sanpete Valley Area (UT627) Collard (CoC); Donnardo (DhD, DKD, DLD); Mountainville variant (MrD);

Iron - Washington Area (UT634) Baboon (312); Tombar (499, 500);

Beaver - Cove Fort Area (UT640) Manderfield (MaB, MaC, MdB, MeC);

**Table 4. Representative soil features**

Surface texture	(1) Gravelly loam (2) Cobbly silt loam (3) Stony fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately slow to moderately rapid
Soil depth	51 cm
Surface fragment cover <=3"	12–28%
Surface fragment cover >3"	0–25%
Available water capacity (0-101.6cm)	7.11–13.97 cm
Calcium carbonate equivalent (0-101.6cm)	0–40%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	6.6–9
Subsurface fragment volume <=3" (Depth not specified)	21–39%
Subsurface fragment volume >3" (Depth not specified)	3–30%

## Ecological dynamics

As ecological condition deteriorates due to overgrazing, bluebunch wheatgrass, Indian ricegrass, bitterbrush, and desirable forbs decrease, while big sagebrush, low rabbitbrush, and snakeweed increase.

When the potential natural plant community is burned, big sagebrush decreases while bitterbrush increases.

Cheatgrass and annual forbs are most likely to invade this site.

# 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 dominant aspect of this plant community is Wyoming big sagebrush. The composition by air-dry weight is approximately 50 percent perennial grasses, 10 percent forbs, and 40 percent shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	224	476	841
Shrub/Vine	179	381	673
Forb	45	95	168
<b>Total</b>	<b>448</b>	<b>952</b>	<b>1682</b>

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	10-20%
Grass/grasslike foliar cover	15-35%
Forb foliar cover	3-5%
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	–	–	–	0-10%
>0.3 <= 0.6	–	–	30-40%	–
>0.6 <= 1.4	–	15-25%	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 5. Plant community growth curve (percent production by month).  
UT3341, PNC. Excellent Condition.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	30	45	5	5	5	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 (%)
<b>Shrub/Vine</b>					
0	<b>Primary Shrubs</b>			202–303	
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	151–202	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	50–101	–
3	<b>Secondary Shrubs</b>			50–101	
	Utah serviceberry	AMUT	<i>Amelanchier utahensis</i>	10–30	–
	black sagebrush	ARNO4	<i>Artemisia nova</i>	10–30	–
	alderleaf mountain mahogany	CEMO2	<i>Cercocarpus montanus</i>	10–30	–
	yellow rabbitbrush	CHV18	<i>Chrysothamnus viscidiflorus</i>	10–30	–
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	10–30	–
	slender buckwheat	ERMI4	<i>Eriogonum microthecum</i>	10–30	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	10–30	–
<b>Grass/Grasslike</b>					
0	<b>Primary Grasses</b>			353–504	
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	202–252	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	30–50	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	30–50	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	30–50	–
	muttongrass	POFE	<i>Poa fendleriana</i>	30–50	–
1	<b>Secondary Grasses</b>			30–50	
	needle and thread	HECO26	<i>Hesperostipa comata</i>	10–30	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	10–30	–
	lameck galleta	DLIA	<i>Blurostipa lameckii</i>	10–30	–

	James galleta	FLJA	<i>Pleurapnis jamesii</i>	10-30	-
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	10-30	-
<b>Forb</b>					
0	<b>Primary Forbs</b>			30-50	
	spiny phlox	PHHO	<i>Phlox hoodii</i>	30-50	-
2	<b>Secondary Forbs</b>			50-101	
	Fendler's sandwort	ARFE3	<i>Arenaria fendleri</i>	10-30	-
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	10-30	-
	Wyoming Indian paintbrush	CALI4	<i>Castilleja linariifolia</i>	10-30	-
	Douglas' dustymaiden	CHDO	<i>Chaenactis douglasii</i>	10-30	-
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	10-30	-
	cushion buckwheat	EROV	<i>Eriogonum ovalifolium</i>	10-30	-
	shaggy fleabane	ERPU2	<i>Erigeron pumilus</i>	10-30	-
	tailcup lupine	LUCAC3	<i>Lupinus caudatus ssp. caudatus</i>	10-30	-
	low beardtongue	PEHU	<i>Penstemon humilis</i>	10-30	-
	rock goldenrod	PEPU7	<i>Petradoria pumila</i>	10-30	-
	Pacific aster	SYCHC	<i>Symphotrichum chilense var. chilense</i>	10-30	-
	American vetch	VIAM	<i>Vicia americana</i>	10-30	-

## Animal community

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

Wildlife using this site include rabbit, coyote, sage grouse, pronghorn antelope, mule deer, and elk.

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 C with runoff curves ranging from 74 to 86 depending on hydrologic condition.

## Recreational uses

Resources that have special aesthetic and landscape values are wildflowers. Some recreation uses of this site are hiking and horseback riding.

## Wood products

None

## Other information

Threatened and endangered species include plants and animals.

## Type locality

Location 1: Iron County, UT	
General legal description	Side Slope Surrounding Elker Basin Five Miles North of Cedar City, Utah

## 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	09/27/2011
Approved by	Shane A. Green
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

- 1. Number and extent of rills:** Minor amount of rills present. Rill development may increase following large storm events, but should begin to heal during the following growing season. Rill development may increase when run in flow 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, and moderate length (6-12'), lengthening as slope steepens. 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:** Less than 5% of 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 (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.

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- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 15-25% 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 considered 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:** No evidence of active wind-generated soil movement. Surface rock 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 4 - 6).

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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 (Abela GRV-L, soil survey area: 611, Tooele). This site has over 25 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 14 inches deep. Structure is typically weak fine and medium granular. Color is typically grayish brown (10YR 5/2), dark brown (10YR 3/3) moist. Mollic epipedon is common.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Vascular plants and any 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. Significant increases in invasive pinyon-juniper canopy reduces understory vegetation and increases 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):** None. 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: Non sprouting shrubs = perennial bunchgrasses

Sub-dominant: forbs = rhizomatous grasses = sprouting shrubs

Other:

Additional: Additional: In the northern portion of the MLRA cool-season perennial grasses dominate. In the southernmost



portion of the MLRA warm-season perennial grasses dominate. The two groups share dominance in the middle portion of the MLRA.

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.

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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 bunchgrass and shrub mortality may occur during severe droughts, particularly on the shallower and coarser soils associated with this site.
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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 15-20% 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):** 850#/ac. 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:** Pinyon, Juniper, Cheatgrass, Russian thistle 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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