

Ecological site R025XY326UT

Upland Shallow Stony Loam (Utah Juniper)

Accessed: 05/13/2025

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.

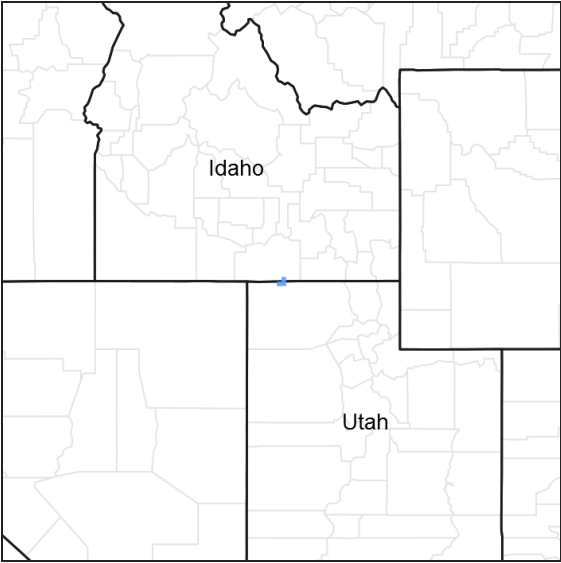


Figure 1. Mapped extent

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.

Classification relationships

Modal soils: Rexmont STV-L – loamy-skeletal, mixed, frigid Lithic Haploxerolls

Associated sites

R025XY316UT	Upland Shallow Loam (Black Sagebrush)
R025XY320UT	Upland Stony Clay (Low Sagebrush)

Similar sites

R025XY316UT	Upland Shallow Loam (Black Sagebrush)
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Table 1. Dominant plant species

Tree	(1) <i>Juniperus osteosperma</i>
Shrub	(1) <i>Purshia tridentata</i>
Herbaceous	(1) <i>Pseudoroegneria spicata</i>

Physiographic features

This site is found on hillslopes on slopes between 15 and 40%. The elevation of the site ranges between 6,000 to 7,000 feet. There is no flooding or ponding potential for this site.

Table 2. Representative physiographic features

Landforms	(1) Hill
Flooding frequency	None
Ponding frequency	None
Elevation	1,829–2,134 m
Slope	15–40%

Climatic features

The climate is cold and snowy winters and warm and dry summers. Average annual precipitation is 12 to 17 inches. Approximately 40 percent occurs as rain from May through September. On the average July, August, and September are the driest months and March, April, and May are the wettest months. In average years, grasses begin growth around May 1 and end growth around September 30.

Table 3. Representative climatic features

Frost-free period (average)	0 days
Freeze-free period (average)	120 days
Precipitation total (average)	432 mm

Influencing water features

Soil features

The soils on this site were formed in colluvium derived from limestone and/or residuum weathered from limestone. The soil is well drained with moderate permeability in the upper 10 inches of soil. The soil has bedrock between 20 and 40 inches beneath the soil surface. The soil texture at the surface is gravelly loam. Surface rock fragments over 3 inches is are not present at this site, subsurface rock fragments over 3 inches is 2% by volume. Surface rock fragments between 2 millimeters and 3 inches is 28% by cover and subsurface rock fragments of the same size is 34% by volume. Available water capacity is between 2.4 and 3.2 in the upper 40 inches of soil. The soil pH is between 7.9 and 9. The soil temperature regime is frigid.

Soils associated with this site:

Box Elder Co. UT601 – Overland (56)

Table 4. Representative soil features

Surface texture	(1) Gravelly loam
Drainage class	Well drained
Permeability class	Moderate
Soil depth	51–102 cm
Surface fragment cover <=3"	28%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	6.1–8.13 cm
Calcium carbonate equivalent (0-101.6cm)	3–15%

Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	7.9–9
Subsurface fragment volume <=3" (Depth not specified)	34%
Subsurface fragment volume >3" (Depth not specified)	2%

Ecological dynamics

As this site deteriorates due to grazing pressure bluebunch wheatgrass, Great Basin wildrye and bitterbrush decrease while Utah juniper, big sagebrush, and rabbitbrush increase. When the potential natural plant community is burned, juniper, big sagebrush, and bitterbrush decrease while rabbitbrush, and horsebrush increase. Broom snakeweed and cheatgrass 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 an overstory of Utah juniper and an understory of bitterbrush and grass. The composition by air-dry weight is approximately 50 percent perennial grasses, 5 percent forbs, and 30 percent shrubs, and 15 percent trees.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	280	392	504
Shrub/Vine	168	235	303
Tree	84	118	151
Forb	28	39	50
Total	560	784	1008

Table 6. Ground cover

Tree foliar cover	49-51%
Shrub/vine/liana foliar cover	29-31%
Grass/grasslike foliar cover	19-21%
Forb foliar cover	4-6%
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	—	—	—	4-6%
>0.3 <= 0.6	—	—	19-21%	—
>0.6 <= 1.4	—	29-31%	—	—
>1.4 <= 4	49-51%	—	—	—
>4 <= 12	—	—	—	—
>12 <= 24	—	—	—	—
>24 <= 37	—	—	—	—
>37	—	—	—	—

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Tree					
0	Dominant Trees			101–127	
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	101–127	—
Shrub/Vine					
0	Dominant Shrubs			236–337	
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	127–168	—
	black sagebrush	ARNO4	<i>Artemisia nova</i>	84–127	—
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	26–43	—
3	Sub-Dominant Shrubs			87–213	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	43–84	—
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	9–26	—
	rubber rabbitbrush	ERNAN5	<i>Ericameria nauseosa ssp. nauseosa var. nauseosa</i>	9–26	—

	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	9–26	–
	stemless mock goldenweed	STAC	<i>Stenotus acaulis</i>	9–26	–
	Nuttall's horsebrush	TENU2	<i>Tetradymia nuttallii</i>	9–26	–
Grass/Grasslike					
0	Dominant Grasses			245–338	
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	168–211	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	26–43	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	26–43	–
1	Sub-Dominant Grasses			121–271	
	Grass, annual	2GA	<i>Grass, annual</i>	43–84	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	43–84	–
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	9–26	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	9–26	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	9–26	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	9–26	–
Forb					
2	Sub-Dominant Forbs			469–925	
	Forb, annual	2FA	<i>Forb, annual</i>	43–84	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	43–84	–
	littleleaf pussytoes	ANMI3	<i>Antennaria microphylla</i>	43–84	–
	Torrey's milkvetch	ASCA9	<i>Astragalus calycosus</i>	43–84	–
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	43–84	–
	sego lily	CANU3	<i>Calochortus nuttallii</i>	43–84	–
	Douglas' dustymaiden	CHDO	<i>Chaenactis douglasii</i>	43–84	–
	wavyleaf thistle	CIUN	<i>Cirsium undulatum</i>	43–84	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	43–84	–
	low beardtongue	PEHU	<i>Penstemon humilis</i>	43–84	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	43–84	–

Animal community

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

This site provides food and cover for wildlife.

Wildlife using this site include blacktail jackrabbit, cottontail, coyote, sage grouse, mule deer, and elk.

Hydrological functions

The soil series is in hydrologic groups c and d. The runoff curve numbers are 74 through 89 depending on the condition of the watershed.

Recreational uses

Hunting, Hiking and Camping

Other products

Fire Wood and Posts

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	12/15/2011
Approved by	Shane A. Green
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- 1. Number and extent of rills:** A moderate amount of rills will normally be present in this site. Rills should be <1 inch deep, fairly short (8-10 feet) and somewhat widely spaced (4-6 feet). On very steep slopes, rills may extend down the entire slope. Rill occurrence may also increase on areas located below exposed bedrock or other water shedding areas where increased runoff may occur. An increase in rill development may also be observed following major thunderstorm or spring runoff events.

- 2. Presence of water flow patterns:** Some evidence of water flow patterns may be found around perennial plant bases, large rock fragments and across surface gravels. There may be some evidence of current erosion. They are expected to be somewhat short (6-8 feet), fairly stable, sinuous and not connected. There may also be some evidence of deposition. Evidence of water flow will increase with slope.

- 3. Number and height of erosional pedestals or terracettes:** Perennial vegetation shows some evidence of erosional pedestalling (3 to 5% of individual plants). Plant roots are covered and litter remains mostly in place around plant crowns. A very few terracettes may also be present but should be stable. An increase in both pedestal and terracette development may occur with increasing slope.

- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 5-20% bare ground. Soil surface is typically covered by 40 to 65% coarse fragments. Bare ground spaces should not be greater than 2 to 3 feet in diameter. Most bare ground is associated with waterflow patterns, rills and gullies.

5. **Number of gullies and erosion associated with gullies:** A very few gullies may be present on site. Some minor additional gully development may also be present in landscape settings where they transport runoff from areas of greater water flow such as exposed bedrock. These landscape level gullies should be limited to slopes exceeding 20% slope and adjacent to sites where this runoff accumulation occurs. Any gullies present should show little sign of accelerated erosion and should be mostly stabilized with perennial vegetation.
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6. **Extent of wind scoured, blowouts and/or depositional areas:** None. No evidence of wind generated soil movement is present. Wind caused blowouts and deposition are not present.
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7. **Amount of litter movement (describe size and distance expected to travel):** Much of the sites litter resides in place with moderate redistribution downslope caused by water movement. Some litter removal may also occur in flow channels with deposition occurring within 2 to 4 feet at points of obstruction. The majority of litter accumulates at the base of plants. Some grass leaves and small twigs (grass stems) may accumulate in soil depressions adjacent to plants. Woody stems may also move 1 to 2 feet down slope. Increased litter movement is expected (up to 6 feet) with increases in slopes and/or increased runoff resulting from heavy 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 a soil stability rating of 4 or 5 under the plant canopies, and a rating of 3 to 4 in the interspaces. The average rating should be a 4. Soil surface texture is typically a gravelly sandy loam.
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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**
(Overland) Soil surface 0-2 inches. Texture is an extremely gravelly loam; color is brownish gray (10YR6/2); and structure is massive, slightly hard friable. Ochric epipedon ranges to 7 inches. 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:** The cobbles or rock fragments on the surface and within the soil profile would be expected to provide a runoff surface that would naturally reduce infiltration in all but gentle storms and slow snowmelt. Plant spatial distribution should slow runoff somewhat, allowing additional time for infiltration. When perennial grasses and shrubs decrease due to natural events including drought, insect damage, etc., which further reduce ground cover and increasing bare ground, runoff is expected to increase and any associated infiltration reduced.
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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. Limestone bedrock is found at 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: Trees (Utah juniper) > Non-Sprouting shrubs (black sagebrush, antelope bitterbrush, Wyoming big sagebrush) > Perennial bunchgrasses (bluebunch wheatgrass, Indian ricegrass).
- Sub-dominant: Other Perennial bunchgrasses (basin wildrye, Nevada bluegrass) > Sprouting shrubs (green rabbitbrush,) >> Perennial forbs (arrowleaf balsamroot).

Other: A wide variety of other perennial grasses and both perennial and annual forbs can be expected to occur in the plant community.

Additional: Natural disturbance regimes include fire, drought, and insects. 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 disturbance such as fire, drought, rodents or insects that remove woody vegetation, forbs and perennial grasses (herbaceous species) may dominate the community for a period of time. If a disturbance has not occurred for an extended period of time, woody species may continue to increase. 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):** The plant community is made up of young, mid, and old aged juniper trees (seedling to 400+ years old) perennial grasses and shrubs. Standing dead trees may be present on the site and approximately 5-20 % of the trees can show evidence of decadence. All age classes of perennial grasses should be present under average to above average growing conditions with age class expression likely subdued during below average years or on sites with a high (usually greater than 65%) similarity index (late seral to historic climax). In drought and/or insect/fungus infestations, juniper mortality may increase with the first sign being a yellowish to reddish leaf color.
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14. **Average percent litter cover (%) and depth (in):** Litter may only occur under perennial vegetation. Most litter will be herbaceous and depths of 0 to 1/4 inch would be considered normal. Perennial vegetation should be well distributed on the site.
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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 650 - 750#/acre on an average year, but could range from 450 to 950#/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:** Cheatgrass, Russian thistle, and non-native invasive annual forbs such as alyssum.
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17. **Perennial plant reproductive capability:** All perennial plants should have the ability to reproduce in most years, except in extreme drought years. Some seedling recruitment of major species should be present during average and above average growing years.
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