

## Ecological site R047XB302UT Upland Clay (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.

### Classification relationships

Modal Soil: Quilt CBVL 4-25% — fine, montmorillonitic Typic Argiborolls

### Associated sites

R047XB309UT	Upland Loam (black sagebrush)
R047XB312UT	Upland Shallow Clay (pinyon/Utah juniper)
R047XB326UT	Upland Shallow Loam (pinyon/Utah juniper)

### Similar sites

R047XB309UT	Upland Loam (black sagebrush)
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Table 1. Dominant plant species

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

### Physiographic features

Table 2. Representative physiographic features

Landforms	(1) Bayou
Elevation	2,073–2,591 m
Slope	5–15%

### Climatic features

The climate is characterized by cold, snowy winters and cool, moist summers. Approximately 50 percent of the moisture comes during the plant growth period from April 1 through September 30. On the average April, May, and June are the driest and July, August, and September are the wettest months.

Table 3. Representative climatic features

Frost-free period (average)	0 days
Freeze-free period (average)	100 days

Precipitation total (average)	406 mm
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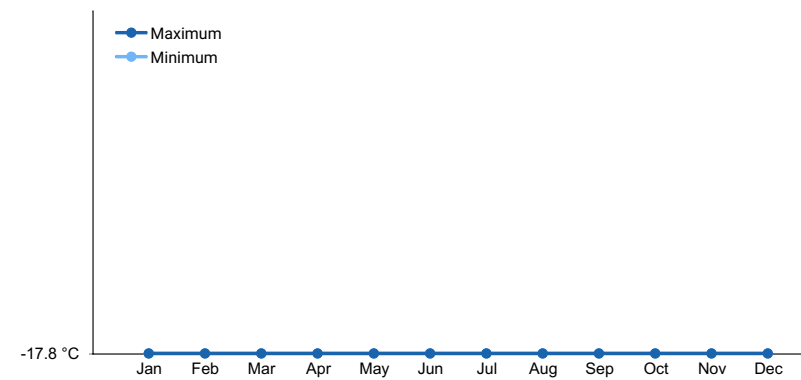


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

Soil features

The soils in this site are deep and well drained. They were formed in alluvium derived dominantly from basic and intermediate igneous rock. Slopes are slightly undulating and medium in length. Typically the surface layer is very cobbly loam about 4 inches thick. The underlying layers are cobbly clay to cobbly clay loam. The substrata are gravelly sandy clay loam to gravelly coarse sandy loam. Permeability is slow and available water holding capacity is 7 to 9 inches. Effective rooting depth is 60 or more inches. Runoff is medium and water erosion hazard is moderate.

Table 4. Representative soil features

Surface texture	(1) Very cobbly loam
Drainage class	Well drained
Permeability class	Slow
Soil depth	102–152 cm
Available water capacity (0-101.6cm)	17.78–22.86 cm

Ecological dynamics

As ecological condition deteriorates, Indian ricegrass and blue grama decrease while black sagebrush, low rabbitbrush, and rubber rabbitbrush increase. When the natural plant community is burned, black sagebrush decreases while Indian ricegrass, blue grama, and rabbitbrush increase. Cheatgrass and mustards 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

State 1  
Reference State

Community 1.1  
Reference State

The aspect of this site is one of a shrub/grass community. The shrub component is dominated by black sagebrush. Mountain big sagebrush and bitterbrush are also apparent. The grass community is dominated by Indian ricegrass and western wheatgrass. Blue grama is also apparent.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	308	799	648
Grass/Grasslike	252	379	530
Forb	28	43	59
Total	588	1221	1237

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	29-31%
Grass/grasslike foliar cover	29-31%
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	—	29-31%	29-31%	—
>0.6 <= 1.4	—	—	—	—
>1.4 <= 4	—	—	—	—
>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 (%)
<b>Shrub/Vine</b>					
0	<b>Dominant Shrubs</b>			269–448	
	little sagebrush	ARAR8	<i>Artemisia arbuscula</i>	179–235	–
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	45–90	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	45–90	–
3	<b>Sub-Dominant Shrubs</b>			108–215	
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	27–45	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	27–45	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	27–45	–
	rock goldenrod	PEPU7	<i>Petradoria pumila</i>	9–27	–
	mountain snowberry	SYOR2	<i>Symphoricarpos oreophilus</i>	9–27	–
	alderleaf mountain mahogany	CEMO2	<i>Cercocarpus montanus</i>	9–27	–
<b>Grass/Grasslike</b>					
0	<b>Dominant Grasses</b>			251–404	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	90–135	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	90–135	–
	slimstalk spiderling	BOGR	<i>Boerhavia gracillima</i>	45–90	–
	squirreldtail	ELEL5	<i>Elymus elymoides</i>	27–45	–
1	<b>Sub-Dominant Grasses</b>			81–170	
	Grass, annual	2GA	<i>Grass, annual</i>	27–45	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	27–45	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	9–27	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	9–27	–
<b>Forb</b>					
2	<b>Sub-Dominant Forbs</b>			143–287	
	Forb, annual	2FA	<i>Forb, annual</i>	45–90	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	45–90	–
	Moenkopi milkvetch	ASMO4	<i>Astragalus moencoppensis</i>	9–18	–
	redroot buckwheat	ERRA3	<i>Eriogonum racemosum</i>	9–18	–
	silky lupine	LUSE4	<i>Lupinus sericeus</i>	9–18	–
	lobeleaf groundsel	PAMU11	<i>Packera multilobata</i>	9–18	–
	gooseberryleaf globemallow	SPGR2	<i>Sphaeralcea grossulariifolia</i>	9–18	–

## Animal community

Good spring-summer cattle and sheep grazing.

No cover-good forage and browse. Mule deer, elk, and antelope.

## Hydrological functions

The soil in this site is in the d hydrologic group.

## Recreational uses

This site has good aesthetic appearance and beauty.

## Wood products

None

## Contributors

Tom Simper

## 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	10/18/2012
Approved by	Shane A. Green
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

- Number and extent of rills:** None to very few. Some very minor rill development may occur on steeper slopes (>10%) or on areas located below exposed bedrock or other water shedding areas where increased runoff may occur. Any rills present should be <1 inch deep, fairly short (<6 feet long) and somewhat widely spaced (8-10 feet). Minor rill development may be observed following major thunderstorm or spring runoff events, but they should heal during the next growing season.

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- Presence of water flow patterns:** Slight. Some very minor evidence of water flow patterns may be found around perennial plant bases. They show little evidence of current erosion. They are expected to be somewhat short (3-6 feet), stable, sinuous and not connected. There may also be very minor evidence of deposition. Evidence of water flow may increase somewhat with slope.

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- Number and height of erosional pedestals or terracettes:** None to Slight. Perennial vegetation shows little evidence of erosional pedestalling (2 to 3% of individual plants). Plant roots are covered and litter remains in place around plant crowns. Terracettes should be absent or, if present, stable. A slight increase in both pedestal and terracette development may occur with increasing slope.

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- Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 10-15% bare ground. Soil surface is typically covered by >50% coarse fragments. Bare ground spaces

should not be greater than 2 to 3 feet in diameter and should not be connected.

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5. **Number of gullies and erosion associated with gullies:** None to Very Few. A few gullies may be present in landscape settings where they transport runoff from areas of greater water flow such as exposed bedrock. These gullies will 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 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 expected.

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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 movement. Minor litter removal may occur in flow channels with deposition occurring within 1 to 2 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 are not likely to move. However, some litter movement is expected (up to 6 feet) with increases in slopes >10% 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 very cobbly clay loam or loam.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** (Quilt) So surface 0-4 inches. Texture is a very cobbly loam or clay loam; color is dark grayish brown (10YR4/2); structure is weak fine granular. Mollic epipedon ranges to 10 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 very cobbly loam surface texture and clay within the soil profile will provide a runoff surface that will reduce infiltration in all but gentle storms and slow snowmelt. Perennial vegetation produces sufficient cover and spatial arrangement to intercept most raindrops and reduce raindrop splash erosion. Litter on soil surface and cryptogamic crusting, where present, also protects soil from splash erosion and encourages a higher rate of infiltration. Good plant spatial distribution should slow runoff, allowing additional time for infiltration. Bare spaces are expected to be small and irregular in shape and are usually not connected. Vegetative structure is usually adequate to capture snow and ensure that snowmelt occurs in a controlled manner, allowing maximum time for infiltration, and reducing runoff and erosion in all but the most extreme storm events. When perennial grasses and shrubs decrease due to natural events including drought, insect damage, etc., which 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. This site has a well developed argillic horizon beginning at 4 inches that should not be mistaken for a compaction layer.

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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 (low sagebrush), > Cool Season Perennial bunchgrasses (Indian ricegrass, western wheatgrass).

Sub-dominant: Warm Season Rhizomatous grasses (Blue grama) >> Perennial forbs (gooseberryleaf globemallow).

Other: Perennial and annual forbs can be expected to vary widely in their expression in the plant community based upon departures from average growing conditions.

Additional: Natural disturbance regimes include fire, drought, and insects. Assumed fire cycle of 50 to 60+ years.

Functional/structural groups may appropriately contain non-native species if their ecological function is the same as the native species in the reference state. 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.

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** All age classes of perennial grasses should be present under average to above average growing conditions with age class expression likely subdued during periods of extended drought. Slight decadence in the principle shrubs could occur near the end of the fire cycle or during periods of extended drought, or insect infestations. In general, a mix of age classes should be expected with some dead and decadent plants present.

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14. **Average percent litter cover (%) and depth ( in):** Litter cover will be heavier under plants. Most litter will be herbaceous and depths of 1/2 to 3/4 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 700 - 800#/acre on an average year, but could range from 400 to 1100#/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, halogeton, Russian thistle, Utah juniper, alyssum, & mustard species.

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17. **Perennial plant reproductive capability:** All perennial plants should have the ability to reproduce in all years, except in extreme drought years. Green rabbitbrush sprouts vigorously following fire. There are no restrictions on either seed or vegetative reproduction. Some seedling recruitment of major species is present during average and above average growing years.

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