USDA Natural Resources
Conservation Service

Ecological site R047XC472UT
Mountain Very Steep Stony Loam (bitterbrush)

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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: Ironco GRV-L, High Rainfall, Eroded — loamy-skeletal, mixed Typic Argiborolls
Type Location: See Uintah County Soil Survey

Associated sites

R047XC446UT	**Mountain Shallow Loam (mountain big sagebrush)**
R047XC475UT	**Mountain Windswept Ridge (black sagebrush)**

Similar sites

R047XC446UT	**Mountain Shallow Loam (mountain big sagebrush)**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Purshia tridentata*
Herbaceous	(1) *Hesperostipa comata*

Physiographic features

Very Steep Mountainsides and Hillsides

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Elevation	2,195–2,743 m
Slope	50–70%
Aspect	NE, SW

Climatic features

The climate is characterized by cool, moist summers and cold, snowy winters. Approximately 55 percent of the moisture comes as rain from May though September. On the average, October through January are the driest months and March, April, May and August are the wettest months. The soil moisture regime is ustic and soil temperatures are in the frigid regime.

Table 3. Representative climatic features

Frost-free period (average)	0 days
Freeze-free period (average)	85 days
Precipitation total (average)	559 mm

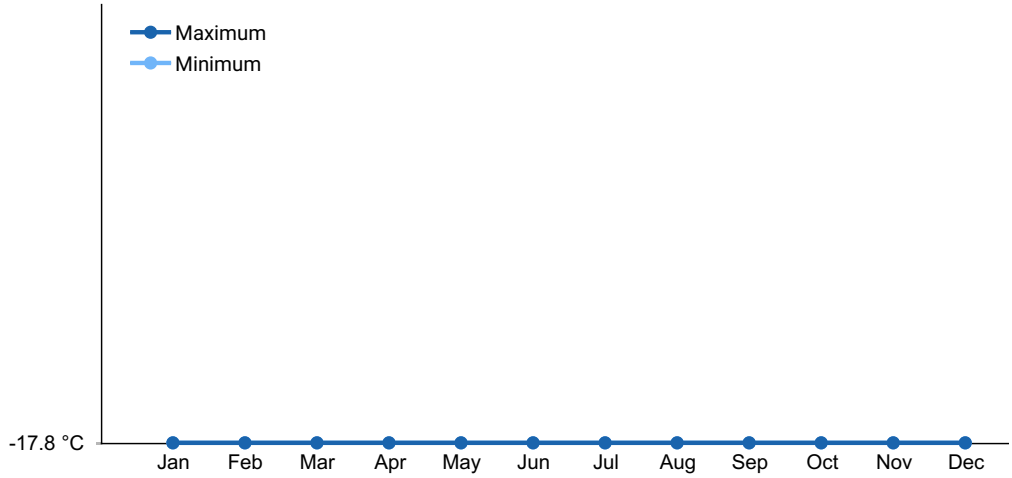

Figure 1. Monthly average minimum and maximum temperature

Influencing water features

Soil features

Slopes are mostly 50 to 70 percent. The soil is moderately deep to deep and well drained. It formed in alluvium and colluvium derived mainly from igneous parent materials. The soil is generally loamy-skeletal with cobbles and gravels throughout the profile. Permeability is moderate and runoff is moderate to rapid. The water supplying capacity is 6.5 to 12 inches.

Table 4. Representative soil features

Surface texture	(1) Loam
Drainage class	Well drained
Permeability class	Moderate
Soil depth	51–152 cm

Ecological dynamics

Because slopes are so steep, grazing by livestock does not appear to be a significant factor in altering the plant community. Fire will cause the shrubs to temporarily decrease while grasses will increase.

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 a stand of bitterbrush and mountain big sagebrush. The composition by air-dry weight is approximately 45 percent perennial grasses, 5 percent forbs, and 50 percent shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	364	532	701
Grass/Grasslike	328	480	631
Forb	37	54	71
Total	**729**	**1066**	**1403**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	49-51%
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%	–
>0.6 <= 1.4	–	49-51%	–	–
>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 (%)
Shrub/Vine					
0	**Dominant Shrubs**			392–560	
	antelope bitterbrush	PUTR2	*Purshia tridentata*	224–280	–
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	112–168	–
	Utah serviceberry	AMUT	*Amelanchier utahensis*	56–112	–
3	**Sub-Dominant Shrubs**			157–415	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	56–112	–
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	11–34	–
	yellow rabbitbrush	CHVIL4	*Chrysothamnus viscidiflorus ssp. lanceolatus*	11–34	–
	crispleaf buckwheat	ERCO14	*Eriogonum corymbosum*	11–34	–
	slender buckwheat	ERMI4	*Eriogonum microthecum*	11–34	–
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	11–34	–
	Watson's goldenbush	ERWA8	*Ericameria watsonii*	11–34	–
	creeping barberry	MARE11	*Mahonia repens*	11–34	–
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	11–34	–
Grass/Grasslike					
0	**Dominant Grasses**			280–448	
	needle and thread	HECO26	*Hesperostipa comata*	168–224	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	56–112	–
1	**Sub-Dominant Grasses**			146–493	
	Grass, annual	2GA	*Grass, annual*	56–112	–
	Grass, perennial	2GP	*Grass, perennial*	56–112	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	11–34	–

	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	11–34	–
	Geyer's sedge	CAGE2	*Carex geyeri*	11–34	–
	squirreltail	ELEL5	*Elymus elymoides*	11–34	–
	sheep fescue	FEOV	*Festuca ovina*	11–34	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	11–34	–
	western wheatgrass	PASM	*Pascopyrum smithii*	11–34	–
	Sandberg bluegrass	POSE	*Poa secunda*	11–34	–
Forb					
2	**Sub-Dominant Forbs**			146–460	
	Forb, annual	2FA	*Forb, annual*	34–112	–
	Forb, perennial	2FP	*Forb, perennial*	34–112	–
	silverleaf milkvetch	ASAR4	*Astragalus argophyllus*	11–34	–
	Wyoming Indian paintbrush	CALI4	*Castilleja linariifolia*	11–34	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	11–34	–
	blue flax	LIPE2	*Linum perenne*	11–34	–
	tailcup lupine	LUCAC3	*Lupinus caudatus ssp. caudatus*	11–34	–
	American vetch	VIAM	*Vicia americana*	11–34	–

Animal community

Because slopes are so steep, livestock grazing is not significant.
This site has good values for wildlife food and cover.
Wildlife using this site include sage grouse, rabbit, coyote, mule deer and elk.

Hydrological functions

The soil series are in hydrologic group b. The hydrologic curve number is 61 when the vegetation is in good condition.

Recreational uses

This site offers color and aesthetic appeal during the growing season and the fall. Because slopes are steep this site receives limited recreation use.

Wood products

None

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	12/12/2012
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are fairly common. Their expression may be less defined where coarse fragments (i.e., gravels and/or channers) dominate the soil surface. Rill occurrence may increase slightly on areas located below exposed bedrock or other water shedding areas where increased runoff may occur. Rills should be <1 inches deep, somewhat long (10 to 15 feet) and somewhat widely spaced (8-12 feet). An increase in rill development may be observed immediately following major thunderstorm or spring runoff events.

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2. **Presence of water flow patterns:** Sinuous flow patterns are common and wind around perennial plants and surface rock. Evidence of flow patterns is expected to increase somewhat as slopes approach 80%. Water flow patterns are long (20 to 30 feet), somewhat narrow (1 to 2 feet wide), and spaced widely (5 to 10 yards) and more closely spaced(3 to 6

yards) on slopes nearing 70 to 80%.

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3. **Number and height of erosional pedestals or terracettes:** Small pedestals will form at the base of plants that occur on the edge of water flow patterns, 2 to 4% of plants show minor exposed roots. Terracettes are fairly common, forming behind debris dams of small to medium sized litter (up to 2 inches in diameter) in water flow patterns. These debris dams may accumulate smaller litter (leaves, grass and forb stems) and sediment.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 20–25%. (Soil surface is typically covered by 15-30% surface fragments). Most bare ground is associated with water flow patterns, rills, and gullies. Bare ground spaces not associated with flow patterns should not be greater than 1 to 2 feet in diameter.

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5. **Number of gullies and erosion associated with gullies:** Few. A few gullies may occur. Any gullies preaent may extend down the length of the site until they reach a stream or other area where water and sediment is deverted or accumulates. Gullies show slightly more indication of erosion as slopes approach 80%, or where the site occurs adjacent to watershed areas with concentrated flow patterns.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None. Perennial shrubs along with surface coarse fragments on this site help break the wind and reduce the potential for wind erosion.

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7. **Amount of litter movement (describe size and distance expected to travel):** Because of the sites very steep slopes, some litter redistribution downslope caused by water movement is normal. Some litter removal may occur in flow channels with deposition occurring within 3 to 5 feet at points of obstruction. The majority of litter still accumulates at the base of plants. Some grass leaves, stems and small woody twigs may accumulate in soil depressions adjacent to plants. Woody stems are likely to move 1 to 2 feet. A slight increase in litter movement is expected following runoff resulting from heavy spring runoff or 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 an erosion rating of 4 or 5 under the plant canopies, and a rating of 3 to 4 in the interspaces. The average should be a 4. Vegetation cover, litter, biological soil crusts and surface rock reduce erosion.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** (Guben) Soil surface A horizon is typically 0 to 4 inches deep. Texture is a gravelly loam. Structure is weak fine granular. Color is grayish brown (10YR 5/2). A Mollic epipedon extends 10 inches into the soil profile. 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:** Good spatial distribution of well developed biological soil crusts (where present) intercept raindrops, reducing splash erosion and providing areas of increased surface detention to store water, allowing additional time for infiltration.

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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. Some soils may have natural textural variability within their profiles, including changes in clay and coarse fragment content, these should not be mistaken for a compaction pans.

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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: Sprouting Shrub (bitterbrush) > Non-sprouting shrubs (Mountain big sagebrush), Utah serviceberry) > cool season perennial grasses (needle-and-thread, bluebunch wheatgrass) >> rhizomatous grasses (western wheatgrass).

    Sub-dominant: Sprouting shrubs (alderleaf mountain mahogany, green rabbitbrush) > cool season perennial grasses (Nevada bluegrass, Letterman needlegrass) = > forbs (spurred lupine) > biological soil crusts (where present).

    Other: Functional/structural groups may appropriately contain non-native species if their ecological function is the same as the native species in the reference state. Biological soil crust is variable in its expression where present 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.

Additional: Factors contributing to temporal variability include insects and other pathogens (mistletoe), drought, extreme precipitation events, etc. Factors contributing to spatial variability include slope, amount of rock fragments, aspect, etc. Following a recent disturbance such as fire, drought or insects, that may remove the woody vegetation, forbs and perennial grasses (herbaceous species) may become more dominate in the community. These conditions may reflect different functional community phases 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 on shrubs, or grasses. There may be partial mortality on individual bunchgrasses and shrubs during drought periods, and complete mortality of individual plants during severe drought periods.

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14. **Average percent litter cover (%) and depth (in):** Cover should be composed mostly of fine litter. Depth should vary from a 1/2 thickness in the interspaces, to up to 1 under herbaceous canopies, and up to 1 1/2” under shrub canopies. Litter cover may increase to 30% on some years due to increased production of plants.

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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 900 - 1000#/acre on an average year, but could range from 600 to 1300#/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:** Few invasive

species are capable of dominating this site. When invasion does occur, cheatgrass, alyssum, and mustard species are the most likely species to invade.

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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. 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.
