

Ecological site R047XB304UT

Upland Gravelly Loam (pinyon/Utah juniper)

Accessed: 05/05/2024

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: Notter GRL 8-25% — fine-loamy, mixed Aridic Argiborolls

Associated sites

R047XB309UT	Upland Loam (black sagebrush)
R047XB332UT	Upland Stony Loam (black sagebrush)
R047XB333UT	Upland Stony Loam (pinyon/Utah juniper)

Similar sites

R047XB333UT	Upland Stony Loam (pinyon/Utah juniper)
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Table 1. Dominant plant species

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

Physiographic features

Alluvial Fans and Mountainsides

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Mountain slope
Elevation	1,981–2,438 m
Slope	3–15%

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 months 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

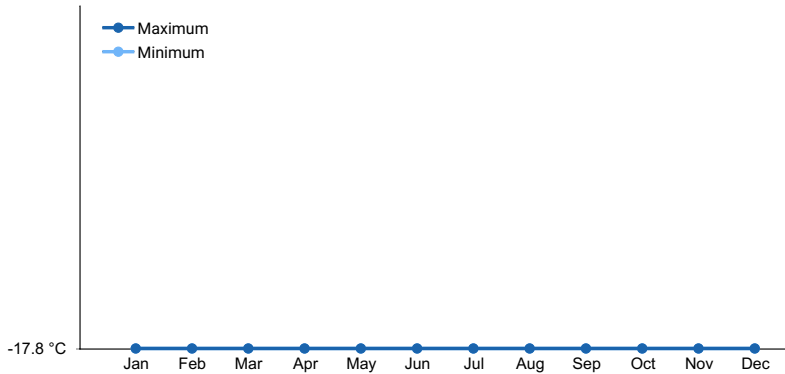


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

Soil features

The soils were formed in alluvium derived dominantly from basic and intermediate igneous rock. Slopes are undulating and medium in length. Typically the surface layer is gravelly sandy loam to 5 inches. The underlying layers are gravelly sandy clay loam, very gravelly sandy loam, and gravelly clay loam. An accumulation of lime occurs at about 20 inches. Permeability is moderate and available water capacity is approximately 4.5 inches. Efficient rooting depth is more than 60 inches. Runoff is slow and water erosion hazard is slight.

Table 4. Representative soil features

Surface texture	(1) Gravelly sandy loam
Drainage class	Well drained
Permeability class	Moderate
Soil depth	102–152 cm
Available water capacity (0-101.6cm)	11.43 cm

Ecological dynamics

As ecological condition deteriorates, Indian ricegrass, needleandthread, and bitterbrush decrease and Utah juniper, pinyon, and big sagebrush increase. When the natural plant community is burned, juniper, pinyon, and big sagebrush decrease and bitterbrush, Indian ricegrass, and needleandthread increase. Utah juniper readily increases and can completely dominate the 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 aspect of this site is dominated by Utah juniper, pinyon, and an understory of mountain big sagebrush, Wyoming big sagebrush, and Indian ricegrass. Forbs make up a minor but important part of the plant community.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	151	252	353
Grass/Grasslike	118	196	275
Forb	34	56	78
Tree	34	56	78
Total	337	560	784

Table 6. Ground cover

Tree foliar cover	29-31%
Shrub/vine/liana foliar cover	6%
Grass/grasslike foliar cover	24-26%
Forb foliar cover	4%
Non-vascular plants	29-31%
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%	24-26%	–
>0.6 <= 1.4	–	–	–	–
>1.4 <= 4	29-31%	–	–	–
>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			235–359	
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>	101–135	–
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	67–101	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	34–67	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	34–67	–
3	Sub-Dominant Shrubs			47–114	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	20–34	–
	Utah serviceberry	AMUT	<i>Amelanchier utahensis</i>	7–20	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	7–20	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	7–20	–
	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	7–20	–
Grass/Grasslike					
0	Dominant Grasses			161–269	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	67–101	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	34–67	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	20–34	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	20–34	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	20–34	–
1	Sub-Dominant Grasses			47–168	
	Grass, annual	2GA	<i>Grass, annual</i>	7–34	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	7–34	–
	Letterman's needlegrass	ACLE9	<i>Achnatherum lettermanii</i>	7–20	–
	purple threeawn	ARPU9	<i>Aristida purpurea</i>	7–20	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	7–20	–
	muttongrass	POFE	<i>Poa fendleriana</i>	7–20	–

	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	7–20	–
Forb					
2	Sub-Dominant Forbs			87–168	
	redroot buckwheat	ERRA3	<i>Eriogonum racemosum</i>	20–34	–
	Forb, annual	2FA	<i>Forb, annual</i>	20–34	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	20–34	–
	Douglas' dustymaiden	CHDO	<i>Chaenactis douglasii</i>	7–20	–
	Pacific aster	SYCHC	<i>Symphyotrichum chilense var. chilense</i>	7–20	–
	James' cryptantha	CRCI3	<i>Cryptantha cinerea</i>	7–13	–
	Cooper's rubberweed	HYCO2	<i>Hymenoxys cooperi</i>	7–13	–
Tree					
4	Sub-Dominant Trees			101–202	
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	34–67	–
	Rocky Mountain juniper	JUSC2	<i>Juniperus scopulorum</i>	34–67	–
	twoneedle pinyon	PIED	<i>Pinus edulis</i>	34–67	–

Animal community

Fair summer grazing

Tree cover good understory feed

Hydrological functions

Soils in this site are in hydrologic group B

Wood products

This site produces wood products suitable for fence posts and fuel wood.

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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Date	10/22/2012
Approved by	Shane A. Green
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None to few. Some minor rill development may occur on steeper slopes 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 (<8 feet) and somewhat widely spaced (6-8 feet). Minor rill development may be observed following major thunderstorm or spring runoff events but should heal during the next growing season.

2. **Presence of water flow patterns:** Very Few. A very few sinuous flow patterns wind around perennial plants and surface rock. Evidence of flow patterns is expected to increase somewhat with slopes greater than 15%. Water flow patterns are long (15-20 feet), narrow (<1 foot wide), and spaced widely (10-20 yards) on gentle slopes (<15%) and more closely (<10 yards) on steeper slopes (>15%).

3. **Number and height of erosional pedestals or terracettes:** Very Few. A few (2-3% of plants) small pedestals may form at the base of plants that occur on the edge of water flow patterns, but they should not show any exposed roots. Terracettes are fairly rare, 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.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground ranges from 20% - 30%. Soil surface may be covered by 15 to 60% coarse fragments. Bare ground openings should not be greater than 2 to 3 feet in diameter and should normally not be connected. Most bare ground is associated with water flow patterns, rills, and gullies.

5. **Number of gullies and erosion associated with gullies:** None at site level. Scattered landscape level gully channels, however, are a normal component of desert environments. Where landscape gullies are present, they should be stable, partially vegetated on their sides and bottoms, with no evidence of head-cutting. Some slight increase in disturbance may be evident following significant weather events or when gullies convey considerable runoff from higher elevation rocky or naturally eroding areas.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None to Rare. Trees break the wind and reduce the potential for wind erosion. The coarse fragments on the soil surface help armor it and reduce the potential for wind erosion.

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.

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.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** (Notter)
Soil surface horizon is typically 0 to 3 inches deep. Texture is an gravelly coarse sandy loam, structure is typically weak fine granular. Color is brown (7.5YR 5/2). A mollic epipedon ranges to a depth of 15 inches. Use the specific information for the soil you are assessing found in the published soil survey to supplement this description.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Good spatial distribution of biological soil crust, where present, will help intercept raindrop splash, reducing erosion. It can also increase water surface retention by allowing additional time for infiltration. Trees canopies and litter accumulating at their bases can create a micro-topography that may enhance development of water flow patterns below the drip line. A significant increase in Pinyon-juniper canopy may reduce understory vegetation and cause an increase in runoff. This may reflect a different community phase within the reference state.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None, There may be dense layers of rock fragments or other naturally occurring hard layers within the soil profile. These should not be interpreted as compaction layers.

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 (two-needle pinyon/Utah juniper) > = Non-sprouting Shrubs (Wyoming & Mountain big sagebrush) > Sprouting shrubs (Green rabbitbrush)>> Cool Season Perennial bunchgrasses (Indian ricegrass, needle-and-thread).

Sub-dominant: Forbs (dustymaiden, redroot wild buckwheat) > Biological soil crusts.

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 recent natural disturbances such as fire, drought or insects that may remove woody vegetation, forbs and perennial grasses (herbaceous species) may become more dominate in the community. These conditions may 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):** During years with average to above-average precipitation, there should be very little recent mortality or decadence apparent in trees, shrubs, or grasses. During severe (multi-year) drought up to 20% of the pinyons and junipers may die, either from drought, insect damage or pathogens such as mistletoe. There may be partial mortality on individual bunchgrasses and shrubs during drought periods, and complete mortality of individual plants during severe drought periods, particularly on the shallower and coarser soils associated with this site. Because woody stems may persist for many years, both pinyons and junipers (especially older trees) will normally have dead stems within the plant canopy.

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

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 400 - 600#/acre on an average year, but could range from 200 to 800#/acre during periods of prolonged drought or above average precipitation.

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 various mustard species are the most likely to invade.

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.
