USDA Natural Resources
Conservation Service

Ecological site R028AY308UT
Upland Gravelly Loam (Singleleaf Pinyon-Utah Juniper)

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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.

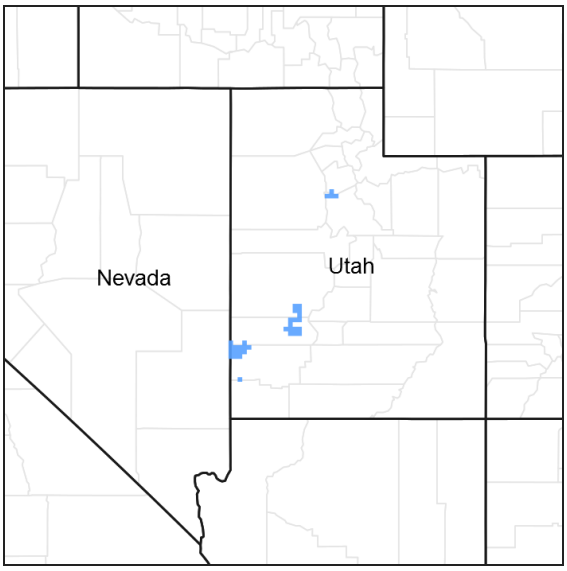

Figure 1. Mapped extent

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

R028AY306UT	**Upland Gravelly Loam (Bonneville Big Sagebrush)**
R028AY310UT	**Upland Loam (Bonneville Big Sagebrush) North**
R028AY334UT	**Upland Stony Loam (Wyoming Big Sagebrush)**

Similar sites

R028AY324UT	**Upland Shallow Loam (Utah Juniper - Singleleaf Pinyon)**
R028AY338UT	**Upland Stony Loam (Pinyon-Utah Juniper)**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Pinus monophylla* (2) *Juniperus osteosperma*
Herbaceous	Not specified

Physiographic features

This site is located in upland areas, primarily on alluvial fan deposits, but occasionally on mountain slopes. Runoff can be low to high depending on slope and other permeability factors, such as plant basal cover and soil properties. This site occurs on all aspects and on slopes that range from 2 to 15 percent. This site most often occurs at elevations between 6400 and 6800 feet.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant (2) Alluvial fan (3) Mountain slope
Flooding frequency	None
Ponding frequency	None
Elevation	1,951–2,073 m
Slope	2–15%
Aspect	Aspect is not a significant factor

Climatic features

The climate is characterized by cold, snowy winters and warm dry summers. The average annual precipitation is mostly 16 to 20 inches. June is commonly the driest month in precipitation. Annual distribution is usually about 45 percent during the plant growth period, May to October. The effective moisture for plant growth is the snow that falls during the winter and moistens the soil in the spring.

Table 3. Representative climatic features

Frost-free period (average)	140 days
Freeze-free period (average)	180 days
Precipitation total (average)	508 mm

Influencing water features

Due to its landscape position, streams and wetlands have no influence on this site.

Soil features

The soils on this site are moderatly deep to deep and usually have a duripan within 40 inches of the soil surface. They formed in alluvium and colluvium derived from a variety of parent materials. The site is typically weakly calcareous with a neutral pH. Surface textures are loamy and gravelly to very cobbly. This site is well drained and has moderately slow to moderate permeablility. Available water holding capacity is 2.6 to 5 inches. The soil moisture regime is xeric and the soil temperature regime can be frigid or mesic.

Table 4. Representative soil features

Surface texture	(1) Gravelly loam (2) Very cobbly silt loam (3) Coarse sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	51–152 cm
Surface fragment cover <=3"	16–18%
Surface fragment cover >3"	0–2%

Available water capacity (0-101.6cm)	6.6–12.7 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.6–7.8
Subsurface fragment volume <=3" (Depth not specified)	7–16%
Subsurface fragment volume >3" (Depth not specified)	2–14%

Ecological dynamics

As ecological condition deteriorates due to overgrazing, Bluebunch wheatgrass, Indian Ricegrass, Forbs, Bitterbrush, Black Sagebrush and Mormon Tea decrease while Pinyon Pine, Utah Juniper, Mountain Big Sagebrush, Cliffrose, Serviceberry, snakeweed, and undesirable forbs increase.

When the potential natural plant community is burned, same as above decrease while Cliffrose, Snakeweed, Gambel Oak increase.

Cheatgrass and annual forbs 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 dominant aspect of the plant community is Pinyon pine, Utah Juniper, and Mountain Big Sagebrush. The composition by air-dry weight is approximately 15 percent trees, 35 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)
Shrub/Vine	202	291	381
Grass/Grasslike	177	256	334
Tree	76	110	143
Forb	50	73	95
Total	**505**	**730**	**953**

Table 6. Ground cover

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

Figure 5. Plant community growth curve (percent production by month). UT3061, PNC. Excellent Condition.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	1	9	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 (%)
Shrub/Vine					
0	**Primary Shrubs**			141–275	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	78–157	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	39–78	–
	mormon tea	EPVI	*Ephedra viridis*	24–39	–
3	**Secondary Shrubs**			24–39	
	Utah serviceberry	AMUT	*Amelanchier utahensis*	8–24	–
	black sagebrush	ARNO4	*Artemisia nova*	8–24	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	8–24	–
Grass/Grasslike					
0	**Primary Grasses**			118–235	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	78–157	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	39–78	–
1	**Secondary Grasses**			24–40	
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	8–24	–
	squirreltail	ELEL5	*Elymus elymoides*	8–24	–
	needle and thread	HECO26	*Hesperostipa comata*	8–24	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	8–24	–
	basin wildrye	LECI4	*Leymus cinereus*	8–24	–
	western wheatgrass	PASM	*Pascopyrum smithii*	8–24	–
	James' galleta	PLJA	*Pleuraphis jamesii*	8–24	–
	muttongrass	POFE	*Poa fendleriana*	8–24	–
	Sandberg bluegrass	POSE	*Poa secunda*	8–24	–
Forb					
0	**Primary Forbs**			24–40	
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	24–40	–
2	**Secondary Forbs**			24–40	
	common yarrow	ACMI2	*Achillea millefolium*	8–24	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	8–24	–
	roundspike cryptantha	CRHU2	*Cryptantha humilis*	8–24	–
	granite prickly phlox	LIPU11	*Linanthus pungens*	8–24	–
	tailcup lupine	LUCAC3	*Lupinus caudatus ssp. caudatus*	8–24	–
	Pacific aster	SYCHC	*Symphyotrichum chilense var. chilense*	8–24	–
Tree					
4	**Trees**			102–157	
	singleleaf pinyon	PIMO	*Pinus monophylla*	78–118	–
	Utah juniper	JUOS	*Juniperus osteosperma*	24–39	–

Animal community

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

Wildlife using this site include rabbit, coyote, fox, badger, 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

This section will be added as the soil series are identified.

Recreational uses

Recreation values are hiking and hunting.

Wood products

Posts and fire wood.

Other information

Threatened and endangered species include plants and animals.

Contributors

David J. Somorville

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	02/09/2010
Approved by	Shane A. Green
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** No rills present. Very minor rill development may occur in sparsely vegetated areas. If rills are present, they should be widely spaced and not connected. Rill development may increase following large storm events, but should begin to heal during the following growing season. Frost heaving will accelerate recovery. Rill development may increase when run inflow enters site from adjacent sites that produce large amounts of runoff (i.e. steeper sites, slickrock, rock outcrop). Site is essentially level and rills do not form.

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2. **Presence of water flow patterns:** Water flow patterns will be short (2-5') and meandering; interrupted by plants and exposed rocks. Some evidence of erosion or deposition associated with flow patterns. Where slopes exceed 5%, water

flow patterns may be longer (5–10').

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3. **Number and height of erosional pedestals or terracettes:** Plants may have small pedestals (1-3") 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.

   Well-developed biological crusts may appear pedestalled, but are actually a characteristic of the crust formation. 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):** 20-40% 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 recorded 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:** Very minor evidence of active wind-generated soil movement. Wind scoured (blowouts) and depositional areas are rarely present. If present they have muted features and are mostly stabilized with vegetation and/or biological crust. Gravel or desert pavement 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.

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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 3.5 -5).

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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 a combination of the 4 correlated soils for this site. This results in variation of each of these attributes. Due to the natural variability of soil attributes, it is critical to supplement this description with the soil-specific information from the published soil survey.

   Soil surface horizon is typically 7 to 18 inches deep. Structure is typically weak very fine granular. Color is typically grayish brown (10YR 5/2), or very dark grayish brown (10YR 3/2) 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. Crowns of trees and accumulating litter at base of trees appear to create a micro-topography that may enhance development of water flow patterns below the drip line of the canopy. Significant increases in 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 clay or calcium carbonate and should not be considered as compaction layers. A duripan (indurated layer of illuvial silica and lime) may be present

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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: bluebunch wheatgrass, mountain big sagebrush> singleleaf pinyon

    Sub-dominant: Indian ricegrass, antelope bitterbrush

    Other: other shrubs, grasses, forbs, trees

    Additional: In the northern portion of the MLRA cool-season perennial grasses (Indian ricegrass, needle and thread) dominate. In the southernmost portion of the MLRA warm-season perennial grasses (galleta, sand dropseed) 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 mortality of bunchgrass and other shrubs may occur during very severe (long-term) droughts. There may be partial mortality of individual bunchgrasses and shrubs during less severe drought. Long-lived species dominate site. Open spaces from disturbance are quickly filled by new plants through seedlings and reproductive reproduction (tillering).

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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 20-30% 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):** 650#/acre.
    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:** Cheatgrass 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.
