USDA icon **Natural Resources Conservation Service**

Ecological site R035XY219UT
Semidesert Sandy Loam (Indian Ricegrass - Galleta)

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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.

Associated sites

R035XY212UT	**Semidesert Sand (Fourwing Saltbush)**
R035XY218UT	**Semidesert Sandy Loam (Blackbrush)**
R035XY233UT	**Semidesert Shallow Sandy Loam (Blackbrush)**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Ephedra viridis* (2) *Atriplex canescens*
Herbaceous	(1) *Achnatherum hymenoides* (2) *Hilaria jamesii*

Physiographic features

This site occurs on undulating benches, alluvial fans and valley plains. Slopes are mostly 2 to 8 percent. Elevations range from 4,500 feet to 5,700 feet.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Valley flat
Elevation	1,370 – 1,740 m

Slope	0 – 10 %

Climatic features

Average annual precipitation is 7 to 10 inches. Approximately. 65 percent occurs as snow or rain from July through December. It may be warm enough to rain any month. On the average, April through June are the driest months and August and October are the wettest months. The mean annual air temperature is 56 degrees f and the soil temperatures are in the mesic regime. The average freeze-free period is 180 to 190 days. Precipitation patterns are extremely variable from year to year and from one spot to another. Some years years favor cool season grasses while others favor the warm season plants, so both are present in good abundance when the site is in high seral condition. In average years, indian ricegrass begins growth around March 1 and end growth around July 10. It will regrow in late summer when the summer rains are earlier, and heavier than average. The warm season grasses reach peak growth in late August and go dormant near the end of September.

Table 3 Representative climatic features

Frost-free period (average)	0 days
Freeze-free period (average)	190 days
Precipitation total (average)	250 mm

Influencing water features

Soil features

The characteristic soils in this site are moderately deep to very deep; 20 to more than 60 inches deep over sandstone and well drained. They formed in aeolian and alluvium derived mainly from sandstone parent materials. The soils have moderately coarse textured surface layers usually about 2 to 6 inches thick. These layers are underlain by fine sandy loam subsoils and substratums. The substratums mostly will have accumulations of carbonate. The soils generally are non-calcareous or calcareous. The available water holding capacity is 3 to 8 inches. The water supplying capacity is 3 to 5 inches. Average annual soil loss in potential is approximately 1 tons/acre/ year.

Table 4. Representative soil features

Surface texture	(1) Fine sandy loam
Soil depth	50 – 150 cm
Available water capacity (0-101.6cm)	7.62 – 20.32 cm

Ecological dynamics

As ecological condition deteriorates due to overgrazing, palatable bunchgrasses, fourwing saltbush and winterfat decrease while blue grama, threeawn, snakeweed, low rabbitbrush and pricklypear increase. Excessive spring grazing will cause the palatable bunchgrasses to decrease and the site will become dominated by warm season grasses such as galleta, blue grama, black grama and dropseeds. When the potential natural plant community is burned, fourwing saltbush and winterfat decrease while annual grasses and forbs, threeawn, snakeweed and low rabbitbrush increase. Cheatgrass, Russian thistle and other forbs are most likely to invade this site.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Shrub/Vine					
0	**Dominant Shrub**			73-168	
	fourwing saltbush	ATCA2	*Atriplex canescens*	28-84	–
	Torrey's jointfir	EPTO	*Ephedra torreyana*	28-56	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	17-28	–
3	**Sub-Dominant Shrub**			90-179	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	28-56	–
	sand sagebrush	ARFI2	*Artemisia filifolia*	6-11	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	6-11	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	6-11	–
	spiny hopsage	GRSP	*Grayia spinosa*	6-11	–
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	6-11	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	6-11	–
	water jacket	LYAN	*Lycium andersonii*	6-11	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	6-11	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	6-11	–
	pillar false gumweed	VAST3	*Vanclevea stylosa*	6-11	–
	narrowleaf yucca	YUAN2	*Yucca angustissima*	6-11	–
Grass/Grasslike					
0	**Dominant Grasses**			196-280	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	56-84	–
	needle and thread	HECO26	*Hesperostipa comata*	56-84	–
1	**Sub-Dominant Grasses**			224-392	
	Grass, annual	2GA	*Grass, annual*	28-56	–
	Grass, perennial	2GP	*Grass, perennial*	28-56	–
	purple threeawn	ARPU9	*Aristida purpurea*	17-28	–
	sixweeks grama	BOBA2	*Bouteloua barbata*	17-28	–
	black grama	BOER4	*Bouteloua eriopoda*	17-28	–
	blue grama	BOGR2	*Bouteloua gracilis*	17-28	–
	squirreltail	ELEL5	*Elymus elymoides*	17-28	–
	sandhill muhly	MUPU2	*Muhlenbergia pungens*	17-28	–
	spike dropseed	SPCO4	*Sporobolus contractus*	17-28	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	17-28	–
	mesa dropseed	SPFL2	*Sporobolus flexuosus*	17-28	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	17-28	–
Forb					
2	**Sub-Dominant Forbs**			185-370	
	Forb, annual	2FA	*Forb, annual*	28-56	–
	Forb, perennial	2FP	*Forb, perennial*	28-56	–
	snowball sand verbena	ABFR2	*Abronia fragrans*	6-11	–
	pink funnel lily	ANBR4	*Androstephium breviflorum*	6-11	–
	freckled milkvetch	ASLE8	*Astragalus lentiginosus*	6-11	–
	Esteve's pincushion	CHST	*Chaenactis stevioides*	6-11	–
	tawny cryptantha	CRFU	*Cryptantha fulvocanescens*	6-11	–

	touristplant	DIWI2	*Dimorphocarpa wislizeni*	6-11	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	6-11	–
	fineleaf hymenopappus	HYFI	*Hymenopappus filifolius*	6-11	–
	manybranched ipomopsis	IPPO2	*Ipomopsis polycladon*	6-11	–
	flatspine stickseed	LAOC3	*Lappula occidentalis*	6-11	–
	mountain pepperweed	LEMO2	*Lepidium montanum*	6-11	–
	rusty lupine	LUPUP	*Lupinus pusillus ssp. pusillus*	6-11	–
	largeflower skeletonplant	LYGR	*Lygodesmia grandiflora*	6-11	–
	desertdandelion	MALAC3	*Malacothrix*	6-11	–
	whitestem blazingstar	MEAL6	*Mentzelia albicaulis*	6-11	–
	Indian plum	OECE	*Oemleria cerasiformis*	6-11	–
	gilia beardtongue	PEAM	*Penstemon ambiguus*	6-11	–
	skyblue phacelia	PHCO	*Phacelia coerulea*	6-11	–
	woolly plantain	PLPA2	*Plantago patagonica*	6-11	–
	rush lemonweed	PSJU2	*Psoralidium junceum*	6-11	–
	gooseberryleaf globemallow	SPGR2	*Sphaeralcea grossulariifolia*	6-11	–
	white heath aster	SYERE	*Symphyotrichum ericoides var. ericoides*	6-11	–
	hoary Townsend daisy	TOIN	*Townsendia incana*	6-11	–

Animal community

--Livestock and Wildlife Grazing-- This site provides good grazing conditions for livestock and wildlife during fall, winter, and spring due to accessibility and availability of nutritious forage. This site often lacks natural perennial water sources, which can influence the suitability for livestock and wildlife grazing. Care should be taken to maintain the native perennial grasses and shrubs due to the poor suitability for re-seeding or restoring this site. Reseeding and/or restoration are difficult due to the extreme temperatures and variability in time and amount of precipitation. This site generally does not occur in wildlife habitats The plant community is primarily grasses and includes galleta, Indian ricegrass, and needleandthread. These grasses provide good grazing conditions for all classes of livestock and wildlife. Shrubs include fourwing saltbush, Torrey jointfir, and winterfat. These shrubs provide good winter browse for cattle, sheep, and goats. Forb composition and annual production depends primarily on precipitation amounts and thus is challenging to use in livestock grazing management decisions. However, forb composition should be monitored for species diversity, as well as poisonous or injurious plant communities which may be detrimental to livestock if grazed. Before making specific grazing management recommendations, an onsite evaluation must be made. --References-- Relative Forage Preference of Plants for Grazing Use by Season: Plants commonly found in Major Land Resource Area D35 --The Colorado Plateau. 2007 Stubbendieck, J., S. L. Hatch, and C. H. Butterfield. 1997. North American range plants. Lincoln, NE: University of Nebraska Press. 501p. USDA, Forest Service. 2007. Fire effects information: plant species life form. Available at http://www.fs.fed.us/database/feis/plants/index.html. Accessed 7 August 2007.

Hydrological functions

The soil is in hydrologic groups b and c. The hydrologic curve numbers are 61 to 86 depending on the watershed condition.

Recreational uses

Recreation activities include hiking and hunting.

Wood products

None

Other information

--Poisonous/Toxic Plant Communities-- Toxic plants associated with this site include freckled milkvetch/spotted locoweed and broom and threadleaf snakeweed. Freckled milkvetch is toxic to all classes of livestock and wildlife. This plant is palatable and had similar nutrient value to alfalfa, which may cause animals to consume it even when other forage is available. Milkvetch contains swainsonine (indolizdine alkaloid) and is poisonous at all stages of growth. Poisoning will become evident after 2-3 weeks of continuous grazing and is associated with 4 major symptoms: 1) neurological damage, 2) emaciation, 3) reproductive failure and abortion, and 4) congestive heart failure linked with “high mountain disease”. Snakeweeds contains steroids, terpenoids, saponins, and flavones that can cause abortions or

reproductive failure in sheep and cattle, however cattle are most susceptible. These toxins are most abundant during active growth and leafing stage. Cattle and sheep generally will only graze snakeweeds when other forage is unavailable, typically in winter when toxicity levels are at their lowest. Potentially toxic plants associated with this site include fourwing saltbush, which may accumulate selenium, but only when growing on selenium enriched soils. These plants, when consumed will cause alkali disease or chronic selenosis, which affects all classes of livestock (excluding goats). Typically animals consuming 5-50 ppm selenium will develop chronic selenosis and animals consuming greater than 50 ppm selenium will develop acute selenosis. Clinical signs include lameness, soughing of the hoof, hair loss, blindness, and aimless wondering. Horses tend to develop what is called a “bob” tail or “roached” main due to breakage of the long hairs. Russian thistle is an invasive toxic plant, causing nitrate and to a lesser extent oxalate poisoning, which affects all classes of livestock. The buildup of nitrates in these plants is highly dependent upon environmental factors, such as after a rain storm during a drought, cool/cloudy days, and soils high in nitrogen and low in sulfur and phosphorus, all which cause increased nitrate accumulation. Nitrate collects in the stems and can persist throughout the growing season. Clinical signs of nitrate poisoning include drowsiness, weakness, muscular tremors, increased heart and respiratory rates, staggering gait, and death. Conversely, oxalate poisoning causes kidney failure; clinical signs include muscle tremors, tetany, weakness, and depression. Poisoning generally occurs when livestock consume and are not accustomed to grazing oxalate-containing plants. Animals with prior exposure to oxalates have increased numbers of oxalate-degrading rumen microflora and thus are able to degrade the toxin before clinical poisoning can occur. --Invasive Plant Communities-- Generally as ecological conditions deteriorate and perennial vegetation decreases due to disturbance (fire, over grazing, drought, off road vehicle overuse, erosion, etc.) annual forbs and grasses will invade the site. Of particular concern in semi-arid environments are the non-native annual invaders including cheatgrass, Russian thistle, kochia, halogeton, and annual mustards. The presence of these species will depend on soil properties and moisture availability; however, these invaders are highly adaptive and can flourish in many locations. Once established, complete removal is difficult but suppression may be possible. Due to the steep slopes associate with this site, the chance for disturbance is rare and thus possibility for invasion decreases. However, cheatgrass and Russian thistle are expected to invade when given the opportunity. --Fire Ecology-- The ability for an ecological site to carry fire depends primarily on the present fuel load and plant moisture content—sites with small fuel loads will burn more slowly and less intensely than sites with large fuel loads. Many semi-desert plant communities in the Colorado Plateau may have evolved without the influence of fire. However a year of exceptionally heavy winter rains can generate fuels by producing heavy stands of annual forbs and grasses. When fires do occur, the effect on the plant community may be extreme due to the harsh environment and slow rate of recovery. In blue grama ecological sites fires may occur at anytime if the grass is dry and the weather is hot and dry. Reductions in fire frequency, however, can result in shrub invasion and less grass cover which may increase or decrease fire intervals depending on type of shrub invasion and conditions. Fire intervals are many times dependent up adjacent plant communities. The ability of fire to spread through a blue grama community also depends upon the amount of bare ground and thus in the semi-desert communities found in southeast Utah fire is relatively rare. Blue grama is typically top-killed by fire and has a fair amount of tolerance for fire when dominant. This plant usually reestablishes through rhizomes but usually depends on precipitation amounts following a fire. --References-- Knight, A. P. and R. G. Walter. 2001. A guide to plant poisoning of animals in North America. Jackson, WY: Teton NewMedia. 367p. USDA, Forest Service. 2007. Fire effects information: plant species life form. Available at http://www.fs.fed.us/database/feis/plants/index.html. Accessed 7 August 2007.

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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Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** **None. Very rare rills are expected on sites that are adjacent to landscape settings where increased runoff may accumulate (such as areas below exposed bedrock). Such rill development should usually be limited to slopes exceeding 5% and adjacent to sites where runoff accumulation occurs (i.e. exposed bedrock, small watersheds, steep sites, etc.) An increase in rill formation may be seen after recent heavy thunderstorms.**

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2. **Presence of water flow patterns:** **Flow patterns are very sinuous and wind around perennial plant bases and are short and stable and there is minor evidence of deposition. On gently sloping (< 5 % slopes) locations within the site, water flow patterns are infrequent and usually less than 3 feet in length. Longer (>3 feet) water flow patterns may be found on steeper slopes. They are narrow (<1 foot wide) and widely spaced (10-20 yards).**

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3. **Number and height of erosional pedestals or terracettes:** **Plants may show very little pedestalling, but there should not be any exposed roots. Any rare pedestals that occur are usually associated with natural wind erosion, and should not have exposed roots. Terracettes should be absent or few, occurring in waterflow patterns obstructed by woody litter. Interspaces between well developed biological soil crusts may resemble pedestals but they are actually a characteristic of the crust formation.**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** **30-40% bare ground. Ground cover is based on the first raindrop impact, and bare ground is the opposite of ground cover. Any well developed biological crusts present should not be recorded as bare ground. Poorly developed biological soil crusts that are interpreted as functioning as bare ground (therefore they would be susceptible to raindrop splash erosion) should be recorded as bare ground.**

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5. **Number of gullies and erosion associated with gullies:** **None to rare. Some gullies may be present in landscape settings where increased runoff may accumulate (such as areas below exposed bedrock). Such gully development is expected to be limited to steeper slopes adjacent to sites where 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:** **Very minor wind generated soil movement is normal. Wind caused blowouts and deposition are generally stable or have healed over. Increased wind generated soil movement can occur during severe wind events.**

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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 grass leaves and small twigs (grass stems) 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):** **This site should have a soil stability rating of 5 or 6 under the plant canopies and a rating of 4 in the interspaces using the soil stability kit test. The average should be a 5. Surface texture varies from loamy fine sand to fine sandy loam. 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):** **Soil surface is typically 5 inches deep. Structure is typically weak very thick platy. Color is typically reddish yellow (5YR6/6). Use the specific information for the soil you are assessing found in the published soil survey to supplement this description. The A horizon would be expected to be more strongly developed under plant canopies. It is important if you are sampling to observe the A horizon under plant canopies as well as the interspaces. 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:** **Vascular plants and any well developed biological soil crusts 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. Interspaces between plants and any well developed biological soil crusts (where present) may serve as water flow patterns during episodic runoff events, with natural erosion expected in severe storms. When perennial grasses decrease, reducing 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. A few soils have bedrock at about 30+ inches. 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.**

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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: cool season perennial grasses (Indian ricegrass, Needle and Thread) => warm season perennial grasses (Galleta, Black grama, Blue grama)

    Sub-dominant: non sprouting shrubs (Fourwing saltbush, Winterfat) > sprouting shrubs (Torrey Moromtea) > forbs > 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 (e.g. Crested wheatgrass and Russian wildrye etc.). Biological soil crust is variable in it's 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: Temporal variability factors include insects, drought, and infrequent fire. Spatial variability factors include soil texture, slope, etc. Following a recent disturbance such as fire or drought that removes the woody vegetation, forbs and perennial grasses (herbaceous species) may dominate the community. If a disturbance has not occurred for an extended period of time, woody species may continue to increase crowding out the perennial herbaceous understory species. In either case, these conditions reflect a 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):** 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.

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14. **Average percent litter cover (%) and depth (in):** Litter cover (including under plants) nearly all of which should be fine litter. Depth should be 1 leaf thickness in the interspaces and up to 1/2" under canopies. Litter cover may increase to 15-25% on some years due to increased plant production.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 450 - 500 #/acre on an average year

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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, Broom snakeweed & introduced annual forbs (Filarie, Russian thistle).

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17. **Perennial plant reproductive capability:** All perennial plants should have the ability to reproduce sexually or asexually in most years, except in drought years.
