

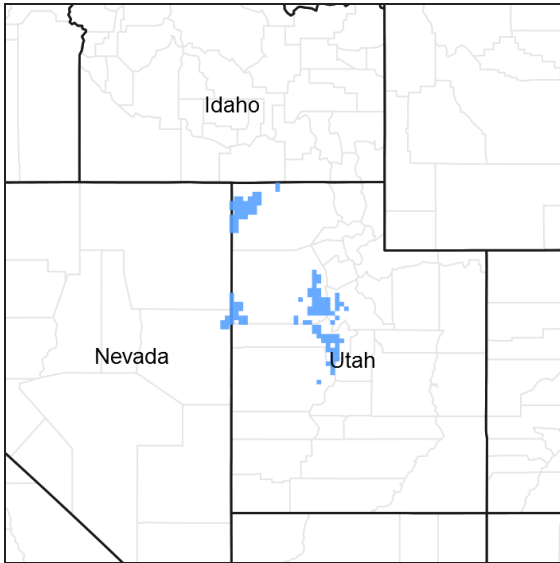
# Ecological site R028AY231UT

## Semidesert Shallow Hardpan (8-10 Ppt)

Accessed: 05/11/2025

### 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

R028AY230UT	<b>Semidesert Shallow Hardpan (Black Sagebrush)</b>
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**Table 1. Dominant plant species**

Tree	Not specified
Shrub	(1) <i>Artemisia nova</i>
Herbaceous	Not specified

### Physiographic features

This site occurs on fans and fan terraces

**Table 2. Representative physiographic features**

Landforms	(1) Fan (2) Terrace
Elevation	4,800–5,500 ft
Slope	1–10%

## Climatic features

The climate is semi-arid and characterized by cold snowy winters and warm dry summers. The average annual precipitation is 8 to 12 inches. Approximately 70 percent comes as rain from March through October. On the average, June through September are the driest months and March through May are the wettest months.

Mean Annual Air Temperature: 45-50

Mean Annual Soil Temperature: 48-52

**Table 3. Representative climatic features**

Frost-free period (average)	0 days
Freeze-free period (average)	150 days
Precipitation total (average)	12 in

## Influencing water features

### Soil features

The characteristic soils in this site are 10 to 20 inches deep over duripan and well drained.

They formed in alluvium derived mainly from tuffaceous sandstone and limestone parent materials. The surface horizon is loam texture and 3 inches thick. About 20 percent of the soil surface is covered by rock fragments in the soil profile is 0 to 35 percent.

These soils are generally moderately to strongly calcareous throughout. They are 12 to 28 percent clay. The permeability is moderately slow and available water capacity ranges from one to four inches. Runoff is slow to medium and the hazard of water erosion is slight.

The water supplying capacity is 1 to 6 inches. Natural geologic erosion in potential is approximately 0.5 tons/acre/year.

**Table 4. Representative soil features**

Surface texture	(1) Loam
Drainage class	Well drained
Permeability class	Moderately slow
Soil depth	10–20 in
Surface fragment cover ≤3"	10%
Surface fragment cover >3"	10%
Available water capacity (0-40in)	1–4 in
Subsurface fragment volume ≤3" (Depth not specified)	0–18%
Subsurface fragment volume >3" (Depth not specified)	0–18%

## Ecological dynamics

As ecological condition deteriorates due to overgrazing, Indian ricegrass, needleandthread, and globemallow decrease, while low rabbitbrush and shadscale increase.

When the potential natural plant community is burned, Indian ricegrass, needleandthread, and black sagebrush

decrease while low rabbitbrush and shadscale increase.

Annual grasses and annual forbs 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
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## State 1 Reference State

## Community 1.1 Reference State

The dominant aspect of this plant community is black sagebrush, Indian ricegrass, and needleandthread. 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 (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	100	188	300
Grass/Grasslike	90	169	270
Forb	20	38	60
<b>Total</b>	<b>210</b>	<b>395</b>	<b>630</b>

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	10-35%
Grass/grasslike foliar cover	10-30%
Forb foliar cover	2-5%
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%
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Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	–	–
>0.5 <= 1	–	–	–	–
>1 <= 2	–	30-40%	25-35%	0-10%
>2 <= 4.5	–	–	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Figure 3. Plant community growth curve (percent production by month).  
UT2301, PNC. Excellent Condition.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	15	40	30	5	5	0	0	0	0

## Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Shrub/Vine</b>					
0	<b>Primary Shrubs</b>			88–140	
	black sagebrush	ARNO4	<i>Artemisia nova</i>	80–120	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	8–20	–
3	<b>Secondary Shrubs</b>			40–60	
	shadscale saltbush	ATCO	<i>Atriplex confertifolia</i>	12–20	–
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	12–20	–
	spiny hopsage	GRSP	<i>Grayia spinosa</i>	12–20	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	12–20	–
<b>Grass/Grasslike</b>					
0	<b>Primary Grasses</b>			96–200	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	60–100	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	20–60	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	8–20	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	8–20	–
1	<b>Secondary Grasses</b>			4–20	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	4–12	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	4–12	–
<b>Forb</b>					
2	<b>Forbs</b>			20–40	
	gooseberryleaf globemallow	SPGR2	<i>Sphaeralcea grossulariifolia</i>	4–12	–
	desert princesplume	STPI	<i>Stanleya pinnata</i>	4–8	–
	low pussytoes	ANDI2	<i>Antennaria dimorpha</i>	4–8	–
	Utah milkvetch	ASUT	<i>Astragalus utahensis</i>	4–8	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	4–8	–

## Animal community

This site is suited for cattle and sheep grazing during winter.

Wildlife using this site include rabbit, coyote, fox, badger, pronghorn antelope, mule deer, and dove.

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

The soils are in hydrological groups C and D with runoff curves ranging from 74 to 86 and 80 to 89 respectively depending on hydrologic condition.

## Recreational uses

Resources that have special aesthetic and landscape values are wildflowers. Some recreation uses of this site are hiking and horseback riding.

## Wood products

None

## Other information

Threatened and endangered species include plants and animals.

## Type locality

Location 1: Box Elder County, UT	
Township/Range/Section	T12N R15W S35
General legal description	Southwest of Kunzler's Ranch 3.8 Miles Western Box Elder County, Utah, 1100 Ft. N, 100 Ft. East of SW Corner, Section 35, Township 12N, Range, 15W.

## 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	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'), narrow (<1'), and meandering; interrupted by plants and exposed rocks. Slight to no evidence of erosion or deposition associated with flow patterns.

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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):** 30-50% 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 is present in reference communities. Wind scoured (blowouts) and depositional areas are rarely present. Slight depositional mounding at plant bases. Slight deposition may occur in perennial bunchgrasses, under winterfat canopy, and within biological soil crusts. Wind scour or deposition areas are associated with fire activity. Very small areas (less than 4 square feet) may be present.

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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 the modal soil (Acana GR-L, soil survey area: 601, West Box Elder). This site has 2 correlated soils, resulting in variation of each of these attributes. Unless working on a location with the modal soil, it is critical to supplement this description with the soil-specific information from the published soil survey.

Soil surface horizon is typically 3 inches deep. Structure is typically medium coarse subangular blocky. Color is typically pale brown (10YR 6/3), dark grayish brown (10YR 4/2) moist. An ochric horizon extends to a depth of 3 inches. An ochric horizon typically extends to a depth of 2 to 10 inches. The ochric horizon is a surface horizon lacking fine stratification and which is either light colored, or thin, or has a low organic carbon content, or is massive and (very) hard when dry. 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.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Bunchgrasses and shrubs equally important for increasing infiltration and reducing runoff. Litter plays a role in increasing infiltration and decreasing runoff. Plants provide microhabitat for seedlings, catch litter and soil, and slow raindrops and runoff. Vascular plants and/or 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. 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. Shrubs catch snow, slow wind evaporation, and provide microhabitat for seedling establishment.

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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 at a depth of 17 to 25 inches.
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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: black sagebrush

Sub-dominant: Indian ricegrass > needle and thread

Other: other shrubs > other grasses > forbs

Additional:

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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 bunchgrass and shrub mortality may occur during severe droughts, particularly on the shallower and coarser soils associated with this site.
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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 15-25% 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):** 395#/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:** Annual grasses and annual forbs

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17. **Perennial plant reproductive capability:** Reproduction restricted by effective precipitation, rock cover, soil depth, and generally harsh growing conditions; all to be expected for site. Site provides harsh environment for seedling establishment.
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