

Ecological site R035XY212UT Semidesert Sand (Fourwing Saltbush)

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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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Composition (Indicators 10 and 12) based on	Foliar Cover

Indicators

1. **Number and extent of rills:** Rills are not present in the reference state on the gentler slopes. Very few rills present on slopes exceeding 10% and likely to form below adjacent exposed bedrock or water flow patterns where sufficient water accumulates to cause erosion. Rills present should be less than 6 feet in length. The number of rills can increase immediately following large storm events but should not persist more than one or two seasons due to coarse soil textures and frost-heave recovery. In areas of active duning (plant community phase 1.1), rills should not be present due to increased soil movement activity by wind.
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2. **Presence of water flow patterns:** The occurrence of water flow patterns is rare (0-3% cover) on all slopes in the reference state, and are typically less than 6 feet long. As slopes increase (>10%) water flow pattern occurrence (3-8%) and length (3-5ft) also increases. An increase in water flow patterns is also expected after disturbance events such as major precipitation events or increased wildlife use, which increases the percent of bare ground and erosion potential. However as erosion increases, active duning may also increase and water flow patterns would quickly disappear due to increased soil movement by wind.
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3. **Number and height of erosional pedestals or terracettes:** The occurrence of pedestalling or terracetting in the reference state is rare; however 1-3 inch pedestalling of shrubs is possible and usually due to natural wind erosion or accumulation. Interspaces with well developed biological crusts may resemble pedestals, but they are actually a characteristic of the crust formation. These well developed biological soil crusts, when present, are typically seen only in

plant community 1.1, and are not present in the dune plant community phase of the reference state.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** In the reference state bare ground is moderate, typically ranging from 10-40%. Plant community phase 1.2, which is described as active dunes, has the most occurrence of bare ground (30-60%). Most bare ground is associated with water flow patterns and rodent activity. Areas with developed biological soil crust should not be counted as bare ground. Areas with poorly developed biological soils crust that are interpreted as functioning as bare ground (therefore they would be susceptible to raindrop splash erosion) should be recorded as bare ground. This site can have up to 5% surface rock cover. Ground cover is based on first raindrop impact, and bare ground is the opposite of ground cover. Ground cover + bare ground = 100%.

5. **Number of gullies and erosion associated with gullies:** Gullies are generally not present in the reference state. Stable gullies may occur in landscape settings where increased runoff may have accumulated from adjacent sites (such as areas below exposed bedrock). Gully development is expected to be limited to steep slopes, show little sign of accelerated erosion, and be stabilized with perennial vegetation.

6. **Extent of wind scoured, blowouts and/or depositional areas:** Wind generated soil movement is normal (especially in the dune plant community phase (1.2) of the reference state) but wind caused blowouts and depositions in the other plant communities are mostly stable or have healed over. Wind caused deposition at the base of shrubs and trees is stabilized by biological soil crusts, when present, or litter. Increased wind generated soil movement can occur after severe (multi-year) drought or severe wind events. Areas that are invaded with scattered Utah juniper are more susceptible to blowouts, which may persist for long periods due to the aggressive competitive nature of the juniper, which limits immediately adjacent plant growth.

7. **Amount of litter movement (describe size and distance expected to travel):** Most litter resides in place with some redistribution caused by water movement and wind. Fine litter (<2.5 inch in diameter) may be moved up to 2-3 ft and usually occurs in water flow patterns and rills, with deposition occurring at obstructions. Sites with well developed crust cover, may exhibit litter being trapped by the crust pinnacles. The majority of litter accumulates at the base of plants or in soil depression adjacent to the plant. Woody stems (those greater than .25 inch in diameter) are not likely to move under normal conditions. Litter movement by wind is slightly greater in plant community 1.2; however it usually will not move more than 4 ft.

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 2-3 throughout the site. Surface texture varies from fine sand to sand. As sites depart from the reference state to a state dominated by invasive annuals soil surfaces textures are expected to become siltier.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface is 2-5 inches deep and structure is weak. The A-horizon color ranges from a reddish brown (5YR 5/4) to reddish yellow (7.5YR 6/6). 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.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** The presence of perennial grasses, shrubs, and any well developed biological soil crusts (moss, pinnacled lichen, and light cyanobacteria) will break raindrop impact and splash erosion. The spatial distribution of vascular plants, non-vascular communities (when present), and interspaces provide detention storage and surface roughness that slows down runoff, allowing 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. A few soils have bedrock at 30+ 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: 10-20% cool season perennial grasses (e.g. Indian ricegrass and needleandthread)
15-40% warm season perennial grasses (e.g. Sand muhly, blue grama, galleta, and dropseeds)

Sub-dominant: 5-20% sprouting shrubs (e.g. Fourwing saltbush, and sand buckwheat)
1-10% sprouting or rhizomatous shrubs (e.g. Cutler mormontea)

Other: Other forbs, shrubs, grasses, biological soil crusts, and trees (e.g. Utah Juniper)

Additional: Factors contributing to temporal variability include wildlife use, drought, and insects. Factors contributing to special variability include soil texture, depth, rock fragments, slope, aspect, and micro-topography. These groups are based on community phase 1.1 of the reference community which is generally considered the reference plant community for this ecological site.

Perennial and annual forbs can be expected to vary widely in their expression in the plant community based upon departures from average growing conditions. Biological crusts (lichen, moss, and cyanobacteria) should be present but are variable based on plant community and state, refer to the community phase section of the ecological site description.

Functional/structural groups may appropriately contain non-native species if their ecological function is the same as the native species in 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 mortality or decadence apparent in either shrubs or grasses. During and following drought fourwing saltbush may appear dead, due to leaf drop and many plant may die during a multi-year drought. Extended insect herbivory may also cause fourwing saltbush to show mortality. Some perennial bunch grass mortality is expected during severe drought.
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14. **Average percent litter cover (%) and depth (in):** Litter cover (including under plants) ranges from 5-10%, nearly all of which should fine litter. Depth is generally 1 leaf thickness in the interspaces and up to ¼ inch under plant canopies. Litter can increase up to 20% immediate following leaf drop or after favorable conditions increase native annual forb production.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Annual production ranges from 200-400 lbs/acre in an average year.

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: Known invasive species include Russian thistle (*Salsola tragus*), cheatgrass (*Bromus tectorum*), broom snakeweed (*Gutierrezia sarothrae*), tansy mustard (*Descurainia pinnata*), annual stickseed (*Lappula* sp.), and annual *Cryptantha* (*Cryptantha* sp.).

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

18. **Supporting Data::** NRCS (Dana Truman/Ashley Garrelts) 2006/2007 ESD data from Arches and Canyonlands National Parks.
