USDA Natural Resources
Conservation Service

Ecological site R035XY236UT
Semidesert Shallow Sandy Loam (Utah Juniper, Blackbrush)

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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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Contact for lead author	shane.green@ut.usda.gov Supporting data: USGS (Mark Miller) 2006-2007 data from Canyonlands and Dugout Ranch. NRCS (Dana Truman) 2006-2007 ESD data from Canyonlands and Arches.
Date	02/08/2008
Approved by	Shane A. Green
Approval date	
Composition (Indicators 10 and 12) based on	Foliar Cover

Indicators

1. **Number and extent of rills:** Rills increase immediately following large storm events but should not persist more than one or two winters due to frost-heave recovery. There should be very few on slopes < 6%. On slopes >6%, rills may be 5-10 feet in length. Rills are most likely to form below adjacent exposed bedrock or water flow patterns where sufficient water accumulates to cause erosion.

2. **Presence of water flow patterns:** Interspaces between vegetation and/or well developed biological soil crusts can serve as somewhat stable water flow patterns below run-off generating areas (exposed bedrock, areas with very shallow soils). If present, these waterflow patterns should be narrow (<1-1½') but can be very long. These waterflow patterns should be widely spaced (15-20 yrds) on low slopes (< 6%), increasing in frequency (every 10-15yrds) with slope. Otherwise, there should be none to few and short (3-6') water flow patterns on low slopes (< 6%), increasing in frequency and length (up to 5-10') with slope. Waterflow patterns should dissipate where the slope flattens.

3. **Number and height of erosional pedestals or terracettes:** Occasional terracettes may be associated with accumulation behind woody juniper litter. Well developed biological crusts may appear pedestalled, but 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):** 25-35%, in non-bedrock areas. Most bare ground is associated with water flow patterns. Areas with well developed biological soil crusts should not be counted as bare ground. Areas with 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. Ground cover is based on first raindrop impact. Bare ground is the opposite of ground cover. Ground cover + bare ground = 100%.

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5. **Number of gullies and erosion associated with gullies:** No active gullies. Some stable 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 slopes exceeding 15%.. Any gullies present should show little sign of accelerated erosion and should be stabilized with perennial vegetation and biological soil crusts.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** There should be very little evidence of active wind scoured, blowout or depositional areas. Wind caused deposition at the base of shrubs and trees is stabilized by biological soil crusts or litter.

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7. **Amount of litter movement (describe size and distance expected to travel):** There may be movement of fine litter outside of the stable waterflow patterns of up to 2-4'on low slopes (< 6%) and 5-10' on steeper slopes . Fine litter may be redistributed in the stable waterflow patterns following large storm events, depositing where the slope flattens or behind obstructions. Woody litter should not move from beneath the plant.

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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 5-6 throughout the site. Surface texture varies from fine sand to gravelly fine sandy loam to channery loam.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface (A horizon) is 1 ½ to 2 inches deep. Structure is weak fine platy parting to moderate fine and medium granular. Color is brown (7.5YR5/4) to light red (2.5YR6/6). 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.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Distribution of vascular plants and/or biological soil crusts (where present) intercept raindrops preventing, but not eliminating, reduction of infiltration due to physical crusting. Plants and/or biological soil crusts usually have sufficient cover to slow runoff allowing time for infiltration (except on clay loam soils where biological soil crust development is minimal). Shrubs, trees, and bunchgrasses and associated plant litter provide barriers to flow.

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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, although bedrock is found within 4 to 20 inches of soil surface. In addition, there may be layers of calcium carbonate or other naturally occurring hard layers found in the soil subsurface. These should not be considered to be 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: Biological soil crusts* codominate with trees (e.g UT juniper) and non-sprouting, drought-deciduous shrubs (e.g. Blackbrush). Blackbrush cover declines relative to tree cover in areas with more rock outcrop.

    Sub-dominant: Cool-season bunchgrasses (e.g. Indian ricegrass), Warm-season bunchgrasses (e.g. Galleta). Non-drought-deciduous shrubs.

    Other: Annual and perennial forbs.
    Perennial and annual 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 wildlife (deer) use of the palatable sub dominant shrubs and forbs.; drought and insects (though these have minimal direct impacts on the dominant plants (blackbrush and juniper)) Factors contributing to spatial variability include texture, depth and coarse fragment (rock/gravel) content, slope, aspect, and degree of topographic heterogeneity (contributing to water redistribution and concentration).

    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 crusts are an important component on many soils of this ecological site except on very fine textured surfaces (clay loams) and where rock fragment cover is high. At least 1/4 to 1/2 of the soil surface not protected by plant litter or rock should support lichens, mosses or dark cyanobacterial crusts.

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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 trees, shrubs, or grasses. During severe (multi-year) drought up to 20% of the blackbrush stems may die. There may be partial mortality of individual bunchgrasses and other shrubs during drought. Some bunchgrass and shrub mortality may occur during severe droughts, particularly on the shallower and coarser soils associated with this site. Because woody stems may persist for many years, juniper (especially older trees) and blackbrush will normally have dead stems within the plant canopy. Blackbrush will drop its leaves when water stressed.

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14. **Average percent litter cover (%) and depth (in):** Litter cover (including under plants) of the non-bedrock areas, nearly all of which should be fine litter. Depth should be 1 leaf thickness in the interspaces, up to ¼" under shrub canopies and ¼ to 1½" under trees. Litter cover may increase up to 30% immediately following leaf drop. Litter redistribution following natural extreme runoff events can reduce litter cover by concentrating it in low-lying areas. Litter cover may increase to 20-30% followings seasons with high production of annuals.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 200-300 #/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:** None currently known; however cheatgrass, Russian thistle, and other introduced annual forbs have future potential. This reference should be revised if any of these species become invasive in this ecological site.

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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. Blackbrush reproduction is naturally very episodic and no young plants may be apparent.
