

Ecological site R036XY316UT Upland Shallow Loam (littleleaf mountain mahogany)

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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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Approval date	
Composition (Indicators 10 and 12) based on	Foliar Cover

Indicators

1. **Number and extent of rills:** Some rills are found throughout the site. Rills often begin at lower end of a water flow pattern or below exposed bedrock where water has accumulated sufficiently to cause erosion. Several rills may connect. Rills may be actively eroding with sharp sides as much as 2 inches high. Most rills will be 6 inches or less wide. Rills may extend 20 or more feet in length. Number of rills will be greater on the steeper slopes (>20 %) associated with this site but length of rills may be less on these slopes (as gullies are more likely to form on steep slopes).

2. **Presence of water flow patterns:** Water flow patterns frequently form on soil surface as water flows from exposed bedrock and from undisturbed areas of biological crusts but not at sufficient quantity to cause erosion. The spaces between biological crusts seem to serve as water storage and flow patterns. Water flow patterns are often connected forming a branching pattern. Water flow patterns may exceed 30 feet in length on gentle (<10 %) sloping land, growing longer on steeper slopes.

3. **Number and height of erosional pedestals or terracettes:** Short pedestals are often found at plant bases growing along sides of rills, but there should be no exposed roots. The interspaces between well formed biological crusts give the appearance of pedestals. A few small (<1 sq ft.) terracettes form behind debris dams of small to medium sized branches in water flow patterns.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground in the reference state is expected to range from 5-10%. Except where covered by plant

canopy cover, the primary areas of bare ground are in water flow patterns and rills. Note that much of the area is covered with biological crusts which should not be recorded as bare ground; however there are some areas of weakly developed crust that may function as bare ground (raindrop splash, runoff, etc.) and should be recorded as bare ground.

5. **Number of gullies and erosion associated with gullies:** A few gullies are found throughout the site and begin where several rills converge or below exposed bedrock where sufficient water has accumulated to cause erosion. Gullies will deepen until bedrock is reached. Once bedrock is reached, a gully will continue to erode soil from the edges and become wider. Gullies will seldom be deeper than 20 inches because of shallow soil (<20 inches) depth. Gullies may be 4 or more feet wide.

6. **Extent of wind scoured, blowouts and/or depositional areas:** The occurrence of wind scoured, blowouts, and/or depositional areas are rare. Trees intercept wind and prevent wind generated soil movement.

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 (<¼ inch in diameter) may be moved in water flow patterns and rills, with deposition occurring at obstruction. 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 ¼ inch in diameter) are not likely to move under normal conditions. In areas below exposed bedrock, it is possible that gullies may remove litter from base of juniper and pinyon trees.

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 textures range from fine sandy loams to sandy loams.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface is 1-3 inches deep and structure is typically described as moderate very coarse platy parting to weak fine granular. The A-horizon color is a yellowish red (5YR5/6). 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, trees 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. The tree canopy is effective in intercepting rain drops and preventing splash erosion but configuration of crowns and litter accumulation under crowns forms micro-topography that may help accumulate water for more rapid runoff, particularly if bare soil lies below the outer edge of the canopy.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** A compaction layer is not expected on this site; however, sandstone bedrock lies within 20 inches or less of the soil surface. Naturally occurring layers of hard calcium carbonate and/or unweathered

parent material may also be found in the soil, but should not be considered a compaction layer.

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: 15-30% trees (e.g. Two Needle Pinyon and Utah Juniper)
25-50% various species of biological crusts (e.g. moss, lichen, and cyanobacteria)
5-10% evergreen shrubs (e.g. Littleleaf Mountain Mahogany)

Sub-dominant: 10-20% deciduous shrubs (e.g. Utah Serviceberry; Birchleaf Mountain Mahogany; Long Flower Snowberry)

15-20% perennial grasses (e.g. Indian Ricegrass, Galleta, and needleandthread)

Other: Other forbs, shrubs, and grasses

Additional: Perennial and annual forbs can be expected to vary widely in their expression in the plant community based upon departures from average growing conditions. 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):** Mix of young, medium aged, and old pinyon and Utah juniper are expected to be found on this site. During years with average to above average precipitation, there should be very little mortality or decadence apparent in either shrubs or grasses. Old and young tree mortality and decadence naturally occurs during severe droughts. Insects and droughts may combine to increase death of pinyon. Insects may also cause some death and decadence of sagebrush during natural cycles.

14. **Average percent litter cover (%) and depth (in):** Litter cover ranges from 1-5%. Most litter accumulates at below and to the side of live plants, and thus percent litter will be just slightly above percent of canopy cover. Litter associated with forbs is less than .10 inches deep, while litter under shrubs is .25 to .5 inches deep and litter under trees is 100% and .5 to 1 inches deep. Bare interspaces of water flow patterns, rill, and gullies do not have litter except where debris dams occur. Very little litter is found on areas of biological crusts

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 350 to 450 pounds per acre in 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 cheatgrass (*Bromus tectorum*), broom snakeweed (*Gutierrezia sarothrae*), tansy mustard (*Descurainia pinnata*), annual stickseed (*Lappula* sp.), annual *Cryptantha* (*Cryptantha* sp.), and Russian thistle (*Salsola tragus*).

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) 2006 ESD data from Natural Bridges National Monument.
