

Ecological site R047XB318UT Upland Shallow Hardpan (pinyon/Utah juniper)

Last updated: 2/06/2025
Accessed: 05/13/2025

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.

Author(s)/participant(s)	V. Keith Wadman (NRCS Retired).
Contact for lead author	shane.green@ut.usda.gov
Date	12/05/2012
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- 1. Number and extent of rills:** None to very few. Some minor rill development may occur on steeper slopes or on areas located below exposed bedrock, or other water shedding areas, where increased runoff may occur. Any rills present should be <1 inch deep, fairly short (<8 feet) and somewhat widely spaced (6-8 feet). Minor rill development may be observed following major thunderstorm or spring runoff events but should heal during the next growing season.
- 2. Presence of water flow patterns:** Very Few. A very few sinuous flow patterns wind around perennial plants and surface rock. Evidence of flow patterns is expected to increase somewhat with slopes greater than 15%. Water flow patterns are long (15-20 feet), narrow (<1 foot wide), and spaced widely (10-20 yards) on gentle slopes (<15%) and more closely (<10 yards) on steeper slopes (>15%).
- 3. Number and height of erosional pedestals or terracettes:** Very Few. A few (2-3% of plants) small pedestals may form at the base of plants that occur on the edge of water flow patterns, but they should not show any exposed roots. Terracettes are fairly rare, forming behind debris dams of small to medium sized litter (up to 2 inches in diameter) in water flow patterns. These debris dams may accumulate smaller litter (leaves, grass and forb stems) and sediment.
- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground in this site should average 20% to 25%. Soil surface is typically covered by 35 to 45% surface fragments. Most bare ground is associated with water flow patterns, rills, and gullies. Bare ground openings should not be greater than 2 to 3 feet and should mostly not be connected.

-
5. **Number of gullies and erosion associated with gullies:** None at site level. Scattered landscape level gully channels, however, are a normal component of basin/range environments. Where landscape gullies are present, they should be stable, partially vegetated on their sides and bottoms, with no evidence of head-cutting. Some slight increase in disturbance may be evident following significant weather events or when gullies convey considerable runoff from higher elevation rocky or naturally eroding areas.
-
6. **Extent of wind scoured, blowouts and/or depositional areas:** None to Rare. Trees break the wind and reduce the potential for wind erosion. The coarse fragments on the soil surface help armor it and reduce the potential for wind erosion.
-
7. **Amount of litter movement (describe size and distance expected to travel):** Most litter resides in place with some redistribution caused by water movement. Minor litter removal may occur in flow channels with deposition occurring within 1 to 2 feet 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. However, some litter movement is expected (up to 6 feet) with increases in slopes >10% and/or increased runoff resulting from heavy thunderstorms.
-
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 an erosion rating of 4 or 5 under the plant canopies, and a rating of 3 to 4 in the interspaces. The average should be a 4. Vegetation cover, litter, biological soil crusts and surface rock reduce erosion.
-
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** (Venture) Soil surface horizon is typically 0 to 6 inches deep. Texture is a very cobbly silt loam, structure is typically weak fine granular. Color is dark grayish brown (10YR 4/2). A Mollic epipedon ranges to a depth of 13 inches. 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:** Good spatial distribution of biological soil crust, where present, will help intercept raindrop splash, reducing erosion. It can also increase water surface retention by allowing additional time for infiltration. Trees canopies and litter accumulating at their bases can create a micro-topography that may enhance development of water flow patterns below the drip line. A significant increase in Pinyon-juniper canopy may reduce understory vegetation and cause an increase in runoff. This may reflect a different community phase within the reference state.
-
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Indurated lime-cemented hardpan occurs at 15 inches. There may be other layers of rock fragments or other naturally occurring hard layers within the soil profile. These should not be interpreted as compaction layers.
-
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: Trees (two-needle pinyon/Utah juniper) > = Sprouting Shrubs (Black sagebrush, Yellow rabbitbrush) > Non-sprouting Shrubs (Wyoming big sagebrush) > Perennial bunchgrasses (Sandberg bluegrass, bottlebrush squirreltail).

Sub-dominant: Non-sprouting shrubs (broom snakeweed) > Perennial bunchgrasses (muttongrass, Indian ricegrass)>> Forbs (carpet phlox, slender wild buckwheat) > 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. Biological soil crust is variable in its 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: Factors contributing to temporal variability include insects and other pathogens (mistletoe), drought, extreme precipitation events, etc. Factors contributing to spatial variability include slope, amount of rock fragments, aspect, etc. Following recent natural disturbances such as fire, drought or insects that may remove woody vegetation, forbs and perennial grasses (herbaceous species) may become more dominate in the community. These conditions may reflect a functional community phase within 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 recent mortality or decadence apparent in trees, shrubs, or grasses. During severe (multi-year) drought up to 20% of the pinyons and junipers may die, either from drought, insect damage or pathogens such as mistletoe. There may be partial mortality on individual bunchgrasses and shrubs during drought periods, and complete mortality of individual plants during severe drought periods, particularly on the shallower and coarser soils associated with this site. Because woody stems may persist for many years, both pinyons and junipers (especially older trees) will normally have dead stems within the plant canopy.
-
14. **Average percent litter cover (%) and depth (in):** Total litter cover will be composed mostly of fine litter. Depth should be 1 leaf thickness in the interspaces, up to 1/2" under shrub canopies, and up to 1" under tree canopies. Litter cover may increase to 30% on some years due to increased production of plants.
-
15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Annual production in air-dry herbage should be approximately 650 - 750#/acre on an average year, but could range from 350 to 850#/acre during periods of prolonged drought or above average precipitation.
-
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:** Few invasive species are capable of dominating this site. When invasion does occur, cheatgrass, alysium, and various mustard species are the most likely to invade.
-
17. **Perennial plant reproductive capability:** All perennial plants should have the ability to reproduce in all years, except in extreme drought years. There are no restrictions on either seed or vegetative reproduction. Some seedling recruitment of major species is present during average and above average growing years.
