USDA Natural Resources
Conservation Service

Ecological site R036XY346CO
Cobbly Foothills

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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	Annual Production

Indicators

1. **Number and extent of rills:** None to very rare. Any rills present should be short in length (less than 6 feet long) and only occur where increased runoff occurs on lower part of steeper slopes and areas below exposed bedrock. Old rills should be weathered and muted in appearance. An increase in rill formation may be seen after disturbance events such as recent fire or thunderstorms.

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2. **Presence of water flow patterns:** Rare. If present, short (less than 8 feet long) and usually disconnected with numerous debris dams. They are stable. Flow patterns typically flow around perennial plant bases and rock fragments. They usually show no evidence of erosion. They are more evident after recent thunderstorms.

3. **Number and height of erosional pedestals or terracettes:** Pedestals are very rare and may form at the base of plants that occur on the edge of flow paths. Terracettes are very rare to rare, forming behind debris dams of small to medium sized litter (up to 2 inches in diameter) may form in water flow patterns. These debris dams may accumulate smaller litter (leaves, grass and forb stems) and sediment. Terracettes or debris dams are more obvious following intense rainfall events.

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 ranges from 15 to 25%. Areas with well-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 6% 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%. Extended drought can cause bareground to increase.

5. **Number of gullies and erosion associated with gullies:** None to very rare. Any gullies present are sparsely located across the landscape and are usually caused by run-in water from adjacent sites that are dominated by exposed bed rock or dissected slopes. If present gullies have been re-stabilized by perennial vegetation.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None to very few. Shrubs break the wind and reduce the potential for wind erosion. The surface fragments armor the soil surface and help to reduce the potential for wind erosion.

7. **Amount of litter movement (describe size and distance expected to travel):** Most litter accumulates at base of plants. Woody stems from trees are not moved unless present in water flow patterns, rills, or gullies.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Stability class rating is 2 to 4 in the interspaces at the soil surface. With cover the expected values are 4 to 6.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil organic matter content ranges from 0.5-2%. Soils are deep in depth. The surface soils of this site are usually cobbly loam or gravelly loam. Soils are cobbly, gravels and/or stone filled. Structure is weak very fine granular structure to moderate fine granular structure. The soil surface (A horizon) ranges from 3 to 8 inches in depth. Refer to soil survey for more detailed information about your specific site.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Bare spaces are small, rounded in shape, and are unconnected. The diverse grass, forb, shrub functional/ structural groups and any well-developed biological soil crusts (moss, pinnacled lichen, and light cyanobacteria) (when present), reduce raindrop impact and slows overland flow providing increased 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, 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: cool season rhizomatous grass (western wheatgrass) > cool season bunchgrasses (Indian ricegrass, muttongrass, needle-and-thread, squirreltail)

    Sub-dominant: = shrubs (Basin big sagebrush, bitterbrush, gambel oak, true mountain mahogany) >

    Other: forbs (longleaf phlox, wooly indianwheat, scarlet globemallow, onion spring parsley, buckwheats,)> Trees (Pinyon pine, Utah Juniper, Rocky Mountain Juniper)

    Additional: There may be scattered pinyon and/or Utah Juniper trees on this site where is more skeletal and/or depth to calcic horizon is shallow.

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Typical minimal. 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 mortality of bunchgrass and other shrubs may occur during very severe (long term) droughts.

14. **Average percent litter cover (%) and depth (in):** Litter cover ranges from 5-15% at a depth of 0.25 to 0.5 inches. Most litter is at the base and under the canopy of the plants.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 700 lbs. /ac. low precipitation years, 1200 lbs. /ac. average precipitation years, 1600 lbs. /ac. above average precipitation years. After extended drought or the first growing season following wildfire, production may be significantly reduced by 400 - 650 lbs. /ac. or more.

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:** Cheatgrass and noxious weeds.

17. **Perennial plant reproductive capability:** All plants have the ability to reproduce in most years. Limitations are weather related, wildfire, natural disease, inter-species competition, and insects may temporarily reduce reproductive capability. Increased tree canopy will result in decreased understory reproductive capability.