USDA Natural Resources
Conservation Service

Ecological site R035XC348AZ
Limestone Hills 10-14" p.z.

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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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Date	03/24/2006
Approved by	S. Cassady
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** A few rills may form due to loamy surface textures, moderate permeability, very rapid runoff, and steep slopes, but they are not likely in most areas due to extensive surface cover of rock fragment armor and large amounts of rock fragments in the soil profile.

2. **Presence of water flow patterns:** Water flow patterns may occur due to moderate permeability, very shallow depth to bedrock, very rapid runoff, and steep slopes, but they are not likely due to the extensive surface cover of rock fragment armor. There will be more water flow patterns in steeper areas and in areas adjacent to large expanses of rock outcrop.

3. **Number and height of erosional pedestals or terracettes:** Some short pedestals and terracettes may form, but they will be limited by the amount of surface rock fragments.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** The site may have 0-20% bare ground. Areas with a greater cover of rock fragments and/or rock outcrop will have less bare ground. Drought may cause an increase in bare ground. This site has only one inch of available water capacity, so it does not have the potential to produce a lot of plant cover.

5. **Number of gullies and erosion associated with gullies:** None

6. **Extent of wind scoured, blowouts and/or depositional areas:** None

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7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous, fine woody and some coarse woody litter will be transported in water flow pathways. Most coarse woody litter will remain under shrub and tree canopies. There may be more litter movement in areas that are adjacent to large expanses of rock outcrop.

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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):** Soil aggregate stability ratings average six under plant canopy and five in the interspaces. Soil surface textures are loam or sandy loam. All surface horizons contain a significant amount of rock fragments (cobbles and/or gravels). Most soils have 50-90% cover of rock fragments (mostly gravels and cobbles, but also stones and boulders). When well vegetated or covered with rock armor, the soils have a high resistance to both water and wind erosion.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface structure is mostly platy (weak to moderate, thick), with some granular (moderate fine) and subangular blocky (weak medium). Surface thickness range is 1-3 inches. Color is variable depending upon parent material.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** This site is characterized by a patchy distribution of mostly shrubs and grasses depending upon the location of bedrock outcrops. Canopy cover averages about 30% and is dominated by shrubs. Basal plant cover averages about 4% and is also dominated by shrubs. Plant cover (especially basal cover) is reduced by the amount of rock fragment and/or bedrock ground cover. Both plant cover values decrease during a prolonged drought. This type of plant community is only slightly effective at capturing and storing precipitation.

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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. This soil is not easily compacted due to extensive cover of rock fragment armor and the high volume of rock fragments within surface horizons of the profile. Inclusions without many rock fragments will compact easily below 1-3 inches. Most soils have a naturally platy surface structure.

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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: shrubs >>

    Sub-dominant: warm season bunchgrasses > Agave family >

    Other: Minor: warm season colonizing grasses = cool season bunchgrasses = forbs >
    Trace: cacti = trees

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** All plant functional groups are adapted to survival except during the most severe droughts. Severe winter droughts affect shrubs and trees the most. Severe summer drought affects grasses the most.

14. **Average percent litter cover (%) and depth (in):** Litter consists of a combination of herbaceous and woody. Litter amounts increase during the first few years of drought, then decrease in later years.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 350-450 pounds per acre (dry weight) in drought years, 450-550 pounds per acre in median years, 550-650 pounds per acre in wet years.

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 red brome are exotic annual grasses that can invade the site regardless of management. They may dominate the site for a few years following a fire.

17. **Perennial plant reproductive capability:** All plants native to the site are adapted to the climate and are capable of producing seeds, stolons and rhizomes except during the most severe droughts.