USDA Natural Resources
Conservation Service

Ecological site R036XY405CO
Loamy Bottom

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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	
Date	08/22/2017
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Very minor to no rills present. Very minor rill development may occur in sparsely vegetated areas. If rills are present, they should be widely spaced and not connected. Rill development may increase following large storm events, but should begin to heal during the following growing season. Frost heaving will accelerate recovery. Rill development may increase when run inflow enters site from adjacent sites that produce large amounts of runoff (i.e. steeper sites, rock outcrop). Site is essentially level and rills do not form.

2. **Presence of water flow patterns:** Vegetation should be persistent in the channel. Flow patterns meander around rocks, litter, and perennial plant bases. They are stable with only minor evidence of deposition. This site is periodically inundated with runoff water due to its physiographic location, so water flow patterns are expected.

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3. **Number and height of erosional pedestals or terracettes:** Plants may have small pedestals (<1”) where they are adjacent to water flow patterns, but without exposed roots. Terracettes should be few and stable. Terracettes should be small (3-6”) and show little sign of active erosion. Some plants may appear to have a pedestal but rather than be formed by erosion, the only place litter accumulates and soil collects is at plant bases forming the appearance of a pedestal.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Expect 5-15% bare ground. Extended drought can cause bare ground to increase. Herbaceous communities are most likely to have lower values. As species composition by shrubs increases, bare ground is likely to increase. Very few if any bare spaces of greater than 1 square foot. Sagebrush invasion is often one of the causes of decreased ground cover and is defiantly an indicator of declining health. Keeping vegetation/litter on the soil surface is the key to maintaining this ecosystem in a functioning condition.

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5. **Number of gullies and erosion associated with gullies:** Gullies may be present in areas. They would usually be expected in the lowest part of the site where water flows concentrate and/or in locations where there are concentrated flows into the site from an adjacent site/watershed. If present, gullies often have steep side walls but the bottoms would be mostly stabilized with perennial vegetation. Gullies may show more indication of erosion as the slope gets greater than 5 percent, or as influenced by adjacent steep sites/watershed that may be providing concentrated flow patterns.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Very minor to no evidence of active wind-generated soil movement. Wind scoured (blowouts) and depositional areas are very rarely present. If present they have muted features and are mostly stabilized with vegetation and/or biological crust.

7. **Amount of litter movement (describe size and distance expected to travel):** Due to run-in nature of this site, water flow patterns would be expected to be common with associated visible evidence of litter movement. Most litter resides in place with some redistribution caused by water movement. Litter movement occurs in flow patterns and rills with deposition occurring at points of obstruction and plant bases. However during major flooding events this site slows water and capture litter and sediment and thus large amounts of litter movement is not uncommon after large flow events. Often litter from adjacent sites/watershed contribute to litter noted on site.
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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):** Stability class rating anticipated to be "2-5". Often the soil surface is not very stable because of frequent deposition and weak soil formation. Litter and vegetation are what maintain soil stability. This site should typically have a soil stability rating of 4 at the soil surface.
   Surface texture varies from loam to clay loam. Vegetation cover, litter, and surface rock reduce erosion.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soils are typically deep and well drained. Soil surface horizon is 0 to 6 inches deep. Structure is weak coarse platy structure parting to moderate medium granular structure or moderate medium platy structure parting to moderate medium granular structure. Soils in areas that have never been degraded or drained by gullies may have multiple buried A horizons to a depth greater than 60 inches. However, soils in areas where degradation has occurred may see drastically reduced A horizons (7” or less).

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** With the topographic location of the site being in alluvial bottoms, drainage ways, and flood plains this site is one of the accumulation sites for runoff water. Diverse grass, forbs, and shrub functional/ structural groups with diverse root structures and patterns reduce raindrop impact, slow overland flow, and provide increased time for infiltration. When perennial grasses decrease, reducing ground cover and increasing bare ground, runoff is expected to increase and any associated infiltration reduced.

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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. Naturally occurring soil horizons in the subsurface may be harder than the surface and should not be considered as compaction layers. This occurs naturally due to this sites lower landscape position (bottoms etc.), where fine soil particles (silts and clays) accumulates. The associated blocky and massive structures in the subsurface should not be mistaken for compaction.

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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 Grasses >= Cool Season Bunchgrasses >= Non-sprouting Shrubs >>

    Sub-dominant: Native Perennial Forbs > Warm season Rhizomatous Grasses > sprouting shrubs

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** 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. There may be partial mortality of individual bunchgrasses and shrubs during less severe drought.

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14. **Average percent litter cover (%) and depth (in):** 15-30% litter cover and ranges from 0.25 to 0.50 inches in depth. Litter cover declines during and following extended drought. Litter cover includes litter under plants. Most litter is fine litter. Excess litter may accumulate in absence of disturbance. Litter may decline due to drought but it is a major factor preventing erosion and site degradation and thus if depleted, even due to drought, rangeland health should reflect the vulnerability.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production,**

not just forage annual-production): 1000 lbs/ac low precip years; 1400 lbs/ac average precip years; 1700 lbs/ac above precip years. After extended drought production may be reduced by 500-1000 lbs/ac or more.

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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:** Cheatgrass, Kentucky bluegrass, Russian thistle, Canada thistle, dandelion other native and non-native annual forbs.

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17. **Perennial plant reproductive capability:** All plants have the ability to reproduce. The limitations can be weather, wildfire, natural disease, inter-species competition, wildlife, excessive litter, or insect related. Any of these might temporarily reduce plant reproductive capability.
