USDA Natural Resources
Conservation Service

Ecological site R035XY216UT
Semidesert Sandy Loam (Wyoming Big Sagebrush)

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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 on flatter slopes (0-5%), none to rare on sites with steeper slopes (>5%). Rills are expected on sites that are adjacent to landscape settings where increased runoff may accumulate (such as areas below exposed bedrock). Such rill development should usually be limited to slopes exceeding 5% and adjacent to sites where runoff accumulation occurs (i.e. exposed bedrock, small watersheds, steep sites,etc.) Rills heal rapidly due to the coarse soil textures and frost heaving action over a couple of winters. Any rills present should be somewhat short in length. An increase in rill formation may be seen after recent large thunderstorms.

2. **Presence of water flow patterns:** Flow patterns wind around perennial plant bases and show little to slight evidence of erosion. They are short and stable and there is minor evidence of deposition. On gently sloping (< 5 % slopes) locations within the site, water flow patterns are infrequent and usually less than 3 feet in length. Longer (>3 feet) water flow patterns may be found on steeper slopes (>5%). They are narrow (<1 foot wide) and widely spaced (10-20 yards)

3. **Number and height of erosional pedestals or terracettes:** Plants may show little pedestalling, but there should not be any exposed roots. Shrubs normally have coppice mounding up to 4 inches caused by deposition of wind borne sediments, do not misinterpret these as pedestals. Terracettes should be rare to few, occurring in waterflow patterns obstructed by woody litter. Any rare pedestals that occur are usually associated with natural wind erosion, and should not have exposed roots. Interspaces between well developed biological soil crusts may resemble pedestals but they are actually a characteristic of the crust formation.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 35-55% bare ground. Ground cover is based on the first raindrop impact, and bare ground is the opposite of ground cover. Any well developed biological crusts present should not be recorded as bare ground. Poorly developed biological soil crusts that are interpreted as functioning as bare ground (therefore they would be susceptible to raindrop splash erosion) should be recorded as bare ground.

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5. **Number of gullies and erosion associated with gullies:** None to rare. Some gullies may be present in landscape settings where increased runoff may accumulate (such as areas below exposed bedrock). Such gully development is expected to be limited to steeper slopes adjacent to sites where runoff accumulation occurs. Any gullies present should show little sign of accelerated erosion and should be stabilized with perennial vegetation.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Very minor wind generated soil movement is normal. Wind caused blowouts and deposition are generally stable or have healed over. Coppice mounding around Mormontea and other shrubs is common. Increased wind generated soil movement can occur during severe wind events.

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7. **Amount of litter movement (describe size and distance expected to travel):** Most litter resides in place with some redistribution caused by water and wind movement. Very minor litter removal may occur in flow patterns and rills with deposition occurring 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.

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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):** This site should have a soil stability rating of 4 or 5 under the plant canopies and a rating of 4 in the interspaces using the soil stability kit test. The average should be a 4. Surface texture varies from loamy fine sand to fine sandy loam. Vegetation cover, litter, biological soil crusts 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):** Soil surface typically varies from 3 to 4 inches. Structure typically weak platy. Color typically varies from reddish yellow (5YR4/6) to brown (7.5YR5/4). An ochric horizon extends to a depth of 3 to 7 inches. An ochric horizon typically extends to a depth of 2 to 10 inches. The ochric horizon is a surface horizon lacking fine stratification and which is either light colored, or thin, or has an low organic carbon content, or is massive and (very) hard when dry. 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. 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:** Vascular plants and any well developed biological soil crusts will break raindrop impact and splash erosion. Spatial distribution of vascular plants and interspaces between well developed biological soil crusts (where present) provide detention storage and surface roughness that slows runoff allowing time for infiltration. Interspaces between plants and any well developed biological soil crusts (where present) may serve as water flow patterns during episodic runoff events, with natural erosion expected in severe storms. When perennial grasses decrease, reducing ground cover and increasing bare ground, runoff is expected to increase and any associated infiltration reduced.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. A few soils have bedrock at about 30+ inches. Naturally occurring soil horizons may be harder than the surface because of an accumulation of clay or calcium carbonate and should not be considered 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: cool season perennial grasses (Indian ricegrass, Needle and Thread) > non sprouting shrubs (Big sagebrush, Fourwing saltbush, Winterfat)

    Sub-dominant: warm season perennial grasses (Galleta, Sand dropseed) > sprouting shrubs (Moromtea) > forbs > 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 (e.g. Crested wheatgrass and Russian wildrye etc.). Biological soil crust is variable in it's 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: Temporal variability factors include insects, drought, and infrequent fire. Spatial variability factors include soil texture, slope, etc.
    Following a recent disturbance such as fire or drought that removes the woody vegetation, forbs and perennial grasses (herbaceous species) may dominate the community. If a disturbance has not occurred for an extended period of time, woody species may continue to increase crowding out the perennial herbaceous understory species. In either case, these conditions reflect a 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 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 (including under plants) nearly all of which should be fine litter. Depth should be 1 leaf thickness in the interspaces and up to 1/2" under canopies. Litter cover may increase to 10-15% on some years due to increased grass plant production.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 450 - 500 #/acre on an 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:** Cheatgrass, Broom snakeweed & introduced annual forbs (Filarie, Russian thistle).

17. **Perennial plant reproductive capability:** All perennial plants should have the ability to reproduce sexually or asexually in most years, except in drought years.