

Ecological site R024XY005NV LOAMY 8-10 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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Approved by	P. Novak-Echenique
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- Number and extent of rills:** Minimal on less than 10% slopes and increasing slightly as slopes increase up to 50%. Rills spaced 15-50 ft. apart when present on slopes of 10-50%. After wildfires, high levels of natural herbivory or extended drought or combinations of these disturbances, rills may double in numbers on slopes from 10-50% after high intensity summer thunderstorms.
- Presence of water flow patterns:** Generally up to 20 ft. apart and short (<10 ft. long) with numerous obstructions that alter the water flow path. On slopes of 10-50%, flow patterns increase in number and length. Flow pattern length and numbers may double after wildfires, high levels of natural herbivory, extended drought, or combinations of these disturbances if high intensity summer thunderstorms occur.
- Number and height of erosional pedestals or terracettes:** Wind caused pedestals are rare and only would occur after wildfires, high levels of natural herbivory, extended drought, or combinations of these disturbances. Pedestals of Sandberg bluegrass outside of water flow patterns are generally caused by frost heaving, not erosion.
- Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground 10-20% depending on amount of rock fragments. Lower slopes are expected to have less bare ground than steeper slopes. Upper end of precip range (10") will also have less bare ground. Bare ground would be expected to increase to 80% or more the first year following wildfire but to decrease to pre-fire levels within 2-5 years depending on climate and other disturbances. Multi-year droughts can also cause bare ground to increase to around 30%.

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5. **Number of gullies and erosion associated with gullies:** None.
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6. **Extent of wind scoured, blowouts and/or depositional areas:** Wind erosion is minimal. Moderate to severe wind erosion can occur when disturbances such as severe wildfires, high levels of natural herbivory, extended drought, or combinations of these disturbances. After rain events, exposed soil surfaces form a physical crust that tends to reduce wind erosion.
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7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage from grasses and annual & perennial forbs) expected to move distance of slope length (1-3 ft on 2-15% slopes, 4-6 ft. on 15-30% slopes, and 7-10 ft. on 30-50% slopes) during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during large rainfall events.
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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):** Values will range from 4 to 6 under canopy and in interspaces.
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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is moderate granular. Soil surface colors are light brownish grays and soils are typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is typically 1 to 1.5 percent dropping off quickly below. Organic matter content can be more or less depending on micro-topography. Loss of several millimeters of soil may occur immediately after a high intensity wildfire, high levels of natural herbivory, extended drought, or combinations of these disturbances.
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Perennial plants and especially sagebrush capture snow, increasing soil water availability in the spring. High bunchgrass density (especially deep-rooted bunchgrasses [i.e., Thurbers needlegrass] slow runoff and increase infiltration. Loss of sagebrush after a high intensity wildfire reduces snow accumulation in the winter, reducing the depth of soil water recharge negatively affecting recovery and growth and reproduction of deep-rooted perennial forbs and grasses.
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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):** Compacted layers are none. These are soil profile features, such as massive sub-surface structure, subsoil argillic horizons, or duripans that would be mistaken for a management induced soil compaction layer. Silica accumulations can cause denser horizons; however these horizons can be distinguished from compaction by their brittleness and "shiny" material in the horizon. These silica accumulations will increase the hardness of the soil, but should not be considered 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: Reference Plant Community: Deep-rooted, cool season, perennial bunchgrasses > Wyoming big sagebrush
- Sub-dominant: Associated shrubs > shallow-rooted, cool season, perennial bunchgrasses > deep-rooted, cool season,

perennial forbs > fibrous, shallow-rooted, cool season, perennial and annual forbs

Other: succulents, annual and perennial forbs, biological crust up to 10-15%

Additional: After wildfires, the functional/structural dominance changes to the herbaceous components with a slow 10-20 year recovery of the non-resprouting shrubs (big sagebrush). Resprouting shrubs (spiny hopsage, rabbitbrush) tend to increase until the sagebrush reestablishes. High levels of natural herbivory, extended drought, or combinations of these factors can increase shrub functional/structural groups at the expense of the herbaceous groups and biological crust.

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Most of the perennial plants are long-lived. Dead branches within individual shrubs common and standing dead shrub canopy material may be as much as 25% of total woody canopy; some of the mature bunchgrasses (<20%) have dead centers.
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14. **Average percent litter cover (%) and depth (in):** Within plant interspaces ($\pm 20\%$) and depth of litter is 0.25 inch. After wildfires, high levels of natural herbivory, extended drought, or combinations of these disturbances, litter cover and depth decreases to none. Depending on climate and vegetation recovery, litter will increase to pre-fire amounts in one to five growing seasons.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (end of June) ± 600 lbs/ac; Favorable years ± 800 lbs/ac and unfavorable years ± 400 lbs/ac. Spring moisture significantly affects total production. After wildfires, high levels of natural herbivory, extended drought, or combinations of these disturbances, can cause production to be significantly reduced (100-200 lbs/ac the first growing season following wildfire) and recovery is slow under below average precipitation regimes.
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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:** Potential invaders include cheatgrass, halogeton, Russian thistle, bassia, annual mustards, and knapweeds. Cheatgrass is the greatest threat to dominate this site after disturbance (primarily wildfires). Exotic mustards and Russian thistle may dominate soon after disturbance but are eventually replaced by cheatgrass.
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17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season years. Only limitations to reproductive capability are weather-related, natural disease or herbivory, insect infestations or combinations of these disturbances.
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