USDA Natural Resources
Conservation Service

Ecological site FX052X01X165
Thin Claypan (Tcp) Dry Grassland

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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	Foliar Cover

Indicators

1. **Number and extent of rills:** Rills are typically not present in the reference condition. Slight evidence of rills may occur following a rainfall event, but rills would be short (less than 3 feet) and discontinuous.

2. **Presence of water flow patterns:** Water flow patterns are typically not present in the reference condition. If present, they are most likely to occur on the margins of the site or where root mats have been disturbed. They are typically faint, disconnected, and very short in length (less than 1 foot). Slight evidence of water flow patterns may also occur following a rainfall or winter thaw event.

3. **Number and height of erosional pedestals or terracettes:** Pedestals are rare in the reference condition and are most likely to occur at the margins of the site. If present, they occur on less than 5 percent of plants and are less than ½ inch in height.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is typically less than 10 percent. It typically consists of randomly scattered patches less than 2 inches in diameter, particularly where clubmoss is absent or disturbed.

   Note: Indicator should be evaluated in the context of current years climate and disturbance patterns. Events such as drought, hail, fire, etc. may increase bare ground. Bare ground is defined as exposed mineral soil without cover from vegetation, litter, surface fragments, or biotic crust (measured by Line-Point Intercept method).

5. **Number of gullies and erosion associated with gullies:** Active gullies are not present in the reference state. If there is evidence of past erosion that has created gullies, these areas should have stable vegetative cover and no active erosion is evident.

6. **Extent of wind scoured, blowouts and/or depositional areas:** Wind scoured or depositional areas are rare in the reference condition. If present, they occur on less than 5 percent of the area and tend to be inconspicuous and not connected.

7. **Amount of litter movement (describe size and distance expected to travel):** Litter movement is typically not evident in the reference condition. If present, fine litter movement is typically less than 1 foot and limited to within water flow patterns, with little or no accumulation around obstructions. Large litter movement is not evident.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** The average soil stability rating is 5 to 6, both under plant canopies and in plant interspaces.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Due to natural soil forming processes, soils on this site typically have a thin, loamy surface horizon with a dense, root restricting clay layer underneath. The soil surface horizon averages 2.5 inches (7 cm) thick but may vary from 1.5 to 4 inches (4 to 10 cm) thick. It has thin platy structure, and moist color typically varies from brown (10YR 5/3) to dark grayish brown (10YR 4/2). The subsurface horizon is hard, clayey, and has columnar structure.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Infiltration and runoff on this site is largely controlled by soil properties. Canopy cover of 40 to 75 percent reduces raindrop impact, slows overland flow, and increases time for infiltration into the soil surface horizon. Plant community composition is dominated by mid-statured cool season rhizomatous grasses (25 to 65 percent) with up to 5 percent mid-statured cool season bunchgrasses, which all have root systems that stabilize soil structure and aid infiltration. Infiltration below the surface horizon is severely limited by the dense, clayey subsoil regardless of plant community composition.

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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):** A compaction layer is not present in the reference condition; however, the natural soil structure may be confused with a compaction layer. Due to the unique soil forming processes on this site soil structure in the surface horizon is typically thin platy. The subsurface horizon has columnar structure, is hard, and is root restrictive. This hard layer occurs due to natural soil forming processes.

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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: Typically, cool-season rhizomatous wheatgrasses are the dominant functional/structural group with a combined cover ranging from 25 to 65 percent.

    Sub-dominant: Shortgrasses are a subdominant component with 5 to 25 percent cover.

    Other: Mid-statured cool season bunchgrasses, forbs, and shrubs/subshrubs are minor components with 0 to 5 percent, 1 to 10 percent, and 5 percent or less cover respectively.

Additional: Functional and structural groups must be evaluated in the context of the current years climate. Climatic fluctuations such as amount and timing of precipitation, temperature, and stored soil moisture may effect composition and structure on the site.

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Mortality is not evident on rhizomatous herbaceous species. Bunchgrasses may show some signs of dead or dying plant parts, but mortality typically does not exceed 5 percent for any given species. Mortality on woody species is typically 5 percent or less per species.

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14. **Average percent litter cover (%) and depth (in):** Total litter cover averages about 35 percent but may range from 20 to 50 percent depending productivity and grazing use. This includes all detached plant material, both on the soil surface and suspended in the canopy. Most litter is loosely distributed throughout the canopy and it is estimated that only 5 to 10 percent is in contact with the soil surface. It does not typically accumulate to a measurable depth on the soil surface.

    Note: Indicator should be evaluated in the context of current years climate and disturbance patterns. Above average precipitation may increase litter amounts whereas events such as drought, hail, fire, etc. may decrease litter amounts.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Total annual production is strongly influenced by climatic factors such as amount and timing of precipitation, temperature, and stored soil moisture and must be evaluated within the context of the current climatic conditions. Estimated annual production expected on this site for below average, average, and above average years is as follows:

    Below Average (pounds per acre)
    Grasses: 220 to 370 Forbs: 40 to 65 Shrubs: 10 to 15 Total: 270 to 450

    Average (pounds per acre)
    Grasses: 325 to 490 Forbs: 60 to 90 Shrubs: 15 to 20 Total: 400 to 600

    Above Average (pounds per acre)
    Grasses: 410 to 620 Forbs: 75 to 115 Shrubs: 15 to 25 Total: 500 to 760

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 invasive plants on this site are crested wheatgrass, noxious weeds, and annual bromes. Invasive species are typically absent or constitute less than 5 percent cover in the reference condition. However, annual brome species such as field brome (*Bromus arvensis*) may exhibit seasonal abundance, depending on moisture and germination conditions, which result in short-term departures from reference.

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17. **Perennial plant reproductive capability:** In the reference condition, all plants are vigorous enough for reproduction either by seed or tillers. For grasses and forbs: at least 50 percent of plants are capable of producing seedheads. For shrubs: 50 percent or more of plants are capable of producing flowering leaders.

    Note: Must be evaluated in the context of the current years climate. Climatic fluctuations such as amount and timing of precipitation, temperature, and stored soil moisture may effect flower or seed production depending on the particular species.
