

Ecological site R036XY111CO **Steep Shallow Clay Loam (pinyon-Utah juniper)**

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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.

Author(s)/participant(s)	This is a copy of the R035XY240UT reference sheet revised to match this site. Original written by Steve Myers (1/24/2005). Revised by Jake Owens (3/23/2007) Owens copied R035XY240UT reference sheet and revised it to match this site. The R035XY240UT reference sheet was originally written by Robert Stager (BLM), Dana Truman (NRCS), Paul Curtis (BLM), Shane A. Green (NRCS), and Randy Beckstrand (BLM). Revised and Updated by Suzanne Mayne-Kinney on 5/18/2017.
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Date	05/18/2017
Approved by	Rachel Murph, State Rangeland Management Spec., USDA NRCS Colorado
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Frequent due to the steepness of the site. The surface rock fragments on this site. The overall stony to bouldery surface is expected to be resistant to rill formation and accelerated erosion in general. Where rills occur, they may extend down entire slope.
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2. **Presence of water flow patterns:** Due to the steep slopes, Flow paths are expected. They are prominent and connected. They tend to wind around rock fragments and perennial plant bases. disconnected with debris dams, Runoff is rapid. They show some evidence of erosion with fines and litter depositing against the uphill side of gravel, rocks and plants. During episodic precipitation events e.g. thunderstorms, these sites are expected to shed large volumes of water to adjacent ecological sites.
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3. **Number and height of erosional pedestals or terracettes:** Pedestals are rare and may form at the base of plants that occur on the edge of flow paths.
Terracettes are rare to few, forming behind debris dams of small to medium sized litter (up to 2 inches in diameter) may form in water flow patterns. These debris dams may accumulate smaller litter (leaves, grass and forb stems) and sediment. Terracettes or debris dams are more obvious following intense rainfall events.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 30-50% bare ground. (Soil surface is typically covered 20 to 65 percent surface fragments). Most bare ground is associated with water flow patterns, rills, and gullies. Areas with well-developed biological soil crusts should not be counted 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. Ground cover is based on first raindrop impact, and bare ground is the opposite of ground cover. Ground cover + bare ground = 100%.
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5. **Number of gullies and erosion associated with gullies:** Gullies are present with the inherent steep slopes of this site. Length often extends from exposed bedrock until gully reaches a stream or an area where water and sediment accumulate, but they may be wide and shallow and armored with very large rocks. Gullies may remove soil from base of trees exposing roots.
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6. **Extent of wind scoured, blowouts and/or depositional areas:** None to very few. Trees break the wind and reduce the potential for wind erosion. The surface fragments armor the soil surface and help to reduce the potential for wind erosion.
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7. **Amount of litter movement (describe size and distance expected to travel):** Movement is expected due to steepness of slope (>25%). Deposition would likely occur at points of obstruction such as the uphill side of gravel, rocks and plants, especially following major storm events. Fine litter is moved with even moderate precipitation events and spring runoff. Woody stems may be washed from site. Distance varies from 2-5 feet; following intense rainfall events up to 15 feet or more depending on water concentrations. Gullies may remove accumulated litter from under trees.
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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 using the soil stability kit test, and a rating of 3 to 4 in the interspaces. The average should be a 4. Surface texture is silty clay loam to very channery loam to gravelly 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):** SOM ranges from 0.5-1%. Surface soils are very shallow to shallow. Surface texture ranges from very stony/very boulder sandy clay loam to clay loam. The soil surface can have stone, boulders and cobbles in it. The A-horizon (soil surface) ranges from 1-4 inches in depth. Soil structure is moderate medium granular structure parts to weak fine granular structure. The A horizon is expected to be more developed under the plant canopies. Use the specific information for the soil you are assessing in the published soil survey to supplement this description.
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** The presence of trees, perennial grasses and forbs, and shrubs will breakup raindrop impact and splash erosion. The spatial distribution of the plants, biological crusts and interspaces will provide small pockets for water storage and surface roughness that slows down runoff, allowing time for infiltration. The tree and shrub canopy is effective in intercepting rain drops and preventing splash erosion on the reference state. But, with increased tree canopy, understory canopy is reduced, increased bare soil and litter accumulates under trees, it can form micro-topography that can help water accumulate which can cause more rapid runoff.

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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, although bedrock is found within 20 inches of soil surface. In addition, there may be layers of calcium carbonate or other naturally occurring hard layers found in the soil subsurface. These should not be considered to be compaction layers.
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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: Trees (Pinyon Pine, Utah Juniper) >
- Sub-dominant: cool season bunchgrass (Muttongrass, Indian ricegrass, prairie junegrass, squirreltail, salina wildrye) > shrubs (Black Sagebrush, Wyoming big sagebrush, Utah serviceberry, mountain mahogany) > forbs > (Buckwheat, locoweeds, cryptantha, penstemons, asters, daisy, threadleaf groundsel, stemless goldenweed)
- Other: cool season rhizomatous grass (western wheatgrass) = warm season short bunchgrass (galleta, blue grama) > cryptogams
- Additional:
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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** A mix of young, middle aged and old pinyon and Utah juniper are expected to be found on this site. In years with average or above average precipitation, shrubs, grasses and forbs should have little mortality or decadence. Tree mortality, especially pinyon, can be expected under severe and/or extended drought and subsequent insect infestations. Under a dense tree canopy, understory has increased decadence and mortality.
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14. **Average percent litter cover (%) and depth (in):** Litter cover ranges from 10-20% at a depth of 0.5 to 2.5 inches. Most litter is at the base and under the canopy of the plants.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Tree canopy cover 0-15%: 275-500 lbs./ac.; Tree canopy cover 15+: 250-450 lbs./ac. Production figures are for total annual vegetation.
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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:** Few invasives capable of dominating this site. Cheatgrass, Broom snakeweed, and Mustard may invade the community
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17. **Perennial plant reproductive capability:** All plants have the ability to reproduce in most years. Limitations are weather related, wildfire, natural disease, inter-species competition, and insects may temporarily reduce reproductive capability. Increased tree canopy will result in decreased understory reproductive capability.

