USDA Natural Resources Conservation Service

# Ecological site R047XC302UT
# Upland Clay (black sagebrush)

Accessed: 05/14/2025

## General information

**Provisional**. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

## Classification relationships

Modal Soil: Fergus Family GRV-CL, 10-25% — fine, mixed Typic Argiborolls

## Associated sites

| | |
|---|---|
| R047XC320UT | **Upland Shallow Loam (black sagebrush)** |
| R047XC326UT | **Upland Shallow Loam (pinyon/Utah juniper)** |

## Similar sites

| | |
|---|---|
| R047XC320UT | **Upland Shallow Loam (black sagebrush)** |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | Not specified |
| Shrub | (1) *Artemisia nova* |
| Herbaceous | (1) *Pseudoroegneria spicata* |

## Physiographic features

Hill Sides

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Hill |
| Elevation | 2,377–2,591 m |
| Slope | 10–25% |

## Climatic features

The climate is characterized by cool, moist summers and cold, snowy winters. Approximately 60 percent of the moisture comes as rain from May through October. On the average, January through April are the driest months and May through October are the wettest months. The soil moisture regime is ustic and soil temperatrures are in the frigid regime.

**Table 3. Representative climatic features**

| | |
|---|---|
| Frost-free period (average) | 90 days |
| Freeze-free period (average) | 0 days |

| | |
|---|---|
| Precipitation total (average) | 508 mm |

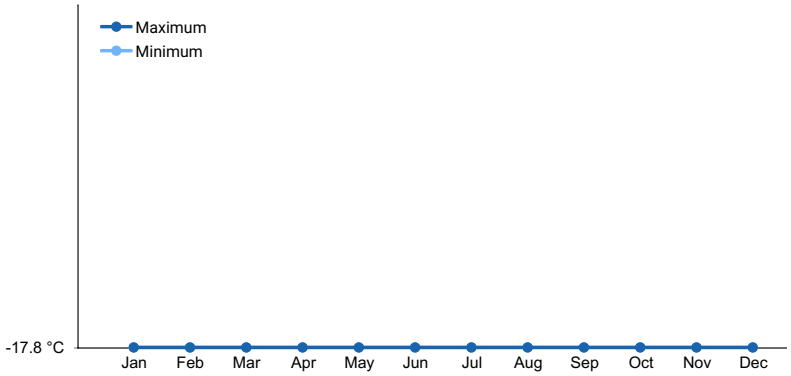


**Figure 1. Monthly average minimum and maximum temperature**

## Influencing water features

## Soil features

This site occurs on hill sides. The soil is deep and well drained. It formed in colluvium and residuum derived from sandstone, shale and quartzite parent materials. The surface soil is very gravelly clay loam about 9 to 12 inches thick. Forty percent of the soil surface is covered by rock fragments. Available water capacity is 0.12 to 0.14 inches per inch.

**Table 4. Representative soil features**

| | |
|---|---|
| Surface texture | (1) Very gravelly clay loam |
| Drainage class | Well drained |
| Soil depth | 102–152 cm |
| Available water capacity (0-101.6cm) | 0.3–0.36 cm |

## Ecological dynamics

As this site deteriorates due to livestock grazing pressure perennial grasses, blue flax, and balsamroot decrease while black sagebrush increases. Fire will reduce or eliminate black sagebrush but perennial and annual grasses and forbs will increase. Utah juniper may invade this site.

## State and transition model

**Ecosystem states**

1. Reference State

**State 1 submodel, plant communities**

1.1. Reference State

## State 1
## Reference State

## Community 1.1
## Reference State

The general view of this area is. The composition by air-dry weight is approximately 40 percent grasses and grasslike plants, 15 percent forbs, 45 percent shrubs, and 5-10 percent trees.

**Table 5. Annual production by plant type**

| Plant Type | Low (Kg/Hectare) | Representative Value (Kg/Hectare) | High (Kg/Hectare) |
|---|---|---|---|
| Grass/Grasslike | 179 | 269 | 336 |
| Shrub/Vine | 179 | 269 | 336 |
| Forb | 67 | 101 | 127 |
| Tree | 22 | 34 | 43 |
| **Total** | **447** | **673** | **842** |

**Table 6. Ground cover**

| | |
|---|---|
| Tree foliar cover | 0% |
| Shrub/vine/liana foliar cover | 14-16% |
| Grass/grasslike foliar cover | 39-41% |
| Forb foliar cover | 4-6% |
| Non-vascular plants | 0% |
| Biological crusts | 0% |
| Litter | 0% |
| Surface fragments >0.25" and <=3" | 0% |
| Surface fragments >3" | 0% |
| Bedrock | 0% |
| Water | 0% |
| Bare ground | 0% |

**Table 7. Canopy structure (% cover)**

| Height Above Ground (M) | Tree | Shrub/Vine | Grass/ Grasslike | Forb |
|---|---|---|---|---|
| <0.15 | – | – | – | – |
| >0.15 <= 0.3 | – | – | – | 4-6% |
| >0.3 <= 0.6 | – | 14-16% | 39-41% | – |
| >0.6 <= 1.4 | – | – | – | – |
| >1.4 <= 4 | – | – | – | – |
| >4 <= 12 | – | – | – | – |
| >12 <= 24 | – | – | – | – |
| >24 <= 37 | – | – | – | – |
| >37 | – | – | – | – |

## Additional community tables

**Table 8. Community 1.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production (Kg/Hectare) | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Shrub/Vine** | | | | | |
| 0 | **Dominant Shrub** | | | 110–146 | |
| | black sagebrush | ARNO4 | *Artemisia nova* | 110–146 | – |
| 3 | **Sub-Dominant Shrubs** | | | 63–171 | |
| | Shrub (>.5m) | 2SHRUB | *Shrub (>.5m)* | 22–37 | – |
| | Utah serviceberry | AMUT | *Amelanchier utahensis* | 8–22 | – |
| | yellow rabbitbrush | CHVIV4 | *Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus* | 8–22 | – |
| | slender buckwheat | ERMI4 | *Eriogonum microthecum* | 8–22 | – |
| | winterfat | KRLA2 | *Krascheninnikovia lanata* | 8–22 | – |
| | plains pricklypear | OPPO | *Opuntia polyacantha* | 8–22 | – |
| | spineless horsebrush | TECA2 | *Tetradymia canescens* | 8–22 | – |
| **Grass/Grasslike** | | | | | |
| 0 | **Dominant Grasses** | | | 315–401 | |
| | bluebunch wheatgrass | PSSP6 | *Pseudoroegneria spicata* | 256–291 | – |
| | prairie Junegrass | KOMA | *Koeleria macrantha* | 37–73 | – |
| 1 | **Sub-Dominant Grasses** | | | 39–112 | |
| | Grass, annual | 2GA | *Grass, annual* | 8–22 | – |
| | Grass, perennial | 2GP | *Grass, perennial* | 8–22 | – |
| | Indian ricegrass | ACHY | *Achnatherum hymenoides* | 8–22 | – |
| | needle and thread | HECO26 | *Hesperostipa comata* | 8–22 | – |
| | Sandberg bluegrass | POSE | *Poa secunda* | 8–22 | – |
| **Forb** | | | | | |
| 0 | **Dominant Forbs** | | | 67–111 | |
| | blue flax | LIPE2 | *Linum perenne* | 22–37 | – |
| | spiny phlox | PHHO | *Phlox hoodii* | 22–37 | – |
| | stemless mock goldenweed | STAC | *Stenotus acaulis* | 22–37 | – |
| 2 | **Sub-Dominant Forbs** | | | 131–222 | |
| | Forb, annual | 2FA | *Forb, annual* | 22–37 | – |
| | Forb, perennial | 2FP | *Forb, perennial* | 22–37 | – |
| | littleleaf pussytoes | ANMI3 | *Antennaria microphylla* | 8–15 | – |
| | lesser rushy milkvetch | ASCO12 | *Astragalus convallarius* | 8–15 | – |
| | cutleaf balsamroot | BAMA4 | *Balsamorhiza macrophylla* | 8–15 | – |
| | arrowleaf balsamroot | BASA3 | *Balsamorhiza sagittata* | 8–15 | – |
| | Douglas' dustymaiden | CHDO | *Chaenactis douglasii* | 8–15 | – |
| | bastard toadflax | COUM | *Comandra umbellata* | 8–15 | – |
| | roughseed cryptantha | CRFL6 | *Cryptantha flavoculata* | 8–15 | – |
| | hoary tansyaster | MACA2 | *Machaeranthera canescens* | 8–15 | – |
| | rock goldenrod | PEPU7 | *Petradoria pumila* | 8–15 | – |

| | | | | | |
|---|---|---|---|---|---|
| | rock goldenrod | PEPU7 | *Petradoria pumila* | 8–15 | – |
| | Rocky Mountain penstemon | PEST2 | *Penstemon strictus* | 8–15 | – |
| | Pacific aster | SYCHC | *Symphyotrichum chilense var. chilense* | 8–15 | – |

## Animal community

This site provides grazing for sheep and cattle during spring, summer, and fall.
The site provides food and cover for a few species of wildlife.
Wildlife species using this site include sage grouse, rabbit, coyote, and mule deer.

## Hydrological functions

The soils in this site are in hydrologic group b and the hydrologic curve number is 61 when the vegetation is in good condition.

## Recreational uses

This site offers color and aesthetic appeal during the growing season.

## Wood products

None

## Contributors

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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) | V. Keith Wadman (NRCS Retired). |
| Contact for lead author | shane.green@ut.usda.gov |
| Date | 10/17/2012 |
| Approved by | |
| Approval date | |
| Composition (Indicators 10 and 12) based on | Annual Production |

## Indicators

1. **Number and extent of rills:** None to very few. Some very minor rill development may occur on steeper slopes (>15%) or on areas located below exposed bedrock or other water shedding areas where increased runoff may occur. Any rills present should be <1 inch deep, fairly short (<6 feet long) and somewhat widely spaced (8-10 feet). Minor rill development may be observed following major thunderstorm or spring runoff events, but they should heal during the next growing season.

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2. **Presence of water flow patterns:** Slight. Some very minor evidence of water flow patterns may be found around

perennial plant bases. They show little evidence of current erosion. They are expected to be somewhat short (3-6 feet), stable, sinuous and not connected. There may also be very minor evidence of deposition. Evidence of water flow may increase somewhat with slope.

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3. **Number and height of erosional pedestals or terracettes:** None to Slight. Perennial vegetation shows little evidence of erosional pedestalling (2 to 3% of individual plants). Plant roots are covered and litter remains in place around plant crowns. Terracettes should be absent or, if present, stable. A slight increase in both pedestal and terracette development may occur with increasing slope.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 25-30% bare ground. Soil surface is typically covered by <15% coarse fragments. Bare ground spaces should not be greater than 2 to 3 feet in diameter and should not be connected.

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5. **Number of gullies and erosion associated with gullies:** None to Very Few. A few gullies may be present in landscape settings where they transport runoff from areas of greater water flow such as exposed bedrock. These gullies will be limited to slopes exceeding 20% slope and adjacent to sites where this 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:** None. No evidence of wind generated soil movement is expected.

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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 movement. Minor litter removal may occur in flow channels with deposition occurring within 1 to 2 feet 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. However, some litter movement is expected (up to 6 feet) with increases in slopes >10% and/or increased runoff resulting from heavy thunderstorms.

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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 3 to 4 in the interspaces. The average rating should be a 4. Soil surface texture is typically a clay loam.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** (Fergus) Soil surface 0-4 inches. Texture is a clay loam; color is dark brown (7.5YR 5/2); structure is medium granular. Mollic epipedon ranges to 15 inches. Use the specific information for the soil you are assessing found 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 clay loam surface texture and clay within the soil profile would be expected to provide a runoff surface that would naturally reduce infiltration in all but gentle storms and slow snowmelt. Perennial vegetation produces sufficient cover and spatial arrangement to intercept most raindrops and reduce raindrop splash

erosion. Litter on soil surface and cryptogamic crusting, where present, also protects soil from splash erosion and encourages a higher rate of infiltration. Good plant spatial distribution should slow runoff, allowing additional time for infiltration. Bare spaces are expected to be small and irregular in shape and are usually not connected. Vegetative structure is usually adequate to capture snow and ensure that snowmelt occurs in a controlled manner, allowing maximum time for infiltration, and reducing runoff and erosion in all but the most extreme storm events. When perennial grasses and shrubs decrease due to natural events including drought, insect damage, etc., which reduce 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. This site has a well developed argillic horizon beginning at 9 inches that should not be mistaken for a compaction laver.

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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: Sprouting shrubs (black sagebrush, green rabbitbrush), > Perennial bunchgrasses (bluebunch wheatgrass, prairie junegrass).

    Sub-dominant: Other perennial bunchgrasses (Nevada bluegrass, needle-and-thread >> Rhizomatous grasses (western wheatgrass) > Shrubs (slender wild buckwheat) >> Perennial forbs (stemless goldenweed).

    Other: Perennial and annual forbs can be expected to vary widely in their expression in the plant community based upon departures from average growing conditions.

    Additional: Natural disturbance regimes include fire, drought, and insects. Assumed fire cycle of 50 to 60+ years. Functional/structural groups may appropriately contain non-native species if their ecological function is the same as the native species in the reference state. Following a disturbance such as fire, drought, rodents or insects that remove woody vegetation, forbs and perennial grasses (herbaceous species) may dominate the community for a period of time. If a disturbance has not occurred for an extended period of time, woody species may continue to increase. These conditions would reflect a functional community phase within the reference state.

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** All age classes of perennial grasses should be present under average to above average growing conditions with age class expression likely subdued during periods of extended drought. Slight decadence in the principle shrubs could occur near the end of the fire cycle or during periods of extended drought, or insect infestations. In general, a mix of age classes should be expected with some dead and decadent plants present.

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14. **Average percent litter cover (%) and depth ( in):** Litter cover will be heavier under plants. Most litter will be herbaceous and depths of 1/2 to 3/4 inch would be considered normal. Perennial vegetation should be well distributed on the site.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Annual production in air-dry herbage should be approximately 550 - 650#/acre on an average year, but could range from 350 to 800#/acre during periods of prolonged drought or above average precipitation.

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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, halogeton, Russian thistle, Utah juniper, alyssum, & mustard species.

17. **Perennial plant reproductive capability:** All perennial plants should have the ability to reproduce in all years, except in extreme drought years. Green rabbitbrush sprouts vigorously following fire. There are no restrictions on either seed or vegetative reproduction. Some seedling recruitment of major species is present during average and above average growing years.