Ecological site R047XC453UT
Mountain Shallow Sandy Loam
(ponderosa pine)

Last updated: 2/11/2025
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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.

MLRA notes

Major Land Resource Area (MLRA): 047X–Wasatch and Uinta Mountains

MLRA 47 occurs in Utah (86 percent), Wyoming (8 percent), Colorado (4 percent), and Idaho (2 percent). It encompasses approximately 23,825 square miles (61,740 square kilometers). The northern half of this area is in the Middle Rocky Mountains Province of the Rocky Mountain System. The southern half is in the High Plateaus of the Utah Section of the Colorado Plateaus Province of the Intermontane Plateaus. Parts of the western edge of this MLRA are in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. The MLRA includes the Wasatch Mountains, which trend north and south, and the Uinta Mountains, which trend east and west. The steeply sloping, precipitous Wasatch Mountains have narrow crests and deep valleys. Active faulting and erosion are a dominant force in controlling the geomorphology of the area. The Uinta Mountains have a broad, gently arching, elongated shape. Structurally, they consist of a broadly folded anticline that has an erosion-resistant quartzite core. The Wasatch and Uinta Mountains have an elevation of 4,900 to about 13,500 feet (1,495 to 4,115 meters). The mountains in this area are primarily fault blocks that have been tilted up. Alluvial fans at the base of the mountains are recharge zones for the basin fill aquifers. An ancient shoreline of historic Bonneville Lake is evident on the footslopes along the western edge of the area. Rocks exposed in the mountains are mostly Mesozoic and Paleozoic sediments, but Precambrian rocks are exposed in the Uinta Mountains. The Uinta Mountains are one of the few ranges in the United States that are oriented west to east. The southern Wasatch Mountains consist of Tertiary volcanic rocks occurring as extrusive lava and intrusive crystalline rocks. The average precipitation is from 8 to 16 inches (203 to 406 mm) in the valleys and can range up to 73 inches (1854 mm) in the mountains. In the northern and western portions of the MLRA, peak precipitation occurs in the winter months. The southern and eastern portions have a greater incidence of high-intensity summer thunderstorms; hence, a significant amount of precipitation occurs during the summer months. The average annual temperature is 30 to 50 degrees Fahrenheit (-1 to 15 C). The freeze-free period averages 140 days and ranges from 60 to 220 days, generally decreasing in length with elevation. The dominant soil orders in this MLRA are Aridisols, Entisols, Inceptisols, and Mollisols. The lower elevations are dominated by a frigid temperature regime, while the higher elevations experience cryic temperature regimes. Mesic temperature regimes come in on the lower elevations and south facing slopes in the southern portion of this MLRA. The soil moisture regime is typically xeric in the northern part of the MLRA, but grades to ustic in the extreme eastern and southern parts. The mineralogy is generally mixed and the soils are very shallow to very deep, generally well drained, and loamy or loamy-skeletal.

LRU notes

E47C is the Uinta Mountains portion of MLRA 47 that run east and west which includes the Uinta Wilderness and The Flaming Gorge National Recreation Area and towns such as Evanston, Wyoming, Hanna and Tabiona, Utah. Structurally these mountains consist of a broadly folded anticline that has an erosion resistance quartzite core. The Duchesne River and many other tributaries to the Green River run through this range, as well as the headwaters of the Bear River.

Ecological site concept

The soils on this site were formed in slope alluvium over residuum or eolian deposits derived from sandstone. The soil is well drained to somewhat excessively drained with moderate to very rapid permeability in the upper 10 inches of soil. The soil is also shallow with bedrock less than 20 inches beneath the soil surface. A lithic bedrock layer is found between 5 and 20 inches below the soil surface. The soil texture at the surface is extremely cobbly sandy loam or sand. Surface gravels are 0 to 37 percent cover and surface rocks larger than 3 inches are 0 to 33 percent cover. Subsurface gravels are 0 to 32 percent volume and rocks over 3 inches in diameter are 0 to 31 percent volume. Available water capacity is between 0.7 and 1.1 in the upper 40 inches of soil. The soil pH is between 6.6 and 7.8. The soil temperature regime is frigid and the soil moisture regime is ustic.

Associated sites

R047XC446UT	**Mountain Shallow Loam (mountain big sagebrush)** Sites can occur adjacent to each other.

Similar sites

F047XC405UT	**Mountain Cobbly Sandy Loam (ponderosa pine)** Sites have similar floral characteristics, however this site has deeper soils.

Table 1. Dominant plant species

Tree	(1) *Pinus ponderosa*
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This ecological site typically occurs on mountain slopes and hills with slopes normally range from 5 to 40 percent but may occasionally be steeper. Slope steepness, aspect and elevation will influence the vegetative floristics of this site. Sites are typically located between 6,800 to 8,600 feet in elevation. Runoff is medium to very high. Flooding and ponding do not occur on this site.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope (2) Hill
Runoff class	Medium to very high
Flooding frequency	None
Ponding frequency	None
Elevation	2,070 – 2,620 m
Slope	10 – 40 %
Aspect	Aspect is not a significant factor

Climatic features

The climate of this site characterized by cold, snowy winters and cool summers. The average annual precipitation ranges from 16 to 22 inches. March thru May and August, are typically the wettest months with June and July being the driest. The most reliable sources of moisture for plant growth are the snow that accumulates over the winter, and spring rains. Summer thunderstorms are intermittent and

sporadic in nature, and thus, are less reliable sources of moisture to support vegetative growth on this site.

Table 3 Representative climatic features

Frost-free period (characteristic range)	70-90 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	410-560 mm

Influencing water features

Due to its landscape position, this site is not influenced by streams or wetlands.

Wetland description

N/A

Soil features

The soils on this site were formed in slope alluvium over residuum or eolian deposits derived from sandstone. The soil is well drained to somewhat excessively drained with moderate to very rapid permeability in the upper 10 inches of soil. The soil is also shallow with bedrock less than 20 inches beneath the soil surface. A lithic bedrock layer is found between 5 and 20 inches below the soil surface. The soil texture at the surface is extremely cobbly sandy loam or sand. Surface gravels are 0 to 37 percent cover and surface rocks larger than 3 inches are 0 to 33 percent cover. Subsurface gravels are 0 to 32 percent volume and rocks over 3 inches in diameter are 0 to 31 percent volume. Available water capacity is between 0.7 and 1.1 in the upper 40 inches of soil. The soil pH is between 6.6 and 7.8. The soil temperature regime is frigid and the soil moisture regime is ustic.

Soils associated with this site:
Uintah Area (UT047): Namlot (68, 161, 111, 22), Strell (196)

Table 4. Representative soil features

Parent material	(1) Slope alluvium – sandstone (2) Residuum – sandstone (3) Eolian deposits – sandstone
Surface texture	(1) Extremely cobbly sandy loam (2) Sand
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderate to very rapid
Depth to restrictive layer	10 – 50 cm
Soil depth	10 – 50 cm

Surface fragment cover <=3"	0 – 40 %
Surface fragment cover >3"	0 – 30 %
Available water capacity (Depth not specified)	1.78 – 2.79 cm
Calcium carbonate equivalent (Depth not specified)	Not specified
Electrical conductivity (Depth not specified)	Not specified
Sodium adsorption ratio (Depth not specified)	Not specified
Soil reaction (1:1 water) (Depth not specified)	6.6 – 7.8
Subsurface fragment volume <=3" (Depth not specified)	0 – 30 %
Subsurface fragment volume >3" (Depth not specified)	0 – 30 %

Ecological dynamics

State 1
Community Phase 1.1
Open mature ponderosa pine with a large diversity of grasses and forbs and pockets of shrubs. Pre-settlement forests were irregularly spaced, uneven-aged stands with trees growing together in small even-aged groups and grassy meadows between these age groups.

Community Phase Pathway 1.1a
Partial removal of mature ponderosa pine canopy achieved through fire and bark beetle infestation.

Community Phase Pathway 1.1b
Removal of majority of mature ponderosa pine canopy achieved through fire and bark beetle infestation.

Community Phase 1.2
The reduced canopy results in higher production on the forest floor of grass, forbs and to some extent shrubs.

Community Phase Pathway 1.2a
Natural regeneration of ponderosa pine.

Community Phase 1.3
Canopy openings are filled in by ponderosa pine, Douglas fir and associated shrubs forming an even aged stand of young trees.

Community Phase Pathway 1.3a
Trees mature and are heavily thinned through fire and insect infestation forming a patchy and mature canopy.

Community Phase Pathway 1.3b
Trees mature and are lightly thinned naturally by fire and insect infestation.

State 2
Tree canopy drastically reduced leaving site dominated by grasses, forbs and sprouting shrubs.

Transition 1
Catastrophic removal of most trees to the point of no natural regeneration.

Restoration Pathway 1
Tree planting restores forest community.

State and transition model

Additional community tables

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel were also used.

Other references

Alexander, R. R. 1985. Major habitat types, community types, and plant communities in the Rocky Mountains. USDA- Forest Service Rocky Mountain Forest and Range Experiment Station. General technical report RM-123. 105p.

Alexander 1988. Forest vegetation on National Forests in the Rocky Mountain and Intermountain Regions: Habitat types and community types. USDA- Forest Service Rocky Mountain Forest and Range Experiment Station. General technical report RM-162. 47p.

Galatowitsch, S.M. 1990. Using the original land survey notes to reconstruct pre-settlement landscapes in the American West. Great Basin Naturalist: 50(2): 181-191. Keywords: [Western U.S., conservation, history, human impact]

Parson, R. E. 1996. A History of Rich County. Utah State Historical Society, County Commission, Rich County, Utah. Keywords: [Rich County, Utah, Historic land use, European settlements]

USDA-NRCS. 2003. National Range and Pasture Handbook. in USDA, editor, USDA-Natural Resources Conservation Service-Grazing Lands Technology Institute. Keywords: [Western US, Federal guidelines, Range pasture management]

Western Regional Climate Center, Western U.S. Climate Historical Summaries. Available at: http://www.wrcc.dri.edu/summary/Climsmut.html. Accessed 15 June 2009.

Web Soil Survey, Official Soil Series Descriptions. Available at: http://soils.usda.gov/technical/classification/osd/index.html. Accessed 15 June 2009.

Contributors

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Approval

Sarah Quistberg, 2/11/2025

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)	
Contact for lead author	
Date	08/24/2026
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

   _____

2. **Presence of water flow patterns:**

   _____

3. **Number and height of erosional pedestals or terracettes:**

   _____

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

   _____

5. **Number of gullies and erosion associated with gullies:**

   _____

6. **Extent of wind scoured, blowouts and/or depositional areas:**

   _____

7. **Amount of litter movement (describe size and distance expected to travel):**

   _____

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

   _____

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and 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):**

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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:

    Sub-dominant:

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**

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17. **Perennial plant reproductive capability:**
