USDA Natural Resources
Conservation Service

Ecological site R047XC007UT
Semi-moist Stream Terrace (ponderosa pine)

Last updated: 2/11/2025
Accessed: 02/26/2025

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.

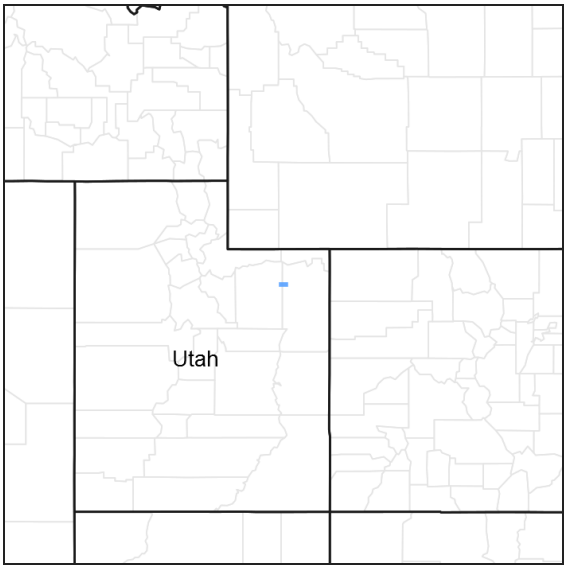


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

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 minerology 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 alluvium derived from sandstone, limestone, shale, and quartzite. The soil is somewhat poorly drained with moderately rapid to rapid permeability in the upper 10 inches of soil. The soil is deep with greater than 60 inches to bedrock. The soil texture at the surface is sandy loam and surface gravels are 4 to 8 percent cover and surface rocks larger than 3 inches are 0 to 4 percent cover. Subsurface gravels are 22 to 26 percent volume and rocks over 3 inches in diameter are 31 to 35 percent volume. The available water capacity is 1.5 to 2.6 and the pH is 6.6 to 8.4. The soil temperature regime is frigid and precipitation regime is ustic.

Associated sites

R047XC005UT	**Semi-wet Streambank (lodgepole pine)**

Similar sites

R047XC003UT	**Interzonal Semi-wet Streambank (narrowleaf cottonwood)**

Table 1. Dominant plant species

Tree	(1) *Populus angustifolia* (2) *Pinus ponderosa*
Shrub	(1) *Artemisia tridentata ssp. vaseyana*
Herbaceous	(1) *Juncus arcticus ssp. littoralis*

Physiographic features

This site can be found in floodplains on gentle slopes between 1 and 3 percent. It can occur at elevations between 5,900 to 7,500 feet. Flooding occurs occasionally because of the sites proximity to stream channels. When the site does flood the duration is very long between the months of March through July. Ponding does not occur at this site; however the runoff class is very low. The water table for this site is within 18 to 42 inches from the surface in spring and early summer.

Table 2. Representative physiographic features

Landforms	(1) Flood plain
Runoff class	Very low
Flooding duration	Very long (more than 30 days)
Flooding frequency	None to occasional
Ponding frequency	None
Elevation	5,900–7,500 ft
Slope	1–3%
Water table depth	18–42 in
Aspect	Aspect is not a significant factor

Climatic features

The climate is cold and snowy in the winter and cool and moist in the summer. On the average, the wettest months are March through July and the driest months are August through February. Average annual precipitation is 8 to 12 inches. The mean annual air temperature is 44 to 47 degrees Fahrenheit and the soil temperatures are in the mesic regime.

Table 3. Representative climatic features

Frost-free period (characteristic range)	
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	12-16 in
Frost-free period (average)	120 days
Freeze-free period (average)	
Precipitation total (average)	

Influencing water features

The water table for this site is within 18 to 42 inches from the surface in spring and early summer.

Wetland description

Further review is required.

Soil features

The soils on this site were formed in alluvium derived from sandstone, limestone, shale, and quartzite. The soil is somewhat poorly drained with moderately rapid to rapid permeability in the upper 10 inches of soil. The soil is deep with greater than 60 inches to bedrock. The soil texture at the surface is sandy loam and surface gravels are 4 to 8 percent cover and surface rocks larger than 3 inches are 0 to 4 percent cover. Subsurface gravels are 22 to 26 percent volume and rocks over 3 inches in diameter are 31 to 35 percent volume. The available water capacity is 1.5 to 2.6 and the pH is 6.6 to 8.4. The soil temperature regime is frigid and precipitation regime is ustic.

Soils associated with this site:
Uintah Area (UT047): Gooseneck (86)

Modal Soil: Uver SL 1-3% — sandy-skeletal, siliceous, mesic Mollic Ustifluvents

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone, sandstone, and shale (2) Alluvium–quartzite
Surface texture	(1) Sandy loam
Family particle size	(1) Sandy or sandy-skeletal
Drainage class	Somewhat poorly drained
Permeability class	Moderately rapid
Depth to restrictive layer	60–80 in
Soil depth	60–80 in
Surface fragment cover <=3"	4–8%
Surface fragment cover >3"	0–4%
Available water capacity (Depth not specified)	1.5–2.2 in
Calcium carbonate equivalent (Depth not specified)	0–5%
Electrical conductivity (Depth not specified)	0–2 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0
Soil reaction (1:1 water) (Depth not specified)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	22–26%
Subsurface fragment volume >3" (Depth not specified)	31–35%

Ecological dynamics

As this site deteriorates due to livestock grazing pressure perennial grasses decrease, rushes show little change, annual grasses, forbs, and sagebrush increase. Wildlife use the shrubs extensively in the fall and winter and may kill the serviceberry and other plants with over use.

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 PIPO canopy achieved through fire and bark beetle infestation.

Community Phase Pathway 1.1b
Removal of majority of mature PIPO 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 PIPO.

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

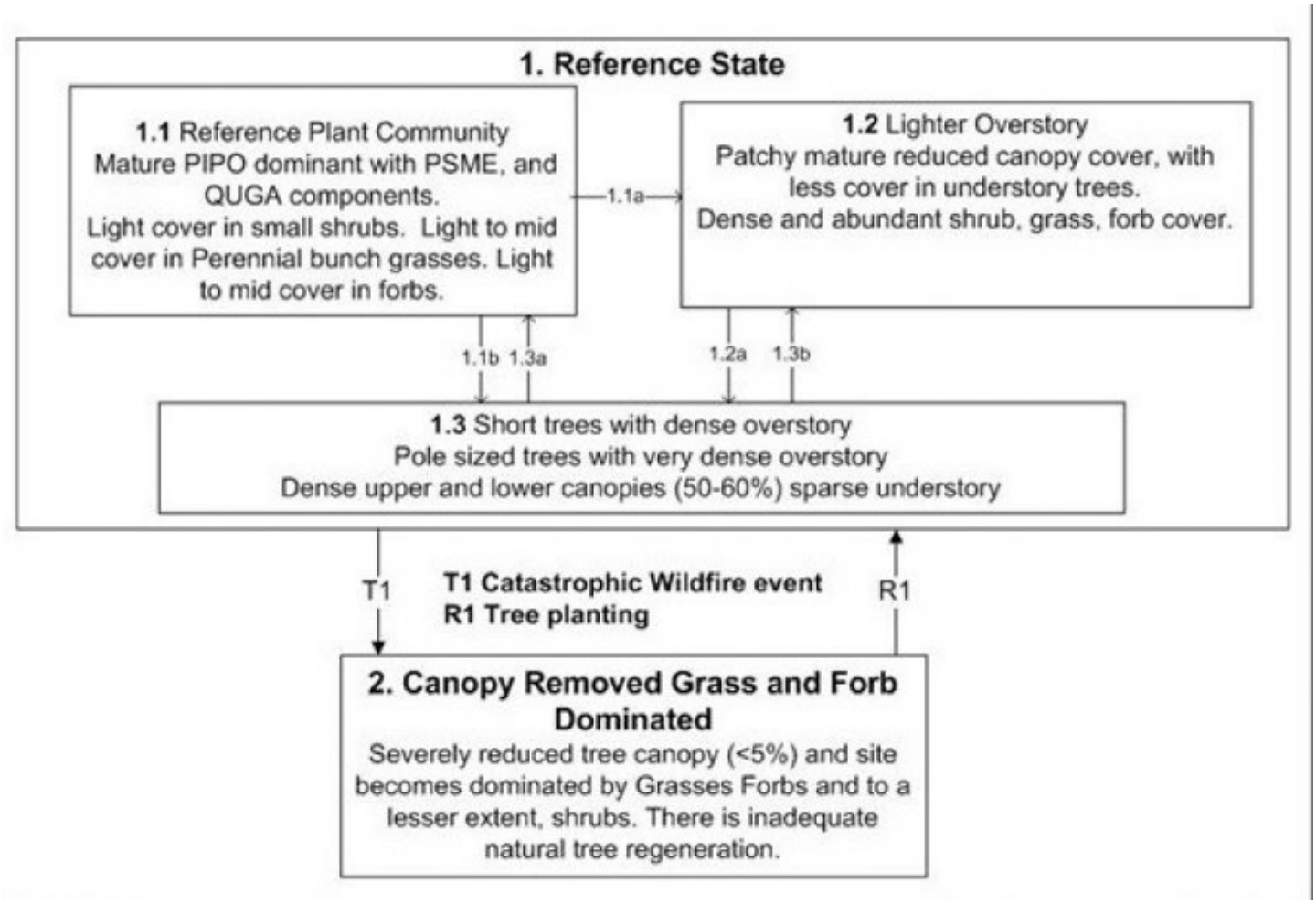
Community Phase Pathway 1.3a
Trees mature and are heavily thinned through fire and insect infestation forming a patchy and mature canopy.

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



State 1
Reference State

Community 1.1
Reference Plant Community

The general view of this area is scattered ponderosa pine and narrowleaf cottonwood protruding above sagebrush and squawbush shrub canopy. There is abundant grasses and grass-like plants in the open areas and understory. The composition by air-dry weight is approximately 35 percent grasses and grasslike plants, 15 percent forbs, 40 percent shrubs, and 10 percent trees.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	320	430	540
Grass/Grasslike	280	376	472
Forb	120	161	203
Tree	80	108	135
Total	**800**	**1075**	**1350**

Table 6. Ground cover

Tree foliar cover	9-11%
Shrub/vine/liana foliar cover	44-46%
Grass/grasslike foliar cover	19-21%
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 (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	–	–
>0.5 <= 1	–	–	19-21%	4-6%
>1 <= 2	–	–	–	–
>2 <= 4.5	–	–	–	–
>4.5 <= 13	–	44-46%	–	–
>13 <= 40	–	–	–	–
>40 <= 80	9-11%	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Tree					
0	**Dominant Trees**			70–150	
	narrowleaf cottonwood	POAN3	*Populus angustifolia*	58–115	–
	ponderosa pine	PIPO	*Pinus ponderosa*	12–35	–
Shrub/Vine					
0	**Dominant Shrubs**			208–346	
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	115–173	–
	skunkbush sumac	RHTR	*Rhus trilobata*	58–115	–
	silver buffaloberry	SHAR	*Shepherdia argentea*	35–58	–
3	**Sub-Dominant Shrubs**			95–233	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	35–58	–
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	12–35	–
	water birch	BEOC2	*Betula occidentalis*	12–35	–
	Woods' rose	ROWO	*Rosa woodsii*	12–35	–
	yellow willow	SALU2	*Salix lutea*	12–35	–
	western poison ivy	TORY	*Toxicodendron rydbergii*	12–35	–
Grass/Grasslike					
0	**Dominant Grasses**			243–404	
	mountain rush	JUARL	*Juncus arcticus ssp. littoralis*	115–173	–
	needle and thread	HECO26	*Hesperostipa comata*	58–115	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	35–58	–
	western wheatgrass	PASM	*Pascopyrum smithii*	35–58	–
1	**Sub-Dominant Grasses**			55–110	
	Grass, annual	2GA	*Grass, annual*	35–58	–
	Grass, perennial	2GP	*Grass, perennial*	35–58	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	12–35	–
	scouringrush horsetail	EQHY	*Equisetum hyemale*	12–35	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	12–35	–
Forb					
0	**Dominant Forbs**			70–116	
	white sagebrush	ARLU	*Artemisia ludoviciana*	35–58	–
	Missouri goldenrod	SOMI2	*Solidago missouriensis*	35–58	–
2	**Sub-Dominant Forbs**			75–125	
	Forb, annual	2FA	*Forb, annual*	35–58	–
	Forb, perennial	2FP	*Forb, perennial*	35–58	–
	common yarrow	ACMI2	*Achillea millefolium*	12–35	–
	littleleaf pussytoes	ANMI3	*Antennaria microphylla*	12–35	–
	spreading dogbane	APAN2	*Apocynum androsaemifolium*	12–35	–
	northern bedstraw	GABO2	*Galium boreale*	12–35	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	12–35	–
	feathery false lily of the valley	MARAR	*Maianthemum racemosum ssp. racemosum*	12–35	–

Animal community

This site could provide summer and fall grazing for cattle.

The site provides food and cover for wildlife. Wildlife using this site include rabbit, coyote, birds, raptors, small rodents, moose, elk, and deer.

Hydrological functions

The soil series is in hydrologic group A. The hydrologic curve number is 39 when the vegetation is in good condition.

Recreational uses

This site offers aesthetic appeal in all seasons of the year. Recreational activities include hiking, picnicking, and hunting.

Wood products

Ponderosa pine 28 trees per acre, tree height 54 feet, diameter at breast height 28 inches.

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

Jim Brown, RHF

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	02/26/2025
Approved by	Sarah Quistberg
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):**

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

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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:

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

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

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

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:**

17. **Perennial plant reproductive capability:**