USDA Natural Resources
Conservation Service

Ecological site F047XC458UT
Mountain Stony Loam (quaking aspen thicket)

Last updated: 2/05/2025
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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 MLRA includes the Uinta Mountains, which trend east and west. 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. Rocks exposed in the Uinta mountains are Precambrian. The Uinta Mountains are one of the few ranges in the United States that are oriented west to east.
The average precipitation can range up to 73 inches (1854 mm) in the mountains. The Uinta mountains 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 Entisols, Inceptisols, and Mollisols.

LRU notes

This LRU 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. The lower elevations are dominated by a frigid temperature regime, while the higher elevations experience cryic temperature regimes. The soil moisture regime is typically ustic. The minerology is generally mixed and the soils are very shallow to very deep, generally well drained, and loamy, sandy or sandy skeletal.

Ecological site concept

This site is represented by a small pocket of weaker/lower growing Aspen. The site resembles 47A 458 site except for a greater composition of warm-season plant species within the reference community.
The soils of this site formed in slope alluvium over outwash derived from metamorphic and sedimentary rock on outwash fans. Surface soils are very cobbly fine sandy loams in texture. Rock fragments may be present on the soil surface and throughout the profile, but make up less than 35 percent of the soil volume. These soils are deep to very deep, well-drained, and have moderately slow to moderately rapid permeability. pH is slightly acidic to neutral. Available water-holding capacity ranges from 1.3 to 2.8 inches of water in the upper 60 inches of soil. The soil moisture regime is mostly ustic and the soil temperature regime can be frigid. Elevations typically range from 7,600 to 8,500 feet with precipitation ranging from 16 to 22 inches.

Associated sites

R047XC462UT	**Mountain Stony Loam (mountain big sagebrush)** Sites often occur adjacent to each other.

Similar sites

F047XC508UT	**High Mountain Loam (quaking aspen)** Sites have similar floristic characteristics, however this site has deeper soils and is generally a larger stand compared to the aspen thicket.

Table 1. Dominant plant species

Tree	(1) *Populus tremuloides*
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

The Mountain Stony Loam (Aspen Thicket) ecological site typically occurs on outwash fans. Slopes normally range from 4 to 50 percent but may occasionally be steeper. Slope steepness, aspect and elevation will influence the vegetative floristics of this site. Sites are typically located between 7,600 to 8,500 feet in elevation.

Table 2. Representative physiographic features

Landforms	(1) Outwash fan
Flooding frequency	None
Ponding frequency	None
Elevation	7,600–8,500 ft
Slope	4–50%
Aspect	Aspect is not a significant factor

Climatic features

The climate of this site is 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)	16-22 in
Frost-free period (average)	
Freeze-free period (average)	
Precipitation total (average)	18 in

Influencing water features

This site is not influenced by water from a wetland or stream.

Wetland description

N/A

Soil features

Data in this section was derived from the one instance a correlation was made to a map unit component. As more data becomes available, this information will be updated.

The soils of this site formed mostly in slope alluvium over outwash derived from metamorphic and sedimentary rock on outwash fans. Surface soils are very cobbly fine sandy loams in texture. Rock fragments may be present on the soil surface and throughout the profile, but make up less than 50 percent of the soil volume. These soils are deep to very deep, well-drained, and have moderately slow to moderately rapid permeability. pH is slightly acidic to neutral. Available water-holding capacity ranges from 1.3 to 2.8 inches of water in the upper 60 inches of soil. The soil moisture regime is mostly ustic and the soil temperature regime can be frigid. Elevations typically range from 7,600 to 8,500 feet with precipitation ranging from 16 to 22 inches.

Table 4. Representative soil features

Parent material	(1) Slope alluvium–metamorphic and sedimentary rock
Surface texture	(1) Very cobbly fine sandy loam
Drainage class	Well drained
Permeability class	Moderately slow to moderately rapid
Depth to restrictive layer	60 in
Soil depth	60 in
Surface fragment cover <=3"	15%
Surface fragment cover >3"	25%
Available water capacity (0-60in)	1.3–2.8 in
Calcium carbonate equivalent (0-60in)	0%
Electrical conductivity (0-60in)	0 mmhos/cm
Sodium adsorption ratio (0-60in)	0
Soil reaction (1:1 water) (0-60in)	6.4–7.2
Subsurface fragment volume <=3" (0-60in)	22%
Subsurface fragment volume >3" (0-60in)	28%

Ecological dynamics

It is impossible to determine in any quantitative detail the historic climax plant community (HCPC) for this ecological site because of the lack of direct historical documentation preceding all human influence. In the 1860s, Europeans brought cattle and horses to the area, grazing large numbers of them on unfenced parcels year-long (Parson 1996). Itinerant and local sheep flocks followed, largely replacing cattle as the browse component increased.

Below is a State and Transition Model diagram to illustrate the common plant communities and “states” (aggregations of those plant communities) that can occur on the site. Differences between communities and states depend primarily upon observations of a range of disturbance histories in areas where this ESD is represented. These situations include grazing gradients to water sources, fence-line contrasts, patches with differing dates of

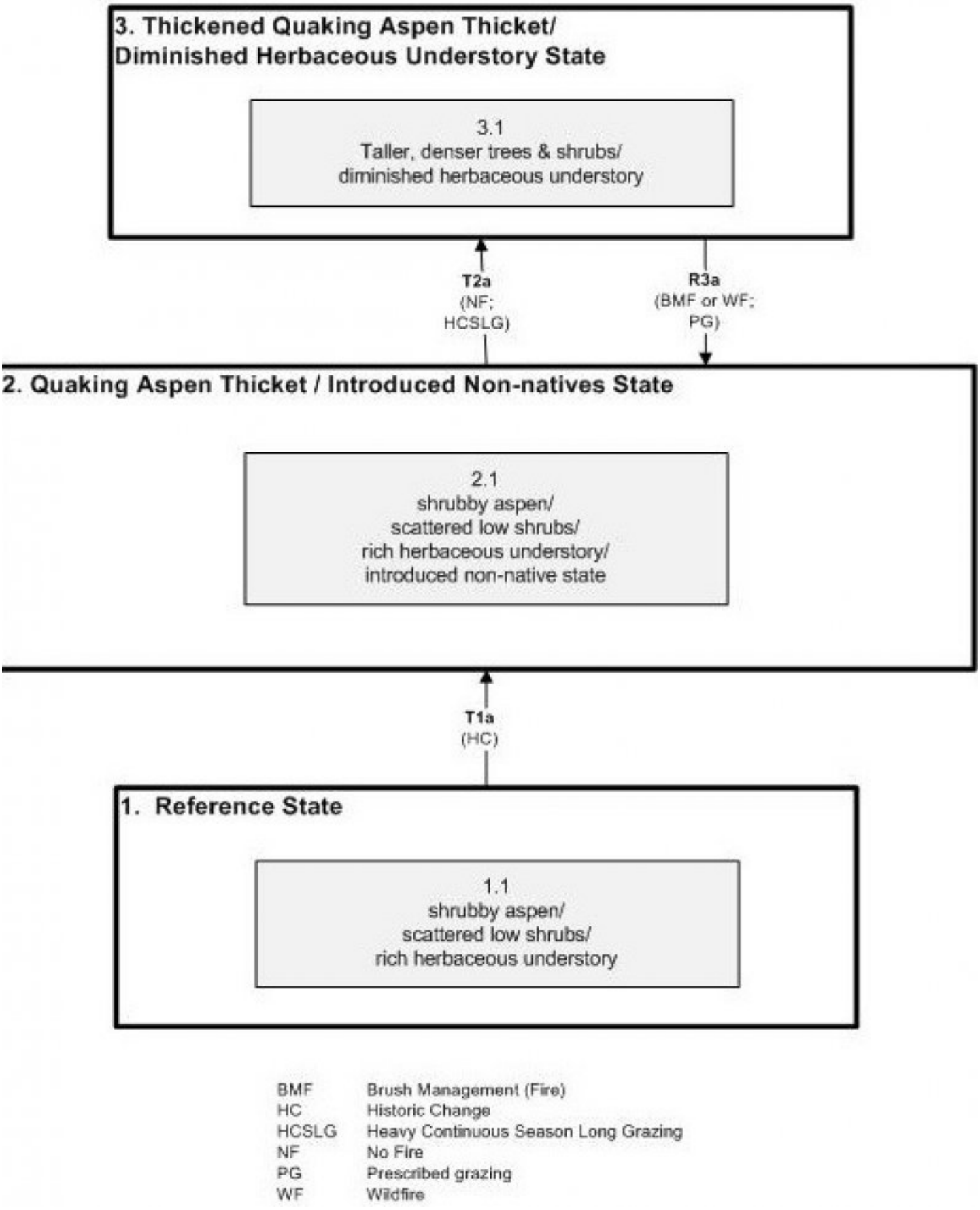
fire, herbicide treatment, tillage, etc. Reference State 1 illustrates the common plant communities that probably existed just prior to European settlement.

The major succession pathways within states, (“community pathways”) are indicated by arrows between phases. “Transitions” are indicated by arrows between states. The drivers of these changes are indicated in codes decipherable by referring to the legend at the bottom of the page and by reading the detailed narratives that follow the diagram. The transition between Reference State 1 and State 2 is considered irreversible because of the naturalization of exotic species of both flora and fauna, possible extinction of native species, and climate change. There may have also been accelerated soil erosion.

When available, monitoring data (of various types) were employed to validate more subjective inferences made in this diagram. See the complete files in the office of the State Range Conservationist for more details.

The plant communities shown in this State and Transition Model may not represent every possibility, but are probably the most prevalent and recurring plant communities. As more monitoring data are collected, some phases or states may be revised, removed, and/or new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities.” According to the USDA NRCS National Range & Pasture Handbook (USDA-NRCS 2003), Desired Plant Communities (DPC’s) will be determined by the decision-makers and will meet minimum quality criteria established by the NRCS. The main purpose for including descriptions of a plant community is to capture the current knowledge at the time of this revision.

State and transition model



State 1
Reference State

The Reference State is a description of this ecological site just prior to Euro-American settlement but long after the

arrival of Native Americans. The description of the Reference State was determined by NRCS Soil Survey Type Site Location information and familiarity with rangeland relict areas where they exist. Along the lee sides of ridges in areas where snow accumulates, these linear-shaped copses would have been dominated by quaking aspen (*Populus tremuloides*), with a scattering of low shrubs, and a rich and productive native perennial herbaceous understory. Mountain snowberry (*Symphoricarpos oreophilus*), chokecherry (*Prunus virginiana*), and Woods' rose (*Rosa woodsii*), among others would have been common shrub associates. The major grasses/grass-likes would have been Mountain brome (*Bromus marginatus*), slender wheatgrass (*Elymus trachycaulus*), and Ross' sedge (*Carex rossii*). Forbs would have included a mixture of Fendler's meadow-rue (*Thalictrum fendleri*), Gray's biscuitroot (*Lomatium grayi*), and lambstongue ragwort (*Senecio integerrimus*) (1.1). These sites would have typically had fire return intervals every 80-100 years.

Community 1.1
Shrubby aspen/ scattered low shrubs/ rich herbaceous understory

This plant community would have been characterized by a shrubby form of quaking aspen, with a scattering of low shrubs and a rich and productive native perennial herbaceous understory.

State 2
Quaking Aspen Thicket/ Introduced Non-natives State

State 2 is identical to State 1 in form and function, with the exception of the presence of non-native plants and animals, possible extinctions of native species, and a different climate. State 2 is a description of the ecological site shortly following Euro-American settlement. This state can be regarded as the current potential. The site is dominated by a shrubby form of quaking aspen along with a suite of mountain shrub species such as mountain snowberry, chokecherry, and woods' rose. The native perennial herbaceous understory species include grasses and grass-likes such as Mountain brome, slender wheatgrass, and Ross' sedge, and forbs including Fendler's meadow-rue, Gray's biscuitroot, lambstongue, ragwort, and hound's tongue (Cynoglossum spp.), among others (2.1). Some non-native species may be present. Since this ESD usually occurs on sheltered topography (e.g. in lee of ridges with extra snowdrift, hollows, north slopes), it is more productive and responsive to management than other sites in this zone. It is however, very important to mule-deer fawning and neo-tropical migrant birds. This State is maintained by periodic wildfire and by a healthy, productive, and diverse plant community that can provide native seed sources and promotes soil stability, water infiltration, and soil moisture retention. Periodic cool season (spring or fall) prescribed fire may also serve to maintain the balance between woody and herbaceous species in these sites. These sites tend to be particularly resilient due to their location in mesic (moist) micro-sites that are usually covered by snow for about half of the year. The resiliency of this State can be maintained by reducing livestock and big game use and by occasional fire. Conversely, excessive livestock and big game use and fire suppression will negatively impact the resiliency of this state.

Community 2.1
shrubby aspen/ scattered low shrubs/ herbaceous understory

This plant community is characterized by a shrubby form of quaking aspen, with a scattering of low shrubs and a rich and productive native perennial herbaceous understory. A small component of introduced non-native species may also be present such as orchardgrass (*Dactylis glomerata*), smooth brome (*Bromus inermis*), or Kentucky bluegrass (*Poa pratensis*).

State 3
Thickened Quaking Aspen Thicket/ Diminished Herbaceous Understory State

In the absence of fire, and with continued heavy impacts from livestock grazing, the native herbaceous understory will markedly decrease. Fire exclusion promotes the thickening of the aspen and other woody species at the expense of the herbaceous understory. The stability of this State is maintained by lack of wildfire and continued impacts to the herbaceous species by livestock.

Community 3.1
taller, denser trees & shrubs/ diminished herbaceous understory

This plant community is characterized by a thickening of the aspen and shrubby understory. The native perennial herbaceous understory, especially the desirable forages, is greatly diminished.

Transition T1
State 1 to 2

The simultaneous introduction of exotic species, both plants and animals, possible extinctions of native flora and fauna, and climate change has caused State 1 to transition to State 2. Reversal of such historic changes (i.e. a return pathway) back to State 1 is not practical.

Transition T2
State 2 to 3

The lack of fire and continued season-long grazing during the growing season of grasses throughout the 1860s to the 1950s caused many of these sites to transition into a Thickened Aspen Thicket/ Diminished Herbaceous Understory State. The approach to this transition is indicated by a decrease in the most desirable forage species and an increase in less desirable species. This transition is triggered by sustained heavy grazing and by fire exclusion occurring since Euro-American settlement.

Restoration pathway R3
State 3 to 2

With prescribed or wildfire, followed by a reduction in livestock grazing levels, it may be possible to restore the aspen and some of the more desirable forage species, as aspen will readily re-sprout following fire. However, retreatment may be required every 40 to 50 years to maintain the appropriate balance of woody and herbaceous components.

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.

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Contributors

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Approval

Kendra Moseley, 2/05/2025

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	05/12/2025
Approved by	Kendra Moseley
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:**