USDA Natural Resources
Conservation Service

Ecological site R048AY471UT
Mountain Very Steep Loam (Curlleaf mountainmahogany)

Last updated: 2/22/2022
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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.

Classification relationships

Modal Soil: Pathead BYX-FSL, 40-70% — loamy-skeletal, mixed (calc.), frigid Typic Ustorthents

Associated sites

R048AY451UT	**Mountain Stony Loam (Shrub)**
R048AY465UT	**Mountain Very Steep Loam (Oak)**

Similar sites

R048AY465UT	**Mountain Very Steep Loam (Oak)**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Cercocarpus ledifolius*
Herbaceous	(1) *Leymus salinus ssp. salinus*

Physiographic features

Mountain and Canyon Side Slopes

Table 2. Representative physiographic features

Landforms	(1) Mountain slope (2) Canyon
Elevation	7,500–9,000 ft
Slope	40–70%
Aspect	S

Climatic features

Average annual precipitation is 16 to 20 inches. Approximately 55 percent occurs as rain from May through October. On the average, November through June are the driest months and July through October are the wettest months. Cool temperatures and length of growing season are important environmental factors in this site. In average years, plants begin growth around April 20 and end growth around September 30.

Table 3. Representative climatic features

Frost-free period (average)	
Freeze-free period (average)	100 days
Precipitation total (average)	20 in

Influencing water features

Soil features

The soil is moderately deep and well drained. It formed in colluvium derived mainly from sandstone and shale parent materials. The soil has an extreamly bouldery fine sandy loam surface over very stony fine sandy loam. Permeability is moderate and runoff is very rapid because of steep slopes. The available water capacity is 1 to 3 inches and the water supplying capacity is 4 to 8.5 inches. The hazard of water erosion is slight.

Table 4. Representative soil features

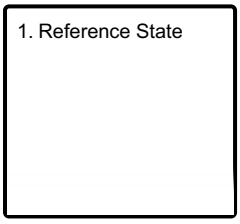
Surface texture	(1) Extremely bouldery fine sandy loam (2) Very stony fine sandy loam
Drainage class	Well drained
Permeability class	Moderate
Soil depth	20–40 in
Available water capacity (0-40in)	1–3 in

Ecological dynamics

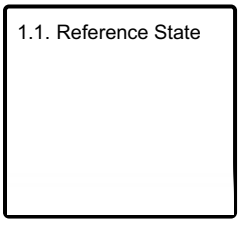
As this site deteriorates due to grazing pressure, grasses and palatable shrubs may decrease while less palatable shrubs and forbs may increase. Fire will kill curlleaf mountainmahogany and many valuable soil-holding plants in the understory. Rabbitbrush, snowberry and snakeweed may increase.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1
Reference State

Community 1.1
Reference State

The dominant aspect of this site is curlleaf mountainmahogany. The potential natural plant community by air-dry

weight is composed of 35 percent perennial grasses, 15 percent forbs, and 50 percent shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	275	375	525
Grass/Grasslike	193	263	368
Forb	83	113	158
Total	**551**	**751**	**1051**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	39-41%
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	–	–	–	4-6%
>1 <= 2	–	–	19-21%	–
>2 <= 4.5	–	–	–	–
>4.5 <= 13	–	39-41%	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>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 (%)
Shrub/Vine					
0	**Dominant Shrubs**			272–360	
	curl-leaf mountain mahogany	CELE3	*Cercocarpus ledifolius*	200–240	–
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	24–40	–

	Utah serviceberry	AMUT	*Amelanchier utahensis*	24–40	–
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	24–40	–
3	**Sub-Dominant Shrubs**			104–272	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	40–80	–
	black sagebrush	ARNO4	*Artemisia nova*	8–24	–
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	8–24	–
	yellow rabbitbrush	CHVIL4	*Chrysothamnus viscidiflorus ssp. lanceolatus*	8–24	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	8–24	–
	creeping barberry	MARE11	*Mahonia repens*	8–24	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	8–24	–
	Woods' rose	ROWO	*Rosa woodsii*	8–24	–
Grass/Grasslike					
0	**Dominant Grasses**			184–240	
	saline wildrye	LESAS	*Leymus salinus ssp. salinus*	160–200	–
	Geyer's sedge	CAGE2	*Carex geyeri*	24–40	–
1	**Sub-Dominant Grasses**			160–400	
	Grass, annual	2GA	*Grass, annual*	40–80	–
	Grass, perennial	2GP	*Grass, perennial*	40–80	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	8–24	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	8–24	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	8–24	–
	needle and thread	HECO26	*Hesperostipa comata*	8–24	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	8–24	–
	western wheatgrass	PASM	*Pascopyrum smithii*	8–24	–
	muttongrass	POFE	*Poa fendleriana*	8–24	–
	Sandberg bluegrass	POSE	*Poa secunda*	8–24	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	8–24	–
Forb					
2	**Sub-Dominant Forbs**			392–936	
	Forb, annual	2FA	*Forb, annual*	80–120	–
	Forb, perennial	2FP	*Forb, perennial*	80–120	–
	common yarrow	ACMI2	*Achillea millefolium*	8–24	–
	littleleaf pussytoes	ANMI3	*Antennaria microphylla*	8–24	–
	Fendler's sandwort	ARFE3	*Arenaria fendleri*	8–24	–
	looseflower milkvetch	ASTE5	*Astragalus tenellus*	8–24	–
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	8–24	–
	Wyoming Indian paintbrush	CALI4	*Castilleja linariifolia*	8–24	–
	bastard toadflax	COUM	*Comandra umbellata*	8–24	–
	roughseed cryptantha	CRFL6	*Cryptantha flavoculata*	8–24	–
	twolobe larkspur	DENU2	*Delphinium nuttallianum*	8–24	–
	shaggy fleabane	ERPU2	*Erigeron pumilus*	8–24	–
	fineleaf hymenopappus	HYFI	*Hymenopappus filifolius*	8–24	

	fineleaf hymenopappus	HYFI	*Hymenopappus filifolius*	8–24	–
	scarlet gilia	IPAGA3	*Ipomopsis aggregata ssp. aggregata*	8–24	–
	Nevada pea	LALA3	*Lathyrus lanszwertii*	8–24	–
	mountain pepperweed	LEMO2	*Lepidium montanum*	8–24	–
	narrowleaf stoneseed	LIIN2	*Lithospermum incisum*	8–24	–
	King's flax	LIKI2	*Linum kingii*	8–24	–
	blue flax	LIPE2	*Linum perenne*	8–24	–
	tailcup lupine	LUCAC3	*Lupinus caudatus ssp. caudatus*	8–24	–
	hoary tansyaster	MACA2	*Machaeranthera canescens*	8–24	–
	feathery false lily of the valley	MARAR	*Maianthemum racemosum ssp. racemosum*	8–24	–
	tufted evening primrose	OECA10	*Oenothera caespitosa*	8–24	–
	Parry's goldenrod	ORPA3	*Oreochrysum parryi*	8–24	–
	lobeleaf groundsel	PAMU11	*Packera multilobata*	8–24	–
	Rocky Mountain penstemon	PEST2	*Penstemon strictus*	8–24	–
	longleaf phlox	PHLO2	*Phlox longifolia*	8–24	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	8–24	–
	Pacific aster	SYCHC	*Symphyotrichum chilense var. chilense*	8–24	–
	Navajo tea	THSU	*Thelesperma subnudum*	8–24	–
Tree					
4	**Sub-Dominant Trees**			0	
	Utah juniper	JUOS	*Juniperus osteosperma*	0	–
	twoneedle pinyon	PIED	*Pinus edulis*	0	–

Animal community

This site is not grazeable by livestock because of steepness of slope.
This site is very valuable for mule deer and elk winter range.
Wildlife using this site include rabbit, coyote, elk, mule deer, a few species of small mammals, and songbirds.

Hydrological functions

The soil series is in hydrologic group c and the hydrologic curve number is 74 when the vegetation is in good condition.

Recreational uses

This site appeals to some people with regard to aesthetics and natural beauty. It is not a good site for hunting due to the dense areas of mountainmahogany where deer and other game can find cover. It has good values for camping and picnicking from a vegetative standpoint.

Wood products

Curlleaf mountainmahogany furnishes some fence posts and stays. Firewood for fireplaces and campfires can be harvested, but the wood is difficult to cut with an axe after it is dry. Knick-knacks and other novelties as lamp stands, etc. can be made from this wood.

Contributors

David Somerville

Approval

Kirt Walstad, 2/22/2022

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	02/22/2022
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Many rills present. This site is subject to rilling even in reference condition due to slope, erodible soils, and percent bare ground. Rill development may increase following large storm events, but should begin to heal during the following growing season. Frost heaving will accelerate recovery. Rill development may increase when run inflow enters site from other sites that produce large amounts of runoff (i.e. steeper sites, slickrock, rock outcrop).

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2. **Presence of water flow patterns:** Water flow patterns are common. Some are long (15-20'). They are generally very widely spaced (about 20-30' apart). Flow patterns occur in low places associated with microtopography commonly occurring on this site.

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3. **Number and height of erosional pedestals or terracettes:** Plants may have small pedestals (1-3") where they are adjacent to water flow patterns, but without exposed roots. Terracettes should be few and stable. Terracettes should be small (1-3") and show little sign of active erosion. Some plants may appear to have a pedestal but rather than be formed by erosion, they are the result of litter and soil accumulating at plant bases, forming the appearance of a pedestal.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 30-40% bare ground (soil with no protection from raindrop impact). Very few if any bare spaces of greater than 1 square foot. In general, bare ground increases as production decreases. As species composition of shrubs relative to grasses increases, bare ground is likely to increase. Poorly developed biological soil crust that is susceptible to erosion from raindrop impact should be recorded as bare ground.

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5. **Number of gullies and erosion associated with gullies:** None to very few. Gullies should show only minor signs of active erosion and should be mostly stabilized with perennial vegetation and rock fragments. Gullies may show slightly more indication of erosion as slope steepens, or as the site occurs adjacent to steep areas with concentrated flow patterns.

6. **Extent of wind scoured, blowouts and/or depositional areas:** Very minor evidence of active wind-generated soil movement. Wind scoured (blowouts) and depositional areas are rarely present. If present they have muted features and are mostly stabilized with vegetation and/or biological crust.

7. **Amount of litter movement (describe size and distance expected to travel):** Most litter resides in place but on steep slopes (>30%), at least half of the litter is likely to be transported downhill by wind or water short. Litter rarely moves more than 1-2' to next obstruction. Leaves, stems, and small twigs will accumulate at plant bases, against rocks, in soil depressions, or against larger woody litter. Woody litter is not likely to move.

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 an erosion rating of 4 to 5 under plant canopies and a rating of 3 to 4 in the interspaces with an average rating of 4 using the soil stability kit test.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A--0 to 3 inches; brown (10YR 5/3) extremely stony loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; few very fine pores; 5 percent angular gravel, 15 percent cobbles, 40 percent stones, and 5 percent boulders; strongly effervescent; carbonates are disseminated, (13 percent calcium carbonate equivalent); strongly alkaline (pH 8.6); abrupt smooth boundary. (2 to 7 inches thick)

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Bunchgrasses and shrubs are more important than trees for enhancing infiltration and preventing runoff. Although tree canopies intercept rainfall and provide a barrier to raindrop impact, some evergreen trees such as pinyon and juniper may intercept so much rainfall that not enough water reaches the ground to supply the understory. In this situation, the soil beneath tree canopies is often unvegetated and susceptible to erosion. Bunchgrasses and shrubs, on the other hand, not only intercept rainfall, but contribute litter cover, soil organic matter, and physical stability to the soil. Bunchgrasses contribute organic matter directly to soil through root decay, and organic matter helps stabilize soil aggregates and maintain soil porosity. Shrubs hold snow and slow wind evaporation. Bunchgrass bases intercept litter and soil in water flow paths, reducing runoff. Biological soil crusts (where present) are resistant to raindrop impact and splash erosion. Spatial distribution of vascular plants and well-developed biological soil crusts (where present) provides detention storage and surface roughness that slows runoff, allowing time for infiltration. Water flow patterns are likely to develop under tree canopies, where herbaceous vegetation is sparse.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** A compaction layer is not expected.

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: Dominant: Tree (curl-leaf mountain mahogany) > perennial cool-season bunchgrass (saline wildrye)

    Sub-dominant: Sub-dominant: Sprouting shrubs (Utah serviceberry, mountain snowberry) > non-sprouting shrubs

(Wyoming big sagebrush) = sedge (Geyer's sedge)

Other: Other: Perennial forbs > other perennial grasses = other shrubs

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** During years with average to above average precipitation, there should be very little recent mortality or decadence apparent in either the shrubs or grasses. Some mortality of bunchgrass and other shrubs may occur during very severe (long-term) droughts. There may be partial mortality of individual bunchgrasses and shrubs during less severe drought and toward the end of the fire cycle. Long-lived species dominate the site. Open spaces from disturbance are quickly filled by new plants through seedlings and asexual reproduction (tillering).

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14. **Average percent litter cover (%) and depth (in):** Litter cover includes litter under plants. Most litter will be fine (herbaceous) litter. Almost all litter is concentrated under plant canopies. Litter between plant canopies is very sparse. Average litter cover is 5-15% and average litter depth is 0.25-0.5 inches.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 700-800 lbs/acre.
    Even the most stable communities exhibit a range of production values. Production will vary between communities and across the MRLA. Refer to the community descriptions in the ESD. Production will differ across the MLRA due to the naturally occurring variability in weather, soils, and aspect. The biological processes on this site are complex; therefore, representative values are presented in a land management context.

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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:** Invasive species unlikely because of high elevation

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17. **Perennial plant reproductive capability:** All perennial plants should have the ability to reproduce sexually or asexually, except in drought years. Density of plants indicates that plants reproduce at level sufficient to fill available resource. Within capability of site there are no restrictions on seed or vegetative reproductive capacity.
