

Ecological site R047XB430UT

Mountain Loam (mountain big sagebrush)

Last updated: 2/06/2025
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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

E47B is the Wasatch Mountains South MLRA. It occurs in the Loa, Panguitch, New Harmony area. Most of Zion, Bryce Canyon National Parks and Cedar Breaks National Monument are in this area. This area is composed of mountain ranges that run north and south.

Ecological site concept

The soils on this site range from moderately deep to deep and are well developed. They are well drained. The dry surface color varies from dark brown to dark grayish brown. Runoff is typically low to very high. The soil temperature and moisture regimes are frigid and ustic respectively. Surface and subsurface textures are generally gravelly or cobbly loams and coarse sandy loams. Soils are non-saline and water holding capacity is 4 to 6.5 inches. Surface rock is not uncommon, but the soils are not skeletal, although some gravel maybe in the profile.

Associated sites

R047XB428UT	Mountain Loam (low sagebrush) Heavier soils associated with Mt Loam. Found in South Garfield Co. and on Cedar Mt. in Iron and Kane counties.
R047XB432UT	Mountain Loam (oak) Mt. Loam (Mountain Big Sagebrush) is often found between the groves of Gambel Oak.
R047XB433UT	Mountain Loam (ponderosa pine) Mt. Loam (Mountain Big Sagebrush) is often found between the groves of Ponderosa Pine.
R047XB406UT	Mountain Gravelly Loam (mountain big sagebrush) Found of gravelly soils associated with Mountain Loam (Mt Big Sagebrush) soils.
R047XB426UT	Mountain Loam (black sagebrush) Soils are similiar but black sagebrush dominates the shrub community of the site. Found in Kane and Garfield counties south of Hatch north of Alton.
R047XB016UT	Interzonal Loamy Bottom (basin wildrye)
R047XB475UT	Mountain Windswept Ridge (black sagebrush or low sagebrush)

Similar sites

R047XB406UT	Mountain Gravelly Loam (mountain big sagebrush) Similar site but with a skeletal soil profile reducing the water supplying capacity for the site.
R047XB426UT	Mountain Loam (black sagebrush) Black sagebrush dominates the shrub community instead of Mountain Big Sagebrush.
R047XB420UT	Mountain Loam (shrub) Less sagebrush more antelope bitterbrush and other browse species including black sagebrush.
R047XB428UT	Mountain Loam (low sagebrush) Low sagebrush dominates shrub community instead of Mountian Big Sagebrush.

Table 1. Dominant plant species

Tree	Not specified
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Shrub	(1) <i>Artemisia tridentata</i> var. <i>vaseyana</i>
Herbaceous	(1) <i>Elymus trachycaulus</i>

Physiographic features

This site occurs mostly on mountain slopes and pediments. Runoff is low to very high. Slopes range from 5 to 30 percent.

Figure 1. Mt. Loam Physiographic

Table 2. Representative physiographic features

Landforms	(1) Mountain slope (2) Pediment
Runoff class	Medium to high
Flooding frequency	None
Ponding frequency	None
Elevation	1,890 – 2,620 m
Slope	10 – 30 %
Aspect	Aspect is not a significant factor

Climatic features

Climate is characterized by cool summers and cold winters. The annual precipitation on this site occurs with about 50% arriving during the growing season. The wettest months are August through March. The driest are May and June. The average snow depth in the winter is between 12 and 24 inches. Summer thunderstorms are typical in July and August. Mean annual temperature is 45 degrees.

Table 3 Representative climatic features

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

Influencing water features

No water features are associated with this site.

Wetland description

N/A

Soil features

The soils on this site range from moderately deep to deep and are well developed. They are well drained. The dry surface color varies from dark brown to dark grayish brown. Runoff is typically low to very high. The soil temperature and moisture regimes are frigid and ustic respectively.

Surface and subsurface textures are generally gravelly or cobbly loams and coarse sandy loams. Soils are non-saline and water holding capacity is 4 to 6.5 inches . Surface rock is not uncommon, but the soils are not skeletal, although some gravel maybe in the profile.

This site had been used in the following soil surveys and has been correlated to the following components.

UT636 Pangutich - Hoodle, Sevier, Winnemucca

UT642 Kane County - Detra, Shawa, Diagulch, Mara

UT634 Iron-Washington - Detra

UT640 Beaver-Cove Fort - Cowers, Maple Mountain, Paice

Typical Profile (Detra)

A1--0 to 3 inches; fine sandy loam; dark brown; slightly alkaline.

A2--3 to 8 inches; fine sandy loam; dark brown; slightly alkaline.

BA--8 to 14 inches; sandy clay loam; dark brown; slightly alkaline.

Bt1--14 to 27 inches; sandy clay loam; brown; slightly alkaline.

Bt2--27 to 44 inches; clay loam; yellowish red; moderately alkaline.

R--44 inches; limestone bedrock with clay loam as described above extending into the cracks.

Table 4. Representative soil features

Parent material	(1) Alluvium – sandstone and shale (2) Alluvium – limestone and sandstone
Surface texture	(1) Gravelly, cobbly loam (2) Coarse sandy loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Depth to restrictive layer	50 – 150 cm
Soil depth	50 – 150 cm
Surface fragment cover <=3"	0 – 20 %

Surface fragment cover >3"	0 – 10 %
Available water capacity (Depth not specified)	10.16 – 16.51 cm
Calcium carbonate equivalent (Depth not specified)	0 – 10 %
Electrical conductivity (Depth not specified)	Not specified
Sodium adsorption ratio (Depth not specified)	Not specified
Soil reaction (1:1 water) (Depth not specified)	6.1 – 7.3
Subsurface fragment volume <=3" (Depth not specified)	0 – 20 %
Subsurface fragment volume >3" (Depth not specified)	0 – 30 %

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 some areas, the earliest reports of dominant plants include the cadastral survey conducted by the General Land Office, which began in the late 19th century for this area. However, up to the 1870s the Shoshone Indians, prevalent in northern Utah and neighboring states, grazed horses and set fires to alter the vegetation for their needs. Europeans brought cattle and horses to the area, grazing large numbers of them on unfenced parcels year-long. 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 “phases” (common plant communities), and “states” (aggregations of those plant communities) that can occur on the site. Differences between phases 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 successional 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, 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 and 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 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. The least modified plant community would have been co-dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and a mixture of herbaceous species (1.1). The primary disturbance factor prior to European colonization would have been wildfire (1.1a), which would have removed the sagebrush and allowed the herbs to dominate for a time (1.2). As the time elapsed since the last wildfire grew longer (1.2a), mountain big sagebrush would have increased, and the herbaceous component would have decreased correspondingly. A more complete list of species by lifeform for the Reference State is available in the accompanying tables in the “Plant Community Composition by Weight and Percentage” section of this document.

Community Phase 1.1: mountain big sagebrush-steppe/ rich and productive herbaceous component

This plant community would have been characterized by the presence of mountain big sagebrush with a rich and productive herbaceous layer.

Community Pathway 1.1a:

Wildfire would remove sagebrush, allowing the herbs to dominate for a time.

Community Phase 1.2: herb dominated

This phase would have been dominated by herbaceous species and having few, if any, mountain big sagebrush present.

Community Pathway 1.2a:

Over time, sagebrush would increase, and the herbaceous understory would decrease slightly.

Transition T1a: (State 1 to State 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.

State 2: Mountain Big Sagebrush-Steppe/ 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. This State varies in the amount of mountain big sagebrush present based upon the time elapsed since the last wildfire. The least modified plant community is a mountain big sagebrush-steppe, characterized by the co-dominance shrubs and herbaceous species. Mountain big sagebrush is the dominant shrub, but other minor shrubs may be present. There is a rich and diverse mixture of herbs as well. Dominant grasses include slender wheatgrass, prairie junegrass, and Sandberg bluegrass, and forbs include yarrow, buckwheat, and lupines, among others (2.1). A small component of non-natives will also be present. Wildfire (2.1a) will remove sagebrush and allow the community to become dominated by herbaceous species for a time (2.2). As the length of time elapsed since the last wildfire grows longer (2.2a), sagebrush will re-establish, and the herbs will decrease slightly. 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. The resiliency of this State will be maintained by reducing or altering seasons of use and number of livestock. Conversely, this State’s resiliency will be negatively impacted by continuous season-long livestock use.

Community Phase 2.1: Mountain big sagebrush-steppe/ rich and productive herbaceous component

This plant community is characterized by co-dominance of mountain big sagebrush and a rich and productive understory of herbs.

Community Pathway 2.1a:

Wildfire will remove sagebrush, allowing the herbs to dominate for a time.

Community Phase 2.2: herb dominated

This phase is dominated by herbaceous species and having few, if any, mountain big sagebrush present.

Community Pathway 2.2a:

Over time, sagebrush will increase, and the herbaceous understory will decrease slightly.

Transition T2a: from State 2 to State 3 (Mountain Big Sagebrush-Steppe/ Introduced Non-natives State to Mountain Big Sagebrush

Super-dominance State)

Lack of fire and continued heavy livestock grazing during the growing season of grasses will cause State 2 to transition into the Mountain Big sagebrush Super-dominance State (State 3). The approach to this transition is indicated by a loss of the perennial grass understory, an increase in the shrub component relative to the grasses, and evidence of soil loss. The trigger causing this transition is heavy growing season grazing.

State 3: Mountain Big Sagebrush Super-dominance State

This State is characterized by a super-dominance of mountain big sagebrush with a markedly diminished grass component which occurs in the absence of fire and with continued heavy impacts from livestock grazing. The stability of this State is maintained by the lack of a healthy, productive and diverse herb component capable of providing native seed source, soil stabilization, and soil moisture retention, and by an abundant seed source for mountain big sagebrush. The resiliency of this State will be maintained by decreased grazing during the growing season of grasses. Conversely, the resiliency of this State will be negatively impacted by continued heavy growing season livestock use.

Community Phase 3.1: abundant Mountain big sagebrush / diminished perennial herbs

This plant community is characterized by a dramatic increase in mountain big sagebrush with substantial reduction in the perennial herbaceous component as compared to State 2.

Transition T3a: from State 3 to State 4 (Mountain Big Sagebrush Super-dominance State to Yellow Rabbitbrush State)

Wildfire or brush management, either by mechanical means or prescribed fire, will temporarily remove the mountain big sagebrush. However, an increase in yellow rabbitbrush (*Chrysothamnus viscidiflorus*) is expected in most circumstances. The herbaceous component will also increase after fire or brush beating. The approach to this transition is indicated by an increase in rabbitbrush seedlings. The transition is triggered by wildfire or mechanical removal of sagebrush accompanied by heavy grazing.

Transition T3b: from State 3 to State 5 (Mountain Big Sagebrush Super-dominance State to Native Perennial Grass State)

Brush management using 2, 4-D or 2, 4-5T will remove both the shrub and forb components, leaving the grasses. This transition is triggered by herbicide application.

Transition T3c: from State 3 to State 6 (Mountain Big Sagebrush Super-dominance State to Introduced Grassland State)

This transition occurs when a decision is made to increase forage production by tilling and re-seeding with intermediate wheatgrass (*Thinopyrum intermedium*), smooth brome (*Bromus inermis*), or orchardgrass (*Dactylis glomerata*); all introduced (non-native) species.

Restoration Pathway: R3a

Prescribed grazing during the non-growing season of the grasses and forbs will allow the native perennial herbaceous species to re-establish, returning the community to a mountain big sagebrush-steppe (State 2).

State 4: Yellow Rabbitbrush State

This State is characterized by having an abundance of yellow rabbitbrush and forb species and a reduced amount of mountain big sagebrush. This State occurs when the sagebrush is removed by fire or mechanical means from an area where it was previously super-dominant. This State is maintained by lack of sagebrush seedling establishment. It could also be maintained by periodic sagebrush removal by fire.

Community Phase 4.1: yellow rabbitbrush and forbs abundant/ mountain big sagebrush reduced

This Phase is characterized by having an abundance of yellow rabbitbrush and forb species and having a reduced amount of mountain big sagebrush.

Transition T4a: from State 4 to State 3 (Yellow Rabbitbrush State to Mountain Big Sagebrush Super-dominance State)

Heavy continuous season long grazing will impact the herbaceous component, allowing the shrubs to return to dominance.

State 5: Native Perennial Bunchgrass State

This State is dominated by native perennial bunchgrasses such as slender wheatgrass, prairie junegrass, and Sandberg bluegrass. Shrubs and have been reduced and forbs eliminated by 2,4-D™ or 2,4-5T™ application. This State is maintained by the lack of shrub and forb seed source, and the abundance of native perennial grass seed source.

Community Phase 5.1: increased native perennial grasses/ shrubs reduced/ forbs eliminated

This Phase is characterized by the dominance of perennial native bunchgrasses such as slender wheatgrass, prairie junegrass, and Sandberg bluegrass. Shrubs and have been reduced and forbs eliminated.

Transition T5a: from State 5 to State 3 (Native Perennial Bunchgrass State to Mountain Big Sagebrush Super-dominance State)

Heavy continuous season long grazing will impact the native graminoids, allowing the shrubs to return to dominance. The approach to this transition is indicated by an increase in sagebrush seedlings. This transition is triggered by heavy growing season livestock grazing.

State 6: Introduced Grassland State

This state is characterized by the dominance of seeded grasses such as intermediate wheatgrass, smooth brome, or orchardgrass. This state occurs when a decision is made to increase forage production by tilling and reseeding introduced grasses. Periodic brush

management is required to maintain the grass-dominance of this state. This resiliency of this State can be maintained by sustainable levels of livestock grazing as determined by monitoring. Conversely, continued heavy use will negatively impact the resiliency of this state.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Shrub/Vine					
0	Primary Shrubs			224-560	
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>	123-404	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	62-123	–
0	Secondary Shrubs			22-56	
	black sagebrush	ARNO4	<i>Artemisia nova</i>	11-22	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	11-22	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	11-22	–
	creeping barberry	MARE11	<i>Mahonia repens</i>	6-11	–
	Woods' rose	ROWO	<i>Rosa woodsii</i>	6-11	–
	mountain snowberry	SYOR2	<i>Symphoricarpos oreophilus</i>	6-11	–
	littleleaf horsebrush	TEGL	<i>Tetradymia glabrata</i>	6-11	–
	buckwheat	ERIOG	<i>Eriogonum</i>	6-11	–
	alderleaf mountain mahogany	CEMO2	<i>Cercocarpus montanus</i>	6-11	–
	Utah serviceberry	AMUT	<i>Amelanchier utahensis</i>	6-11	–
Grass/Grasslike					
0	Primary Grasses			773-1681	
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	84-375	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	84-375	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	84-280	–
	Lemmon's needlegrass	ACLEL	<i>Achnatherum lemmonii var. lemmonii</i>	39-179	–
	Letterman's needlegrass	ACLE9	<i>Achnatherum lettermanii</i>	39-179	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	39-179	–
0	Secondary Grasses			90-202	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	11-22	–
	mountain brome	BRMA4	<i>Bromus marginatus</i>	11-22	–
	Geyer's sedge	CAGE2	<i>Carex geyeri</i>	11-22	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	11-22	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	11-22	–
	muttongrass	POFE	<i>Poa fendleriana</i>	11-22	–
	sheep fescue	FEOV	<i>Festuca ovina</i>	11-22	–
Forb					
0	Forbs			84-191	
	common yarrow	ACMI2	<i>Achillea millefolium</i>	11-22	–
	aster	ASTER	<i>Aster</i>	11-22	–
	milkvetch	ASTRA	<i>Astragalus</i>	11-22	–
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	11-22	–

	castilla	CASTI	<i>Castilla</i>	11-22	–
	bastard toadflax	COUM	<i>Comandra umbellata</i>	11-22	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	11-22	–
	buckwheat	ERIOG	<i>Eriogonum</i>	11-22	–
	geranium	GERAN	<i>Geranium</i>	11-22	–
	pea	LATHY	<i>Lathyrus</i>	11-22	–
	lupine	LUPIN	<i>Lupinus</i>	11-22	–
	beardtongue	PENST	<i>Penstemon</i>	11-22	–
	longleaf phlox	PHLO2	<i>Phlox longifolia</i>	11-22	–
	pale agoseris	AGGL	<i>Agoseris glauca</i>	6-11	–
Tree					
0	Primary Tree			11-22	
	Rocky Mountain juniper	JUSC2	<i>Juniperus scopulorum</i>	11-22	–

Animal community

Wildlife Interpretations -- This site is important to deer, elk and antelope for grazing and cover. It is also important to the black-tailed jackrabbit, a few white-tailed jackrabbit and cottontails, coyote, badger and fox. The greater sage grouse use this site for feed and cover, particularly when small forbs are available for chick rearing. When the mountain big sagebrush increases choking out the forbs and grasses, this site loses some of its importance to all wildlife species. Grazing Interpretations -- This site provides excellent summer and fall grazing to all livestock due to its accessibility and forage supply. It is an excellent supplier of forbs, grass and palatable browse species. The mountain big sagebrush provides grazing to all big game and livestock in late fall when early snow arrives.

Hydrological functions

The soils associated with this ecological site are generally in Hydrologic Soil Group B but some soils range from C to D. Runoff potential on this site varies from low to very high depending on soils and slopes.

Recreational uses

Recreation activities include aesthetic value and good opportunities for hunting, hiking, horseback riding, and off road vehicle use. Due to possible high erosion potential after surface disturbance, care should be taken when planning recreational activities. Camp sites are limited but available when some shelter trees have invaded on the site.

Wood products

None

Other information

Fire Ecology -- This site usually has a fuel load to carry a fire, but much of the year the plant moisture content is high enough to limit fire. Fire was a typical disturbance in the historic climax plant community for this ecological site.

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.

Type locality

Location 1: Washington County, UT	
Township/Range/Section	T41 S R10 W S13

General legal description	Washington County, Utah; just south of the deer exclosure on Cable Mountain Road in Zion National Park; about; located about 1,200 feet south and 800 feet east of the northwest corner of sec. 13, T. 41 S., R. 10 W.
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Other references

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Contributors

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Approval

Kendra Moseley, 2/06/2025

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	08/27/2026
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):

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:
