USDA Natural Resources
Conservation Service

Ecological site R047XA430UT
Mountain Loam (mountain big sagebrush)

Last updated: 2/05/2025
Accessed: 05/11/2025

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.

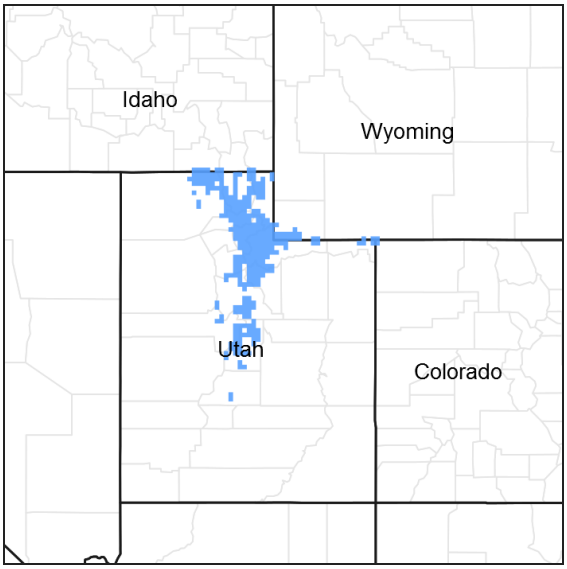


Figure 1. Mapped extent

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 mineralogy is generally mixed and the soils are very shallow to very deep, generally well drained, and loamy or loamy-skeletal.

LRU notes

Major Land Resource Unit 47A is located in the northern half of the Middle Rocky Mountains Province of the Rocky Mountain System. This MLRA includes the Wasatch Mountains which tend to run north and south. These steeply sloping, precipitous mountains have narrow crests and deep valleys. They are primarily fault blocks that have been tilted up. The alluvial fans located at the base of these mountains are important recharge zones for valley aquifers.

Classification relationships

Modal Soil: Ant Flat Loam 2-40% — fine, montmorillonitic, frigid Calcic Argixeroll

Ecological site concept

The soils in this site are at least 60 inches deep, well-drained and have dark colored surface layers. The underlying layers are medium to fine textured and contain limited gravel and cobble in places. They are weathered from sandstone, shale, limestone, quartzite, volcanic ash and igneous rock. Permeability is moderately slow to moderate. Roots penetrate the soils readily. These soils have a high water holding capacity, ranging from about 5 to 7.7 inches in the upper 40 inches of the profile. Rock fragments are variable throughout the profile, but average less than 15 percent by volume. Under proper management, these soils have little surface runoff and slight or no erosion. The soil moisture regime is xeric and the soil temperature regime is frigid.

Associated sites

R047XA432UT	**Mountain Loam (oak)**
R047XA434UT	**Mountain Loam (shrub)**
R047XA004UT	**Interzonal Cold Semi-wet Fresh Meadow (meadow sedge/tufted hairgrass)**
R047XA008UT	**Interzonal Wet Fresh Meadow (sedge)**
R047XA402UT	**Mountain Clay (slender wheatgrass)**
R047XA406UT	**Mountain Gravelly Loam (mountain big sagebrush)**
R047XA410UT	**Mountain Gravelly Loam (oak)**
R047XA418UT	**Mountain Loam (bigtooth maple)**
R047XA446UT	**Mountain Shallow Loam (mountain big sagebrush)**
R047XA448UT	**Mountain Shallow Loam (oak)**
R047XA454UT	**Mountain Stony Clay (slender wheatgrass)**
R047XA458UT	**Mountain Stony Loam (quaking aspen thicket)**
R047XA461UT	**Mountain Stony Loam (mountain big sagebrush)**

R047XA463UT	**Mountain Stony Loam (Gambel oak)**
R047XA469UT	**Mountain Very Steep Shallow Loam (mountain big sagebrush)**
R047XA471UT	**Mountain Very Steep Stony Loam (oak)**
R047XA473UT	**Mountain Very Steep Stony Loam (browse)**
R047XA474UT	**Mountain Very Steep Stony Loam (mountain big sagebrush)**

Similar sites

R047XA434UT	**Mountain Loam (shrub)**
R047XA458UT	**Mountain Stony Loam (quaking aspen thicket)**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. vaseyana*
Herbaceous	(1) *Pseudoroegneria spicata*

Physiographic features

This site is found on mountain slopes and fan remnants with slopes ranging from 2 to 60 percent. Runoff is medium to high depending on slope and plant basal cover. This site is found on all aspects and at elevations ranging between 5,100 to 8,400 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope (2) Fan remnant (3) Mountain
Runoff class	Medium to high
Flooding frequency	None
Ponding frequency	None
Elevation	5,100–8,400 ft
Slope	2–60%
Aspect	Aspect is not a significant factor

Climatic features

The climate of this site is typically moist sub-humid or humid, with cold snowy winters and cool dry summers. Distribution of the precipitation is 55 to 60 percent during the plant dormant period (October to March). Winter snow is the most dependable water supply for plant growth. Low precipitation and high evaporation rates during July, August, and September causes slowing of plant growth for all species and dormancy in many of the grasses and forbs.

Table 3. Representative climatic features

Frost-free period (average)	110 days
Freeze-free period (average)	153 days
Precipitation total (average)	21 in

Influencing water features

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

Wetland description

N/A

Soil features

The soils in this site are at least 60 inches deep, well-drained and have dark colored surface layers. The underlying layers are medium to fine textured and contain limited gravel and cobble in places. They are weathered from sandstone, shale, limestone, quartzite, volcanic ash and igneous rock. Permeability is moderately slow to moderate. Roots penetrate the soils readily. These soils have a high water holding capacity, ranging from about 5 to 7.7 inches in the upper 40 inches of the profile. Rock fragments are variable throughout the profile, but average less than 15 percent by volume. Under proper management, these soils have little surface runoff and slight or no erosion. The soil moisture regime is xeric and the soil temperature regime is frigid.

Soil Map Units for R047XA430UT
Soil Survey Area Soil Components (Map Units in parentheses)
Camp Williams (UT605) Jesh (8008, 8010); Beefhollow (8009, 8010);
Box Elder County, Eastern Part (UT602) Goring (GLE, YRE); Goring Variant (GM); Hendricks (HeB, HeD, HeE, HkD); Manila (BTG, MbC, MbE, MDG); Picayune (AGG)
Cache Valley Area (UT603) Ant Flat (AND, HKG); Goring (AGE, AGG2, CSE, CSG, GGE, LUE); Hendricks (HdD); Leatham (BEF, LMG2); Nebeker (NbB, NbC, NbE, RFG2); Picayune (BKG2, POG2, PRG)
Rich County (UT604) Despain (DGF); Guilder (GCE); Yeljack (YCD);
Fairfield-Nephi Area (UT608) Ant Flat (AeD); Broadhead (BnD, BnF); Manila (MeC, MeD)
Morgan Area (UT609) Ant Flat (AnD); Broadhead (BeB); Brownlee (BfA, BfB); Causey (CdG, CeG, OcG); Collinston (HcE); Cumulic Haploxerolls (CX); Donner (DaG, DbE); Eastcan (EaA, EcA, EdC, EeC); Fuventic Haploxerolls (FAB); Guilder (GeE, SsD); Hades (HaC, HaG); Isbell (IbG, IgD); Manilla (MbA, MbB, MbC, MbD, MbE, McD, McG); Moweba (DmG, MwC, MwG, MyG); Nebeker (NrA, NrB); Parleys (PaA); Parlo (PcA); Phoebe (PhA); Steed (SmA, SmB); Stoda (SuD, SuG); Trojan (TnA, TnD)
Summit Area (UT613) Ant Flat (102, 103, 104, 105, 154, 155); Fewkes (128, 129, 130, 131, 132, 133, 134, 135, 137, 138, 140, 141, 153); Harter (139, 142, 156); Manila (154, 155, 156, 157)
Utah County (UT621) Henefer (HEG, HFF, HFG2, HKG); Manila (MAF); McMurdie (MrC, MtE2); Picayune (PHG2, PIF, PJG2)
Heber Valley Area (UT622) Clegg (CgA, CgB, CgC, ChC, WLC); Henefer (BLF, HeA, HeC, HeD, HFF, HGF, HHF, HjC, HjD, HjE, MHF, YTC, YTD); Rasband (RaB, RCC, RdA, RdC); Watkins Ridge, DWC, DWD, WcC, WcD, WLC, WLD, WNC, WND); Whipstock (WPF, WSC, WSD, WSE)
Sanpete Valley Area (UT627) Ant Flat (AHD); Clegg (CNC, LLE); Watkins Ridge (WGD)
Sevier County (UT628) FAIM (FFC, FFD); Hamtah (WLD); Trove (TRE, TRG); Vicking (VRE, VZF);
Loa, Marysvale Area (UT629) FAIM (FFC, FFD);
WY638 Amsden (167); Chittum (144); Davtone (167, 176); Heath (150); Tally (102, 186, 187)

Table 4. Representative soil features

Parent material	(1) Igneous, metamorphic and sedimentary rock
Surface texture	(1) Gravelly loam (2) Loam (3) Silt loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	60 in
Surface fragment cover <=3"	5–15%
Surface fragment cover >3"	0–5%

Available water capacity (0-40in)	5–7.7 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	6.1–7.8
Subsurface fragment volume <=3" (Depth not specified)	3–15%
Subsurface fragment volume >3" (Depth not specified)	0–3%

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 (Galatowitsch 1990). 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 (Parson 1996). 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 “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.

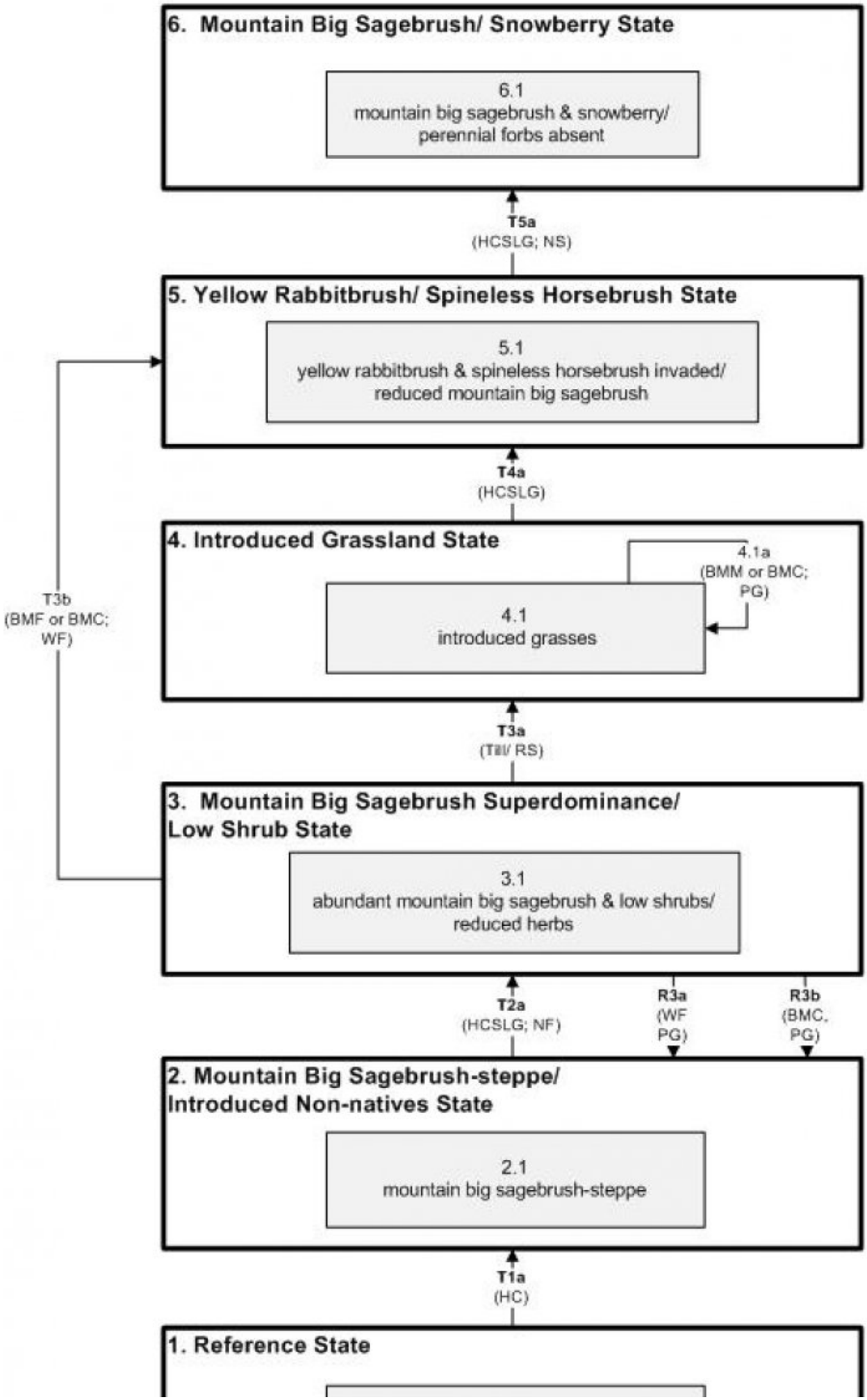
The major successional pathways within states, (“community pathways”) are indicated by arrows between phases. “Transitions” are indicated by arrows between states. The drivers of these changes are indicated in codes decipherable by referring to the legend at the bottom of the page and by reading the 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, 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

R047AY430UT: Mountain Loam (Mountain Big Sagebrush)



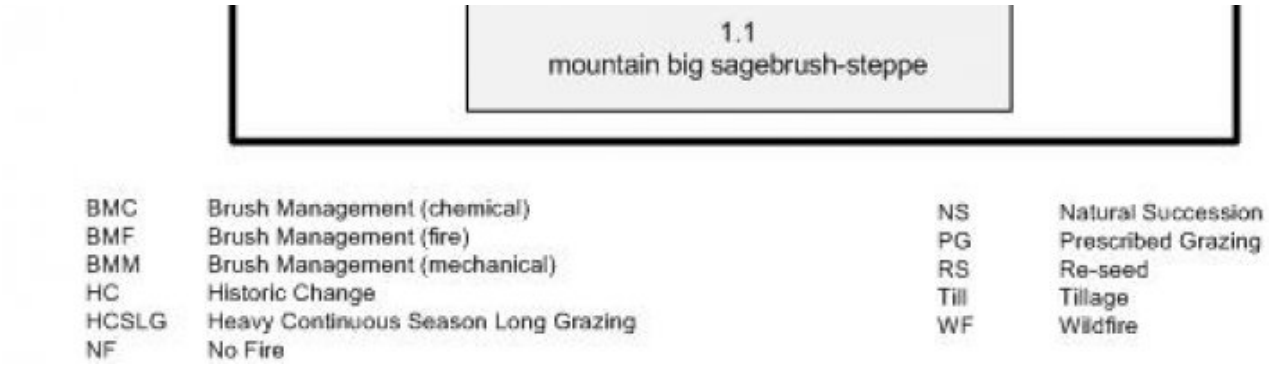


Figure 4. State and Transition Model

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. The least modified plant community would have been co-dominated by mountain big sagebrush (*Artemisia tridentata* ssp. vaseyana) and a mixture of herbaceous species. Dominant grasses would have included bluebunch wheatgrass (*Pseudoroegneria spicata*), and basin wildrye (*Leymus cinereus*), and forbs would have included sticky purple geranium (*Geranium viscosissimum*), shortstem buckwheat (*Eriogonum brevicaule*), and lupines (*Lupinus caudatus* ssp. caudatus and *L. argenteus*), among others (1.1). 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 1.1
Mountain big sagebrush-steppe

This plant community would have been characterized by a co-dominance of mountain big sagebrush and a rich and productive herbaceous understory.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1080	1440	1600
Shrub/Vine	203	270	300
Forb	68	90	100
Total	**1351**	**1800**	**2000**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	9-11%
Grass/grasslike foliar cover	59-61%
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	–	–	59-61%	–
>2 <= 4.5	–	9-11%	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

State 2
Mountain big sagebrush-steppe / Non-natives

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 is a shrub-steppe community where there is a co-dominance between mountain big sagebrush (and other minor shrubs) and a rather diverse mixture of herbaceous species. Dominant grasses are bluebunch wheatgrass and basin wildrye, and forbs include sticky purple geranium, shortstem buckwheat, and lupine species, among others (2.1). A small component of non-natives will also be present. The resiliency of this State is maintained by a healthy, productive, and diverse plant community that can provide native seed sources and promotes soil stability, water infiltration, and soil moisture retention. Wildfire may also play a role in maintaining the balance between shrubs and herbs. The resiliency of this State will be maintained appropriate stocking rates and season of use. Conversely, heavy continuous season long livestock grazing and accelerated soil erosion will negatively impact the resiliency of this State.

Community 2.1
Mountain big sagebrush-steppe

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

State 3
Mountain big sagebrush superdominance / low shrub

Fire and heavy livestock grazing reduce native grasses. Shrubs, mainly mountain big sagebrush, will increase becoming super-dominant. Some low shrubs such as yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. viscidiflorus), broom snakeweed (*Gutierrezia sarothrae*), and spineless horsebrush (*Tetradymia canescens*) may also increase. 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. The abundance of sagebrush seed source and lack of fire will also serve to maintain this State. Appropriate livestock grazing (correct stocking rate, timing, etc.) will help maintain the resiliency of this State, but continuous heavy livestock grazing will negatively impact the resiliency of this State.

Community 3.1
abundant mountain big sagebrush & low shrubs/ reduced herbs

This plant community is characterized by a dramatic increase in mountain big sagebrush with low shrubs replacing some of the perennial herbaceous component in the understory.

State 4
Introduced grassland

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 re-seeding introduced grasses. Periodic brush management is required to maintain the grass-dominance of this State. This resiliency of this State can be maintained by moderate grazing, high intensity short duration use. Conversely, continued heavy and accelerated soil erosion use will negatively impact the resiliency of this State.

Community 4.1
Introduced grassland

This plant community is dominated by seeded species such as intermediate wheatgrass, smooth brome, or orchardgrass. Because of the depletion of native grass seed reserves, it is common for introduced grasses that have not been seeded in these areas, such as bulbous bluegrass (*Poa bulbosa*), to establish. Periodic shrub control or brush management will be necessary to maintain grass dominance by either chemical or mechanical means, provided any livestock grazing is less than three-quarters (75 percent) of the current annual growth.

State 5
Yellow rabbitbrush / Spineless horsebrush

The shrub component of this State is characterized by an increased amount of root-sprouting shrubs such as yellow rabbitbrush and spineless horsebrush, and a reduction in mountain big sagebrush as a result of sagebrush removal by pyric (fire) or chemical means. The stability of this State is maintained by the lack of sagebrush and the lack of a productive herbaceous component capable of providing native seed source. Proper livestock grazing (correct stocking rates and timing, etc.) will help maintain the resiliency of this community, but heavy season long livestock grazing will negatively impact its resiliency.

Community 5.1
yellow rabbitbrush & spineless horsebrush invaded/ reduced mountain big sagebrush

The shrub component of this Phase is characterized by an increased amount of root-sprouting shrubs such as yellow rabbitbrush and spineless horsebrush, and a reduction in mountain big sagebrush as a result of sagebrush removal by pyric (fire) or chemical means.

State 6
Mountain big sagebrush / Snowberry

This State is characterized by the dominance of mountain big sagebrush and snowberry that is the result of natural succession combined with continuous heavy season long grazing. The shrub dominance is maintained by abundant shrub seed source and the lack of herb seed source. The stability of this State is also partially maintained by the fact that the longer-lived shrubs serve to protect the soil and provide abundant litter. Heavy season long livestock grazing will negatively impact the resiliency of this State. Earlier sheep grazing may have reduced the forb component to the extent that introduced grasses become established in the plant community in their place.

Community 6.1
mountain big sagebrush & snowberry/ perennial forbs absent

This community phase is characterized by the dominance of mountain big sagebrush and snowberry that is the result of natural succession combined with continuous heavy season long grazing. Earlier sheep grazing may have reduced the forb component such that introduced grasses become established in the plant community.

Transition T1a

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 T2a
State 2 to 3

Lack of fire and continued heavy livestock grazing during the growing season will cause a transition into the Mountain Big Sagebrush Super-dominance/Low Shrub State. The approach to this transition is indicated by a loss of perennial grass understory, an increase in the shrub component relative to grasses, and the bare soil exposure between shrubs and/or other evidence of accelerated soil erosion. The transition is triggered by sustained heavy season-long grazing.

Restoration pathway R3a
State 3 to 2

Wildfire combined with prescribed grazing during only part of the non-growing season of the grasses and forbs will remove much of the dense sagebrush and allow the native perennial herbaceous species to re-establish. Application of 2, 4-D™ combined with prescribed grazing during the non-growing season of the grasses and forbs will also remove much of the dense sagebrush and allow the native perennial herbaceous species to re-establish.

Transition T3a
State 3 to 4

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*).

Transition T3b
State 3 to 5

Wildfire or brush management, either by mechanical means or prescribed fire, will temporarily remove the mountain big sagebrush. However, an increase in yellow rabbitbrush or other root-sprouting shrubs such as spineless horsebrush will follow the removal of sagebrush in most circumstances. The herbaceous component may also increase after fire or brush beating.

Transition T4a
State 4 to 5

Heavy continuous season-long grazing will reduce the herbaceous component, allowing the fast-growing unpalatable shrubs to re-establish. The approach to this transition is indicated by decreased grass vigor and an increase in shrub seedlings. This transition is triggered by excessive or improperly timed grazing of grasses.

Transition T5a
State 5 to 6

Shrubs, mainly mountain big sagebrush and mountain snowberry (*Symphoricarpos oreophilus*), will come to dominate the community through natural succession as the length of time increases since the last shrub-killing disturbance. The approach to this transition is indicated by the presence of only older yellow rabbitbrush and spineless horsebrush, and the presence of sagebrush and snowberry seedlings. The trigger causing this transition is heavy season-long grazing combined with natural succession.

Additional community tables

Table 8. Community 1.1 plant community composition

				Annual Production	Foliar

Group	Common Name	Symbol	Scientific Name	(Lb/Acre)	Cover (%)
Tree					
0	**Dominant Trees**			0–100	
	Utah juniper	JUOS	*Juniperus osteosperma*	0–100	–
Shrub/Vine					
0	**Dominant Shrubs**			100–200	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	100–200	–
3	**Sub-Dominant Shrubs**			100–200	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	100–200	–
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	20–60	–
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	20–60	–
	yellow rabbitbrush	CHVIV4	*Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus*	20–60	–
	slender buckwheat	ERMI4	*Eriogonum microthecum*	20–60	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	20–60	–
	creeping barberry	MARE11	*Mahonia repens*	20–60	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	20–60	–
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	20–60	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	20–60	–
Grass/Grasslike					
0	**Dominant Grasses**			1260–1500	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	1100–1200	–
	basin wildrye	LECI4	*Leymus cinereus*	100–200	–
1	**Sub-Dominant Grasses**			100–200	
	Grass, perennial	2GP	*Grass, perennial*	100–200	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	20–60	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	20–60	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	20–60	–
	California brome	BRCA5	*Bromus carinatus*	20–60	–
	Geyer's sedge	CAGE2	*Carex geyeri*	20–60	–
	squirreltail	ELEL5	*Elymus elymoides*	20–60	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	20–60	–
	sheep fescue	FEOV	*Festuca ovina*	20–60	–
	needle and thread	HECO26	*Hesperostipa comata*	20–60	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	20–60	–
	spike fescue	LEKI2	*Leucopoa kingii*	20–60	–
	oniongrass	MEBU	*Melica bulbosa*	20–60	–
	western wheatgrass	PASM	*Pascopyrum smithii*	20–60	–
	Sandberg bluegrass	POSE	*Poa secunda*	20–60	–
Forb					
2				100–200	
	Forb, perennial	2FP	*Forb, perennial*	100–200	–

	Forb, annual	2FA	*Forb, annual*	0–50	–
	common yarrow	ACMI2	*Achillea millefolium*	0–40	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–40	–
	silverleaf milkvetch	ASAR4	*Astragalus argophyllus*	0–40	–
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	0–40	–
	northwestern Indian paintbrush	CAAN7	*Castilleja angustifolia*	0–40	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	0–40	–
	shortstem buckwheat	ERBR5	*Eriogonum brevicaule*	0–40	–
	Eaton's fleabane	EREA	*Erigeron eatonii*	0–40	–
	northern bedstraw	GABO2	*Galium boreale*	0–40	–
	sticky purple geranium	GEVI2	*Geranium viscosissimum*	0–40	–
	oneflower helianthella	HEUN	*Helianthella uniflora*	0–40	–
	Scouler's woollyweed	HISC2	*Hieracium scouleri*	0–40	–
	Nevada pea	LALA3	*Lathyrus lanszwertii*	0–40	–
	western stoneseed	LIRU4	*Lithospermum ruderale*	0–40	–
	tailcup lupine	LUCAC3	*Lupinus caudatus ssp. caudatus*	0–40	–
	Tolmie's owl's-clover	ORTO	*Orthocarpus tolmiei*	0–40	–
	low beardtongue	PEHU	*Penstemon humilis*	0–40	–
	Munro's globemallow	SPMU2	*Sphaeralcea munroana*	0–40	–
	American vetch	VIAM	*Vicia americana*	0–40	–
	mule-ears	WYAM	*Wyethia amplexicaulis*	0–40	–

Animal community

This site has excellent potential for summer grazing by cattle, sheep, and horses.
This site is extremely valuable for wildlife habitat because of the great variety and abundance of grasses, forbs and shrubs and the interspersion of this site among other types of habitat – uplands and dry croplands, woodlands and stream-bottoms with the associated riparian vegetation. This site is located between upland range sites and woodlands.
Resident wildlife on this site include: sage grouse, snowshoe hare, mule deer, elk, and moose.

Hydrological functions

Soil series in this site are grouped into b and c hydrologic groups. These soils have moderately low to moderately high runoff potential. When the vegetation is in climax (potential) condition, the hydrologic curves for the soils in b hydrologic groups are from 48 to 50 and for the soils in c hydrologic group are hydrologic curves are from 58 to 62.

Recreational uses

This site has aesthetic value and is suitable for hiking and horseback riding. It has a large number of forbs and shrubs in bloom from early spring throughout the summer and into the fall. It has a combination of grasses, forbs, small shrubs and large shrubs which attract snowshoe hare, elk and mule deer for wildlife viewing and hunting. Fishing opportunities are good on streams, lakes and reservoirs through and adjacent to this site. Snowmobiling has high value potential on this site.

Wood products

None

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

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Approval

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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.

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Date	10/24/2012
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None to Rare. Some minor rill development may occur on steeper slopes (> 20%) or on areas located below exposed bedrock or other water shedding areas where increased runoff may occur. Where these rills are present, they should be fairly short (3-6 feet), < 1 inch deep and somewhat widely spaced (4-8 feet). Minor rill development may be observed on all slopes following major thunderstorm or spring runoff events but should heal during the next growing season.

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2. **Presence of water flow patterns:** Rare. Some very minor evidence of water flow patterns may be found winding around perennial plant bases. They show little evidence of current erosion. They are expected to be short (3-6 feet), stable, sinuous and normally not connected. There may be very minor evidence of deposition. Evidence of water flow may increase somewhat on slopes > 20%.

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3. **Number and height of erosional pedestals or terracettes:** Perennial vegetation shows little evidence of erosional pedestalling (1 to 2% of individual plants). Plant roots are covered and most litter remains in place around plant crowns. Terracettes should be absent or, if present, stable. A slight increase in both pedestal and terracette development may occur with increasing slope.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground ranges from 20% - 30%. Soil surface may be covered by 15 to 35% coarse fragments. Bare ground openings should not be greater than 1 foot in diameter and should normally not be connected.

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5. **Number of gullies and erosion associated with gullies:** None to Rare at site level. Scattered landscape level gully channels, however, are a normal component of basin/range environments. Where landscape gullies are present, they should be stable, partially vegetated on their sides and bottoms, with no evidence of head-cutting. Some slight increase in disturbance may be evident following significant weather events or when gullies convey considerable runoff from higher elevation rocky or naturally eroding areas.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None. No evidence of wind generated soil movement is present. Wind caused blowouts and deposition are not present.

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7. **Amount of litter movement (describe size and distance expected to travel):** Most litter resides in place with some redistribution caused by water movement. Minor litter removal may occur in flow channels with deposition occurring within 1 to 2 feet at points of obstruction. The majority of litter accumulates at the base of plants. Some grass leaves and small twigs (grass stems) may accumulate in soil depressions adjacent to plants. Woody stems are not likely to move. However, some litter movement is expected (up to 6 feet) with increases in slopes >20% and/or increased runoff resulting from heavy thunderstorms.

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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 a soil stability rating of 5 or 6. Soil surface textures are typically loams, very fine sandy loams and silt loams.

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

Soil surface 0-4 inches. Texture is a silt loam; color is very dark brown (10YR 4/2); and structure moderate medium granular. Mollic epipedon ranges to 20 inches. Use the specific information for the soil you are assessing found in the published soil survey to supplement this description.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Perennial vegetation produces sufficient cover and spatial arrangement to intercept most raindrops and reduce raindrop splash erosion. Litter on soil surface and cryptogamic crusting, where present, also protects soil from splash erosion and encourages a higher rate of infiltration. Plant spatial distribution should slow runoff, allowing additional time for infiltration. Bare spaces are expected to be small and irregular in shape and are usually not connected. Vegetative structure is usually adequate to capture snow and ensure that snowmelt occurs in a controlled manner, allowing maximum time for infiltration, and reducing runoff and erosion in all but the most extreme storm events. When perennial grasses and shrubs decrease due to natural events including drought, insect damage, etc., which reduce ground cover and increase bare ground, runoff is expected to increase and associated infiltration reduced.

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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):** None. Some soils have an argillic horizon that could be mistaken for a compaction pan.

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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: Perennial bunchgrasses (bluebunch wheatgrass, basin wildrye), = > Non-sprouting shrub (mountain big sagebrush, >> Sprouting shrub (bitterbrush).

    Sub-dominant: Rhizomatous grasses (slender wheatgrass, western wheatgrass) > Perennial forbs (arrowleaf balsamroot).

    Other: A wide variety of other perennial grasses and both perennial and annual forbs can be expected to occur in the plant community.

    Additional: Natural disturbance regimes include fire, drought, and insects. Assumed fire cycle of 30 to 40+ years. Functional/structural groups may appropriately contain non-native species if their ecological function is the same as the native species in the reference. Following a disturbance such as fire, drought, rodents or insects that remove woody vegetation, forbs and perennial grasses (herbaceous species) may dominate the community for a period of time. If a disturbance has not occurred for an extended period of time, woody species may continue to increase. These conditions would reflect different functional community phases within the reference state.

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** All age classes of perennial grasses should be present under average to above average growing conditions with age class expression likely subdued during periods of extended drought. Slight decadence in the principle shrubs could occur near the end of the fire cycle or during periods of extended drought, or insect infestations. In general, a mix of age classes should be expected with some dead and decadent plants present.

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14. **Average percent litter cover (%) and depth (in):** Litter cover will be heavier under plants. Most litter will be herbaceous and depths of 1 to 3 inches would be considered normal. Perennial vegetation should be well distributed on

the site.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Annual production in air-dry herbage should be approximately 1600 - 2000 #/acre on an average year but could range from 1200 - 2200 #/acre during periods of prolonged drought or above average precipitation.

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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:** Cheatgrass, Alyssum, mustard species, Canada thistle, black medic, Utah juniper, Gamble oak.

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17. **Perennial plant reproductive capability:** All perennial plants should have the ability to reproduce in all years, except in extreme drought years. Green rabbitbrush sprouts vigorously following fire. There are no restrictions on either seed or vegetative reproduction. Some seedling recruitment of major species is expected to be present during average and above average growing years.
