USDA Natural Resources Conservation Service

Ecological site R047XC460UT
Mountain Stony Loam (shrub)

Last updated: 2/11/2025
Accessed: 05/14/2025

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

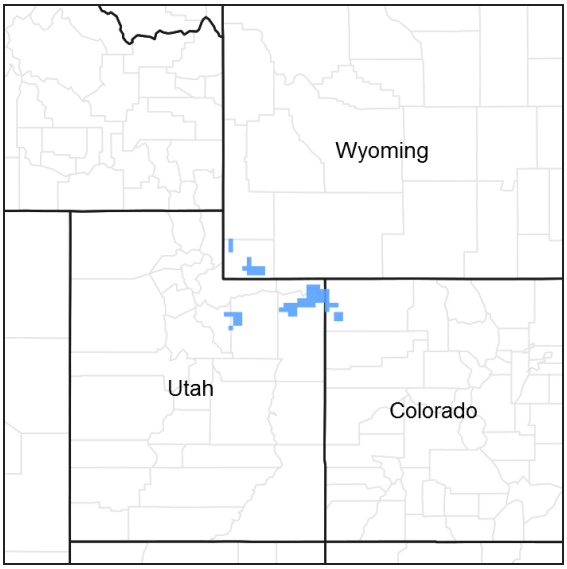

Figure 1. Mapped extent

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

MLRA notes

Major Land Resource Area (MLRA): 047X–Wasatch and Uinta Mountains

MLRA 47 occurs in Utah (86 percent), Wyoming (8 percent), Colorado (4 percent), and Idaho (2 percent). It encompasses approximately 23,825 square miles (61,740 square kilometers). The northern half of this area is in the Middle Rocky Mountains Province of the Rocky Mountain System. The southern half is in the High Plateaus of the Utah Section of the Colorado Plateaus Province of the Intermontane Plateaus. Parts of the western edge of this MLRA are in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. The MLRA includes the Wasatch Mountains, which trend north and south, and the Uinta Mountains, which trend east and west. The steeply sloping, precipitous Wasatch Mountains have narrow crests and deep valleys. Active faulting and erosion are a dominant force in controlling the geomorphology of the area. The Uinta Mountains have a broad, gently arching, elongated shape. Structurally, they consist of a broadly folded anticline that has an erosion-resistant quartzite core. The Wasatch and Uinta Mountains have an elevation of 4,900 to about 13,500 feet (1,495 to 4,115 meters).

The mountains in this area are primarily fault blocks that have been tilted up. Alluvial fans at the base of the mountains are recharge zones for the basin fill aquifers. An ancient shoreline of historic Bonneville Lake is evident on the footslopes along the western edge of the area. Rocks exposed in the mountains are mostly Mesozoic and Paleozoic sediments, but Precambrian rocks are exposed in the Uinta Mountains. The Uinta Mountains are one of the few ranges in the United States that are oriented west to east. The southern Wasatch Mountains consist of

Tertiary volcanic rocks occurring as extrusive lava and intrusive crystalline rocks.

The average precipitation is from 8 to 16 inches (203 to 406 mm) in the valleys and can range up to 73 inches (1854 mm) in the mountains. In the northern and western portions of the MLRA, peak precipitation occurs in the winter months. The southern and eastern portions have a greater incidence of high-intensity summer thunderstorms; hence, a significant amount of precipitation occurs during the summer months. The average annual temperature is 30 to 50 degrees Fahrenheit (-1 to 15 C). The freeze-free period averages 140 days and ranges from 60 to 220 days, generally decreasing in length with elevation.

The dominant soil orders in this MLRA are Aridisols, Entisols, Inceptisols, and Mollisols. The lower elevations are dominated by a frigid temperature regime, while the higher elevations experience cryic temperature regimes. Mesic temperature regimes come in on the lower elevations and south facing slopes in the southern portion of this MLRA. The soil moisture regime is typically xeric in the northern part of the MLRA, but grades to ustic in the extreme eastern and southern parts. The minerology is generally mixed and the soils are very shallow to very deep, generally well drained, and loamy or loamy-skeletal.

LRU notes

E47C is the Uinta Mountains portion of MLRA 47 that run east and west which includes the Uinta Wilderness and The Flaming Gorge National Recreation Area and towns such as Evanston, Wyoming, Hanna and Tabiona, Utah. Structurally these mountains consist of a broadly folded anticline that has an erosion resistance quartzite core. The Duchesne River and many other tributaries to the Green River run through this range, as well as the headwaters of the Bear River.

Ecological site concept

The soils on this site were formed in slope alluvium and colluvium from sandstone and quartzite. These soils occur on mountain slopes, are well drained, and have a stony soil surface. The subsoils are extremely stony sandy clay loams. Coarse fragments in the root zone average 41 percent by volume. The permeability is moderate and the available water holding capacity is between 1.5 to 1.9 inches in the upper 40 inches of soil. The pH ranges from 6.6 to 7.8. The soil temperature regime is frigid and the soil moisture regime is ustic.

Associated sites

R047XC461UT	**Mountain Stony Loam (curl-leaf mountain mahogany)**
R047XC430UT	**Mountain Loam (mountain big sagebrush)**
R047XC446UT	**Mountain Shallow Loam (mountain big sagebrush)**
R047XC456UT	**Mountain Stony Loam (antelope bitterbrush)**
R047XC474UT	**Mountain Very Steep Stony Loam (shrub)**

Similar sites

R047XC461UT	**Mountain Stony Loam (curl-leaf mountain mahogany)**
R047XC446UT	**Mountain Shallow Loam (mountain big sagebrush)**
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Cercocarpus montanus* (2) *Amelanchier utahensis*
Herbaceous	(1) *Pseudoroegneria spicata*

Physiographic features

This site is found on mountain slopes at elevations between 7400 and 9000 feet. It is also present on hills with a northern exposure. The slope ranges from 25 to 50 percent with high runoff.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Runoff class	High to very high
Flooding frequency	None
Ponding frequency	None
Elevation	2,256–2,743 m
Slope	25–50%
Aspect	NW, N, NE

Climatic features

The climate is characterized by cool, moist summers and cold, snowy winters. Approximately 60 percent of the moisture comes as rain from May through October. On the average, January through April are the driest months and May through October are the wettest months. The soil moisture regim is ustic and soil temperatures are in the frigid regime.

Table 3. Representative climatic features

Frost-free period (characteristic range)	
Freeze-free period (characteristic range)	50-90 days
Precipitation total (characteristic range)	356-508 mm

Influencing water features

Due to its landscape position, this site is not influenced by streams or wetlands. However, it may be located upslope from these water features.

Wetland description

N/A

Soil features

The soils on this site were formed in slope alluvium and colluvium from sandstone and quartzite. These soils occur on mountain slopes, are well drained, and have a stony soil surface. The subsoils are extremely stony sandy clay loams. Coarse fragments in the root zone average 41 percent by volume. The permeability is moderate and the available water holding capacity is between 1.5 to 1.9 inches in the upper 40 inches of soil. The pH ranges from 6.6 to 7.8. The soil temperature regime is frigid and the soil moisture regime is ustic.

Soils associated with this site:
Soil Survey Area: Soil component (map unit)
Uintah Area (UT047): Flynncove (67, 72)

Modal Soil: Flynncove STX-SL, 25-50% — Loamy-skeletal, siliceous, superactive, frigid Typic Argiustolls

Table 4. Representative soil features

Parent material	(1) Colluvium–quartzite (2) Colluvium–sandstone (3) Slope alluvium–quartzite (4) Slope alluvium–sandstone
Surface texture	(1) Extremely stony loam
Family particle size	(1) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderate
Soil depth	102–152 cm
Surface fragment cover <=3"	20–24%
Surface fragment cover >3"	39–43%
Available water capacity (Depth not specified)	3.81–4.83 cm
Calcium carbonate equivalent (Depth not specified)	0%
Electrical conductivity (Depth not specified)	0 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0
Soil reaction (1:1 water) (Depth not specified)	6.6–7.8
Subsurface fragment volume <=3" (Depth not specified)	22–26%
Subsurface fragment volume >3" (Depth not specified)	39–43%

Ecological dynamics

Ecological Dynamics of the site:
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 detail.

Plant Community Narratives:
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 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 (1.1) within the Reference State would have been a sagebrush-dominated stand with mountain big sagebrush (Artemisia tridentate spp. vaseyana), mountain snowberry (*Symphoricarpos oreophilus*) and associated bunch grasses such as bluebunch wheatgrass (Pseudoroegeneria spicata), Nevada bluegrass (*Poa secunda*) and slender wheatgrass (*Elymus trachycaulus*). Forbs such as Arrowleaf balsamroot (*Balsamorhiza sagittata*), sticky purple geranium (*Geranium viscosissimum*) and fleabane (Erigeron sp.) would be present. Fire is believed to be the dominant disturbance force in natural big sagebrush communities. The reference plant community (1.1) would have been relatively stable with occasional use by wildlife. Following a natural fire (1.1a) and depending on the severity, would have killed most if not all of the sagebrush favoring the sprouting shrubs and bunchgrasses (1.2). Over time and without any further disturbances (1.2a) sagebrush and other non-sprouting shrubs would slowly come back into the site (1.3), however the sprouting shrubs and bunch grasses would still dominate the site. If there were another fire to occur on the site (1.3a) the site would return to community phase 1.2. If community phase 1.3 continued to experience no disturbances over a longer period of time (1.3b) it would eventually show a codominance between mountain big sagebrush and the other shrubs on the site. 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 with perennial grasses and deciduous shrubs.
The least modified plant community within the Reference State would have been a mountain big sagebrush-dominated with associated deciduous shrubs such as mountain snowberry, antelope bitterbrush, serviceberry and associated perennial grasses such as bluebunch wheatgrass and slender wheatgrass. Arrowleaf balsamroot, sticky purple geranium and erigeron sp. would have been the commonly associated forbs. Percent composition would have been 45 percent shrubs, 45 percent grasses and 15 percent forbs.

Community Pathway 1.1a
A naturally occurring fire would have killed all the non-sprouting shrubs like mountain big sagebrush. As the site recovered, it would be converted to the sprouting shrubs with perennial bunchgrasses community.

Community Phase 1.2 Sprouting shrubs with perennial bunch grasses.
Fire is a naturally occurring disturbance on this site and would have kept shrubs like mountain big sagebrush and antelope bitterbrush less dominant. Sprouting shrubs like mountain snowberry and serviceberry and perennial grasses would have become the dominant aspect of this site.

Community Pathway 1.2a
Over time and without the occurrence of a natural disturbance, such as fire, non-sprouting shrubs like mountain big sagebrush, antelope bitterbrush and alderleaf mountain mahogany would become re-established on the site.

Community Phase 1.3 Non-sprouting shrubs start becoming re-established.
Non-sprouting shrubs start becoming re-established from seed over time. Sprouting shrubs and perennial grasses are still the dominant aspect of this site.

Community Pathway 1.3a
In the event that there is another natural disturbance, like a fire, the site would return to the sprouting shrubs with perennial bunch grasses community.

Community Pathway 1.3b
Over time and with the absence of a natural disturbance, like fire, the non-sprouting shrubs will continue becoming more abundant to a point where they are co-dominant with the sprouting shrubs.

T1a: Transition from State 1 to State 2 (Reference State to Current Potential/ Introduced Non-natives State)
The simultaneous introduction of exotic species, both plants and animals, and possible extinctions of native flora and fauna, along with climate change, will cause State 1 to transition to State 2. A return pathway back to State 1 would be impracticable because of these issues.

State 2: Current Potential/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, which can be regarded as the current potential. The least modified plant community (2.1) within State 2 is a sagebrush (Artemisia tridentate spp. vaseyana) dominated state with mountain snowberry (*Symphoricarpos oreophilus*) and associated bunch grasses such as bluebunch wheatgrass (Pseudoroegeneria spicata), Nevada bluegrass (*Poa secunda*) and slender wheatgrass (*Elymus trachycaulus*). Forbs such as Arrowleaf balsamroot (*Balsamorhiza sagittata*), sticky purple geranium (*Geranium viscosissimum*) and fleabane (Erigeron sp.) would be present. A common non-native species in this state is cheatgrass. Fire is believed to be the dominant disturbance force in natural big sagebrush communities. Following brush management or fire (2.1a) and depending on the severity, would have killed most if not all of the sagebrush, and other non-sprouting shrubs, favoring the sprouting shrubs and bunchgrasses (2.2). This plant community is relatively stable under mixed use by wildlife and livestock. However, heavy utilization by bison, elk, horses, and domestic cattle on these sites during the growing season (2.1b) would deplete the grasses and deciduous shrubs creating site that is dominated by mountain big sagebrush (2.3). In community 2.2, when management, such as prescribed grazing, can be combined with time (2.2a) to allow the site to recover returning to community 2.1. However if the community continues to be over utilized by both wildlife and domestic livestock, and possibly in combination with a natural or man caused disturbance (2.2b) this community (2.2) can be degraded to community 2.4 which is dominated by rhizomatous grasses with unpalatable sprouting shrubs and forbs. In community 2.3 when management, such as prescribed grazing coupled with time, (2.3a) the sprouting shrubs and perennial grasses can have an opportunity to recover and recolonize the site and return to community 2.1. In community 2.3, when it experiences a disturbance such as brush management or fire, coupled with management like prescribed grazing (2.3b) it can drive the site to a more stable and diverse community 2.2. However, when community 2.3 continues to be over utilized and this is coupled with a disturbance such as brush management or fire (2.3c) it can drive the site to an undesirable community 2.4.

Community Phase 2.1: Mountain big sagebrush with perennial grasses and deciduous shrubs. Introduced annual species present.
The least modified community within the mountain big sagebrush/deciduous shrub/introduced state. This is a mountain big sagebrush dominated community with an abundance of deciduous shrubs such as mountain snowberry, antelope bitterbrush and serviceberry. Community is also characterized by an abundance of native perennial grasses such as, bluebunch wheatgrass, slender wheatgrass and Nevada bluegrass. Associated forbs on this site may consist of arrowleaf balsamroot, sticky purple geranium and erigeron sp. Introduced species likely to occur on this site are cheatgrass, annual forbs, milkweed and stickseed.

Community Pathway 2.1a
This pathway is characterized by the implementation of brush management, prescribed or natural fire. This will reduce the abundance of non-sprouting shrubs giving the competitive advantage to sprouting shrubs and native perennial grasses (2.2).

Community Pathway 2.1b
Heavy continuous grazing and browsing by wildlife and domestic animals would deplete resources of the deciduous shrubs and native perennial grasses (2.3).

Community Phase 2.2: Sprouting shrubs with perennial grasses with introduced annuals present.
This community represents what the site would look like following brush management or a natural or prescribed fire. Depending on the severity of the fire/management practice, some or all of the non-sprouting shrubs would be killed.

This would open up resources for the sprouting shrubs and native perennial grasses subsequently they would be the dominant aspect of the site.

Community Pathway 2.2a
This pathway represents that over time and under normal climatic conditions, along with prescribed grazing, this community would return to the previous community (2.1).

Community Pathway 2.2b
This pathway represents when the community experiences heavy continuous grazing and browsing by wildlife and domestic animals. Natural disturbances such as fire could also occur simultaneously in this pathway (2.4).

Community Phase 2.3: Depauperate sagebrush with conifers possibly present.
This community represents what the site would look like following a long period of over grazing and browsing. The more palatable species would be heavily utilized giving a competitive advantage to species such as mountain big sagebrush. Over time sagebrush would be the dominant aspect of the site with a low diversity of the other native species that normally occur on the site.

Community Pathway 2.3a
This pathway represents that over time and under normal climatic conditions, along with prescribed grazing, this community would return to the previous community (2.1).

Community Pathway 2.3b
This pathway represents that over time and under normal climatic conditions, along with prescribed grazing along with a natural or prescribed fire or brush management mountain big sagebrush/conifers would be killed. This would stimulate the sprouting shrubs and perennial native grasses moving the site to community 2.2.

Community Pathway 2.3c
This pathway represents the occurrence when the site continues to be overgrazed and there is a disturbance like a fire. Non-sprouting shrubs and conifers, if present, would be killed. Deciduous shrubs and native perennial grasses are already at low diversity and stressed, giving the competitive advantage to rhizomatous grasses and unpalatable sprouting shrubs like rabbitbrush (2.4).

Community Phase 2.4: Rhizomatous grasses with unpalatable sprouting shrubs and forbs with low growing grasses.
This community represents the site when there has been continued overgrazing/browsing for an extended period of time, followed by a disturbance such as a brush management treatment or natural/prescribed fire. Species diversity was already low (2.3). The overutilization of the desirable native vegetation coupled with the fire has reduced the site to unpalatable sprouting shrubs and forbs along with low growing grasses.

Community Pathway 2.4a
This pathway represents that over time, along with prescribed grazing that the sprouting shrubs and native perennial grasses would eventually re-establish and return the site back to community 2.2.

T2a: Transition from State 2 to State 3 (Current Potential to Seeded State)
When land managers or landowners have made the decision that the herbaceous understory species are so depleted and/or undesirable, and the biological, hydrological and soil resources are at risk, introduced and native perennial grasses are utilized in a range seeding. This often occurs in combination with a natural/prescribed fire or other brush management treatment.

State 4: Seeded State:
This State occurs where historic excessive livestock grazing reduced canopy cover, and in an attempt to prevent any additional excessive erosion it was intentionally seeded with species such as smooth brome and/or crested wheatgrass. Do to the decreased canopy cover and increased erosion, and rangeland seeding is utilized, either rangeland drilled or aerial application with predominately introduced species.

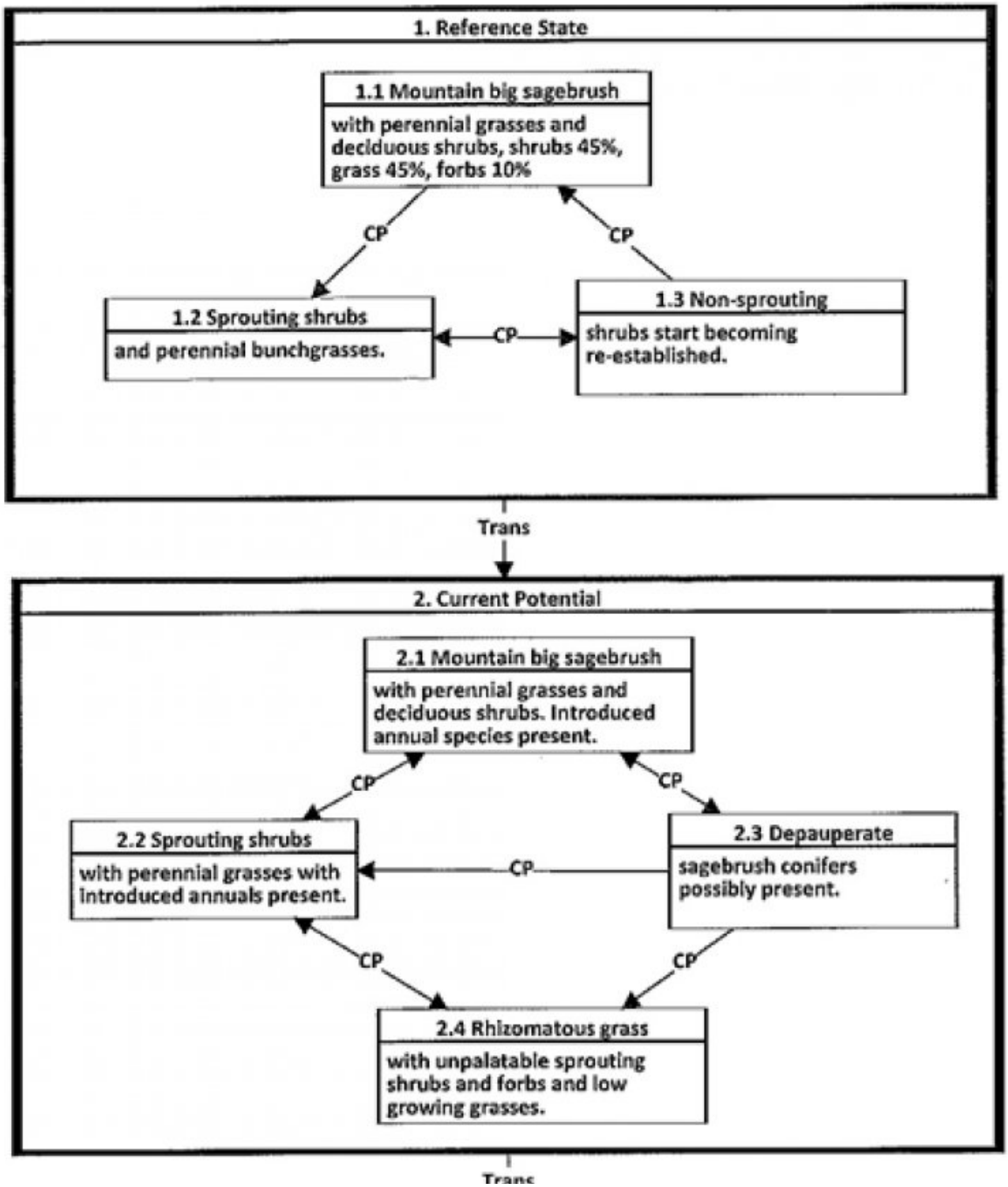
Community Phase 3.1: Range seeding with perennial introduced species.
This community represents a time shortly following a brush management treatment/fire in addition to the range seeding. Non-sprouting shrubs have been greatly reduced and sprouting shrubs have not had adequate time to

become re-established. Introduced and native grass species with a few sprouting shrubs dominate the site.

Community Pathway 3.1a
Over an extended period of time and in combination with prescribed grazing, the native desirable sprouting shrubs begin to become well established.

Community Phase 3.2: Sprouting shrubs becoming co-dominant with perennial grasses.
This community phase represents the site over a 5 to 10 year period of time under normal climatic conditions. The desirable sprouting shrubs have had adequate time to re-establish and become co-dominant with the perennial grasses. Non-sprouting shrubs have also started to re-establish on the site as well. It is imperative that prescribed grazing must be implemented in order for this community to be persist.

State and transition model



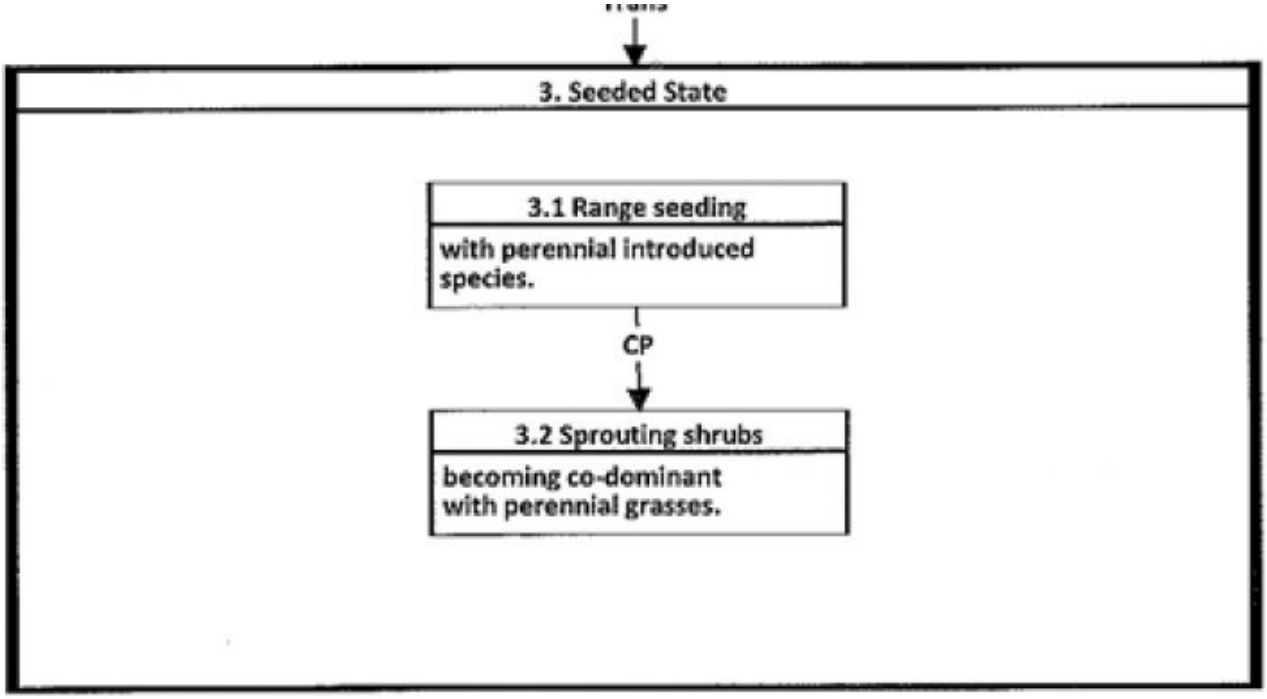


Figure 2. STM

Diagram Legend

T 1-2	Introduced species.
T 2-3	Disturbance with range seeding.
CP 1.1-1.2	Natural disturbance such as fire.
CP 1.2-1.3	Time
CP 1.3-1.1	Time and lack of disturbance.
CP 1.3-1.2	Natural disturbance such as fire.
CP 2.1-2.2	Fire or brush management.
CP 2.1-2.3	Historic over grazing/browsing.
CP 2.2-2.1	Time and with prescribed grazing.
CP 2.2-2.4	Over grazing/browsing with a disturbance like fire.
CP 2.3-2.1	Time with prescribed grazing.
CP 2.3-2.2	Disturbance with prescribed grazing.
CP 2.3-2.4	Continued overgrazing and a disturbance like fire.
CP 2.4-2.2	Time with prescribed grazing.
CP 3.1-3.2	Time with prescribed grazing.

Figure 3. Legend

State 1

Reference State

Community 1.1
Reference Plant Community

The general view of this site is birchleaf mountainmahogany and Utah serviceberry. The composition by air-dry weight is approximately 30 percent perennial grasses, 10 percent forbs, and 60 percent shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	908	1244	1715
Grass/Grasslike	454	622	857
Forb	151	207	286
Total	**1513**	**2073**	**2858**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	49-51%
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 (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	–
>0.15 <= 0.3	–	–	–	4-6%
>0.3 <= 0.6	–	49-51%	19-21%	–
>0.6 <= 1.4	–	–	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)

Shrub/Vine					
0	**Dominant Shrubs**			1042–1384	
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	426–532	–
	Utah serviceberry	AMUT	*Amelanchier utahensis*	426–532	–
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	64–106	–
	chokecherry	PRVI	*Prunus virginiana*	64–106	–
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	64–106	–
3	**Sub-Dominant Shrubs**			297–577	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	64–106	–
	curl-leaf mountain mahogany	CELE3	*Cercocarpus ledifolius*	21–43	–
	yellow rabbitbrush	CHVIL4	*Chrysothamnus viscidiflorus ssp. lanceolatus*	21–43	–
	shortstem buckwheat	ERBR5	*Eriogonum brevicaule*	21–43	–
	rockspirea	HODU	*Holodiscus dumosus*	21–43	–
	creeping barberry	MARE11	*Mahonia repens*	21–43	–
	Oregon boxleaf	PAMY	*Paxistima myrsinites*	21–43	–
	littleleaf mock orange	PHMI4	*Philadelphus microphyllus*	21–43	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	21–43	–
	wax currant	RICE	*Ribes cereum*	21–43	–
	Woods' rose	ROWO	*Rosa woodsii*	21–43	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	21–43	–
Grass/Grasslike					
0	**Dominant Grasses**			224–336	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	106–213	–
	Geyer's sedge	CAGE2	*Carex geyeri*	64	–
	Sandberg bluegrass	POSE	*Poa secunda*	64	–
1	**Sub-Dominant Grasses**			404–813	
	Grass, annual	2GA	*Grass, annual*	106–213	–
	Grass, perennial	2GP	*Grass, perennial*	106–213	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	21–43	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	21–43	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	21–43	–
	mountain brome	BRMA4	*Bromus marginatus*	21–43	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	21–43	–
	needle and thread	HECO26	*Hesperostipa comata*	21–43	–
	basin wildrye	LECI4	*Leymus cinereus*	21–43	–
	western wheatgrass	PASM	*Pascopyrum smithii*	21–43	–
Forb					
0	**Dominant Forbs**			62–106	
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	64–106	–
1	**Sub-Dominant Forbs**			168–280	
	Forb, annual	2FA	*Forb, annual*	64–106	–
	Forb, perennial	2FP	*Forb, perennial*	64–106	–

	nodding onion	ALCE2	*Allium cernuum*	21–43	–
	littleleaf pussytoes	ANMI3	*Antennaria microphylla*	21–43	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	21–43	–
	Wyoming Indian paintbrush	CALI4	*Castilleja linariifolia*	21–43	–
	Eaton's fleabane	EREA	*Erigeron eatonii*	21–43	–
	scarlet gilia	IPAGA3	*Ipomopsis aggregata ssp. aggregata*	21–43	–
	fernleaf biscuitroot	LODI	*Lomatium dissectum*	21–43	–
	longleaf phlox	PHLO2	*Phlox longifolia*	21–43	–
	lambstongue ragwort	SEIN2	*Senecio integerrimus*	21–43	–
	baby goldenrod	SONA	*Solidago nana*	21–43	–
	Pacific aster	SYCHC	*Symphyotrichum chilense var. chilense*	21–43	–

Animal community

This site provides forage and browse for sheep and cattle in the spring, summer, and fall.

The plants offer food and cover for many species of wildlife. Wildlife species using this site include sage grouse, rabbit, coyote, mule deer and elk.

Hydrological functions

The soils series are in hydrologic group B and the hydrologic curve number is 61 when the vegetation is in good condition.

Recreational uses

This site offers color and aesthetic appeal in the spring, summer and fall. Recreation activities include hiking and hunting.

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

Alexander, R. R. 1985. Major habitat types, community types, and plant communities in the Rocky Mountains. USDA- Forest Service Rocky Mountain Forest and Range Experiment Station. General technical report RM-123. 105p.

Alexander 1988. Forest vegetation on National Forests in the Rocky Mountain and Intermountain Regions: Habitat types and community types. USDA- Forest Service Rocky Mountain Forest and Range Experiment Station. General technical report RM-162. 47p.

Galatowitsch, S.M. 1990. Using the original land survey notes to reconstruct pre-settlement landscapes in the American West. Great Basin Naturalist: 50(2): 181-191. Keywords: [Western U.S., conservation, history, human impact]

Parson, R. E. 1996. A History of Rich County. Utah State Historical Society, County Commission, Rich County, Utah. Keywords: [Rich County, Utah, Historic land use, European settlements]

USDA-NRCS. 2003. National Range and Pasture Handbook. in USDA, editor, USDA-Natural Resources Conservation Service-Grazing Lands Technology Institute. Keywords: [Western US, Federal guidelines, Range pasture management]

Western Regional Climate Center, Western U.S. Climate Historical Summaries. Available at: http://www.wrcc.dri.edu/summary/Climsmut.html. Accessed 15 June 2009.

Web Soil Survey, Official Soil Series Descriptions. Available at: http://soils.usda.gov/technical/classification/osd/index.html. Accessed 15 June 2009.

Contributors

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Approval

Sarah Quistberg, 2/11/2025

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

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Date	11/15/2012
Approved by	Sarah Quistberg
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rare to Slight. Slight rill development may occur in exposed areas, on steeper slopes (> 20%) and/or on areas located below exposed bedrock or other water shedding areas where increased runoff may occur. Where rills are present, they should be fairly short (4-8 feet), < 1 inch deep and somewhat widely spaced (5-10 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:** Slight. Some 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 25% - 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 under the plant canopies, and a rating of 4 to 5 in the interspaces. The average rating should be a 5. 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):** (Flynncove) Soil surface 0-3 inches. Texture is a cobbly loam; color is brown (7.5YR 4/2); and structure is moderate very fine granular. Mollic epipedon ranges to 15 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 protect the soil surface from splash erosion and encourage higher infiltration. Bare spaces are expected to be small and irregular in shape and usually not connected. Vegetative structure and distribution are 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 such as long-term drought, insect damage, etc., runoff is likely to increase and infiltration be reduced.

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 may have natural textural variability within their profiles, including changes in clay content, these should not be mistaken for a compaction pan.

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: Sprouting shrubs (alderleaf mountain mahogany, Utah serviceberry) > Non-sprouting shrub (mountain big sagebrush) = > Perennial bunchgrasses (bluebunch wheatgrass, Nevada bluegrass) > Rhizomatous Grasses (western wheatgrass).

    Sub-dominant: Perennial bunchgrasses & grasslikes (Letterman needlegrass, Geyer sedge) > Sprouting shrubs (green rabbitbrush, mountain snowberry) > 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 40 to 60+ 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.

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.

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 2 inches would be considered normal. Perennial vegetation should be well distributed on the site.

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 1800 - 1900 #/acre on an average year but could range from 1300 - 2600 #/acre during periods of prolonged drought or above average precipitation.

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.

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.