USDA Natural Resources
Conservation Service

Ecological site R048AY334UT
Upland Stony Loam (basin big sagebrush-saline wildrye)

Last updated: 2/22/2022
Accessed: 05/10/2025

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.

MLRA notes

Major Land Resource Area (MLRA): 048A–Southern Rocky Mountains

This ecological site occurs in the Uintah Basin Section of the Southern Rocky Mountain Provence which extends westward into Utah. Mountains in this area are mostly crustal uplifts that formed in the Cretaceous and Tertiary periods. Alluvial fans at the base of these mountains are recharge zones for local aquifers.

Associated sites

R048AY366UT	**Upland Very Steep Loam (Salina Wildrye)**
F048AY330UT	**Upland Shallow Stony Loam (Two-Needle Pinyon /Douglas Fir)**
R048AY322UT	**Upland Shallow Loam (Two-Needle Pinyon / Utah Juniper)**
R048AY443UT	**Mountain Shallow Loam (Mixed Conifer)**

Similar sites

R048AY366UT	**Upland Very Steep Loam (Salina Wildrye)**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. tridentata* (2) *Atriplex confertifolia*
Herbaceous	(1) *Leymus salinus*

Physiographic features

This ecological site typically occurs on steep draw sides and hill slopes, structural benches slopes, and on escarpments and ledges. Slope, aspect and elevation influence the vegetative floristics of this ecological site. Sites are located located between 6,200 to 7,800 feet in elevation. Slopes normally range from 50 to 80 percent but may ccasionally be steeper.

Table 2. Representative physiographic features

Landforms	(1) Draw (2) Structural bench (3) Hill
Flooding frequency	None

Ponding frequency	None
Elevation	6,300–7,800 ft
Slope	50–85%
Water table depth	0 in
Aspect	N, NE, NW

Climatic features

The climate of this site is dry subhumid and semiarid. It is characterized by cold, snowy winters and warm, dry summers. The average annual precipitation ranges from 11 to 15 inches. July, August, and October are typically the wettest months with June being the driest. The most reliable sources of moisture for plant growth are the snow that accumulates over the winter and spring rains. Summer thunderstorms are intermittent and sporadic in nature, and thus, are not reliable sources of moisture to support vegetative growth on this site. The mean annual air temperature ranges from 42 to 45 degrees.

Table 3. Representative climatic features

Frost-free period (average)	131 days
Freeze-free period (average)	158 days
Precipitation total (average)	14 in

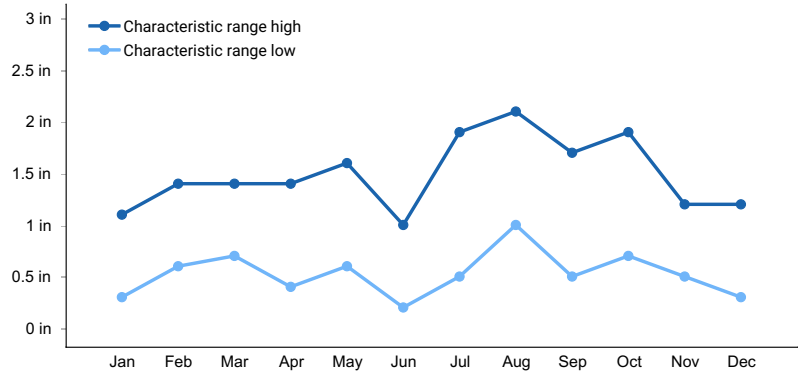


Figure 1. Monthly precipitation range

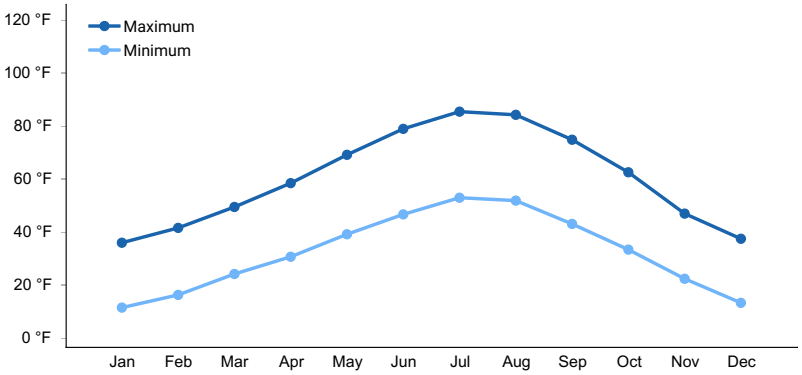


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features on this site.

Soil features

This site occurs on deep, well drained soils. The dry surface layer color is typically a dark grayish brown and the

surface soil texture is a boulderly sandy loam. These soils are moderately well developed and have moderate water holding capacities. Soil temperature regime is frigid and moisture regime is ustic.

This site has been used in the following soils surveys and has been correlated to the following components:

UT013—Duchesne: Dancehall; Tabyago (Deep).
UT653-Uintah and Ouray Indian Reservation: Dancehall; Tabyago (Deep).

Typical Soil Profile: (Dancehall).
A—0-6 inches; boulderly sandy loam; very slightly effervescent; finely disseminated calbonates; slightly alkaline.
C1—6-11 inches; loam; strongly effervescent; finely disseminated calbonates; moderately alkaline.
C2-11-26 inches; very boulderly loam; strongly effervescent; disseminated calconates; moderately alkaline.
C3-26-34 inches; very boulderly loam; strongly effervescent; disseminated calconates; moderately alkaline.
C4-34-60 inches; very gravelly sandy loam; strongly effervescent; disseminated calconates; moderately alkaline.

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone and shale
Surface texture	(1) Very channery fine sandy loam (2) Bouldery sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid
Soil depth	60 in
Surface fragment cover <=3"	0–30%
Surface fragment cover >3"	35–60%
Available water capacity (0-40in)	3.4–3.9 in
Calcium carbonate equivalent (0-40in)	0–20%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0–1
Soil reaction (1:1 water) (0-40in)	7.9–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–50%
Subsurface fragment volume >3" (Depth not specified)	0–70%

Ecological dynamics

This site developed under the Uintah Basin Section of the Southern Rocky Mountain Provence ecological conditions and the natural influences of herbivory, fire and climate. This site occurs on very steep (50 to 85%) slopes with an aspect that is typically northeasterly. It is usually found directly below vertical canyon rims and above valley floors. Species composition is generally dominated by basin big sagebrush. Wyoming big sagebrush, shadscale and slender buckwheat are other common shrub species. Salina wildrye is the dominant herbaceous species with Indian ricegrass and bluebunch wheatgrass commonly occurring.

This sites extremely stony and/or gravelly soils combined with its steep slopes limit its availability for livestock grazing. Grazing is usually limited to the sites lower slopes and a grazing limit line is often visable along most hillsides. Plant community phases described to date can often be observed by hiking from the bottom to the top a

sidehill anywhere this site is found.

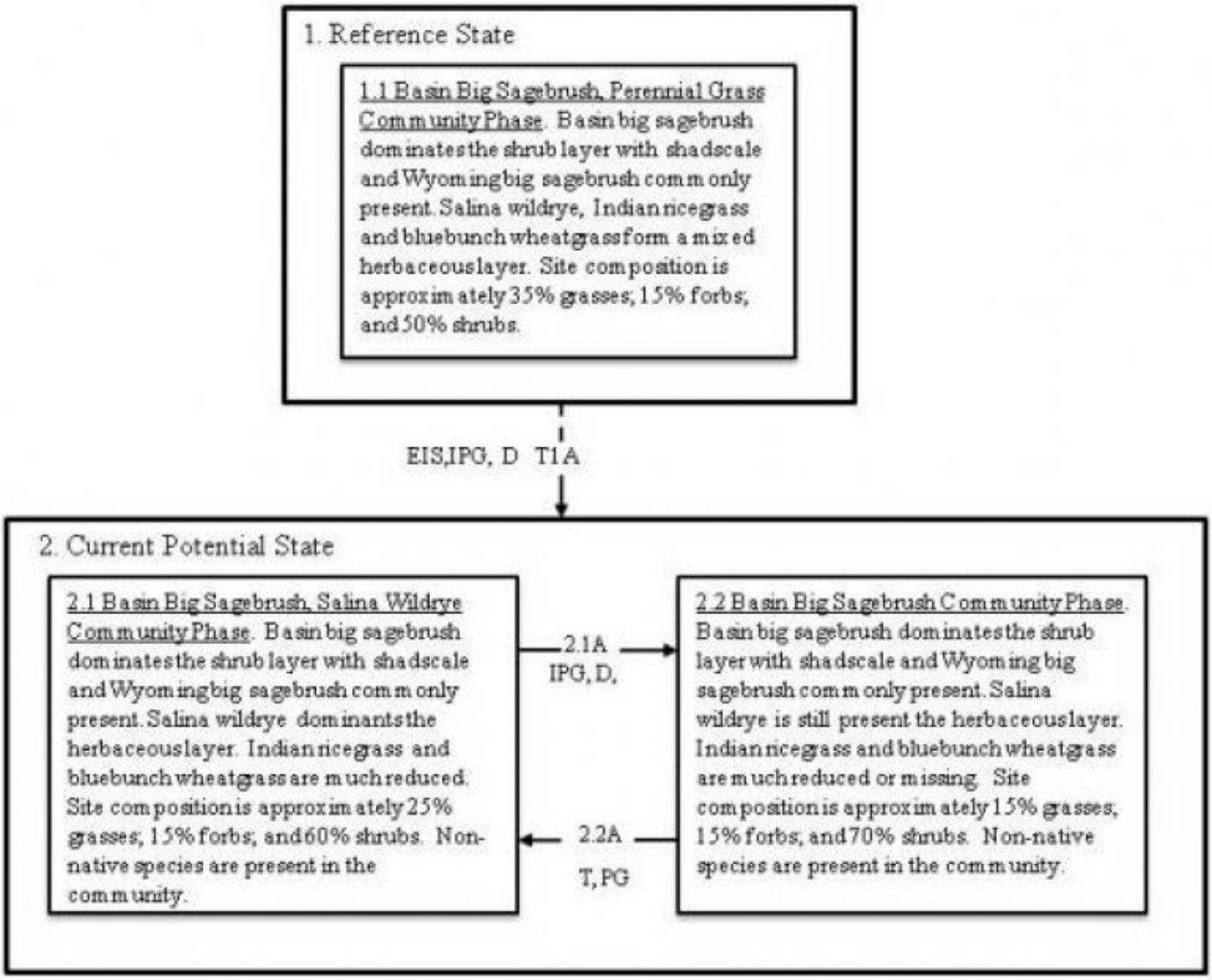
Evidence indicates that this site historically maintained a fairly long burn cycle (100 years or more). Following a fire, sagebrush species are removed or much reduced and Salina wildrye and other herbaceous species will dominate the site for a period of years. Over time basin and Wyoming sagebrush will once again dominate the community.

As vegetative communities respond to changes caused by natural or manmade events that cause them to cross ecological thresholds, a return to previous states may not be possible. The amount of effort needed to affect desired vegetative shifts depends on a sites present biotic and abiotic features and the desired results.

The following State and Transition diagram depicts the most common plant communities found on this ecological site. It does not necessarily depict all the plant communities that can occur, but does show the most prevalent and repeatable. As more data are collected, some of these plant communities may be revised or removed, and new ones added. These descriptions capture the current knowledge and experience at the time of this revision.

State and transition model

State and Transition Model
State: Utah
Site Type: Rangeland
MLRA: D-48A - Southern Rocky Mountain Province, Uintah Basin Extension.
R048AY334UT – Upland Stony Loam (Basin Big Sagebrush, Salina Wildrye).



Legend:
D=Drought
T=Time.
EIS = Establishment of invasive species.
PG=Proper Livestock Grazing.
IPG = Improper Livestock Grazing.

State 1

Reference State

This state describes the biotic communities that may become established on this ecological site if all successional sequences are completed under natural disturbance conditions. The reference state has a well developed shrub layer with basin big sagebrush often dominating. Wyoming big sagebrush, shadscale and slender buckwheat are other common shrub species. Salina wildrye is the dominant herbaceous species with Indian ricegrass and bluebunch wheatgrass commonly found also. Other native grasses, forbs, and shrubs may produce significant composition in the plant community. This site occurs on very steep (50 to 85%) slopes with an aspect that is typically northeasterly. It is usually found directly below vertical canyon rims and above valley floors. Its soils are extremely stony and/or gravelly, somewhat limiting site production. The primary disturbance mechanisms are shrub layer density, weather fluctuation, and fire. The reference state is self sustaining and resistant to change due to a high resistance to natural disturbances and a high resilience following those disturbances. When natural disturbances occur, the rate of recovery can be quite variable. Reference State: Plant communities influenced by shrub canopy density, long term weather fluctuations, and periodic fire. Indicators: A community dominated by basin big sagebrush and Salina wildrye. The density of the shrub canopy determines the amount and composition of the other native perennial grasses and forbs that may be present. Feedbacks: Natural fluctuations in weather patterns that allow for a self sustaining shrub and native grass community. Prolonged drought, more frequent fires, or other disturbances that may allow for the establishment of invasive species. At-risk Community Phase: All communities are at risk when native plants are stressed and nutrients become available for invasive plants to establish. Trigger: The establishment of invasive plant species.

Community 1.1
Basin Big Sagebrush, Perennial Grass Community Phase.

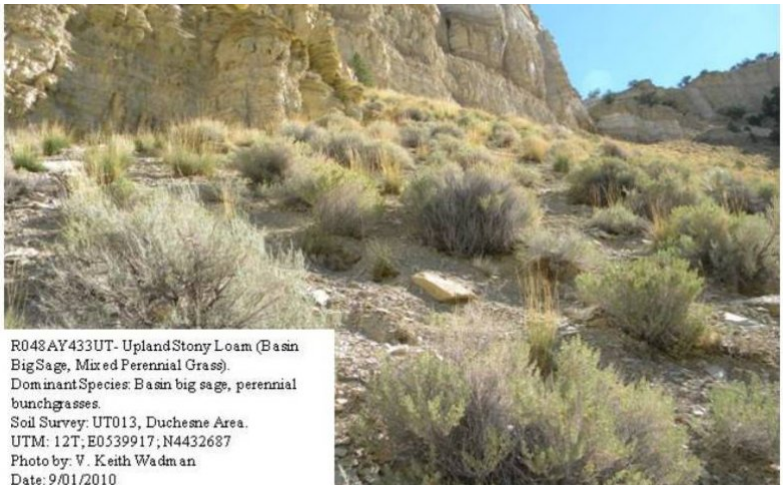


Figure 3. Community Phase 1.1

This community phase is characterized by a shrub layer often dominated by basin big sagebrush. Wyoming big sagebrush, shadscale and slender buckwheat are other common shrubs. Salina wildrye is typically the dominant grass. Other commonly occurring grasses include Indian ricegrass, and bluebunch wheatgrass. Other perennial grasses, shrubs, and forbs are also often present. Air dry composition of this site is approximately 15 percent forbs, 35 percent grasses, and 50 percent shrubs. Bare ground is variable (2-20%) depending on biological crust cover, (1-5%) and surface rock fragments (40-60%). Biological crust is typically madeup of cyanobacteria. The following tables provide an example the typical vegetative floristics of a community phase 1.1 plant community.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	200	275	325
Grass/Grasslike	175	225	250
Forb	75	100	125
Total	**450**	**600**	**700**

Table 6. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	35-50%
Grass/grasslike foliar cover	25-30%
Forb foliar cover	15-20%
Non-vascular plants	0%
Biological crusts	0%
Litter	5-10%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	30-50%

State 2
Current Potential State

The Current Potential State is similar to the Reference Sate except that non-native species are now present. This state describes the plant communities that may become established on this ecological site if all successional sequences are completed under natural disturbance conditions. This state has a well developed shrub layer with basin big sagebrush often dominating. Wyoming big sagebrush, shadscale and slender buckwheat are other common shrub species. Salina wildrye is the dominant herbaceous species with Indian ricegrass and bluebunch wheatgrass commonly found also. Other native grasses, forbs, and shrubs may produce significant composition in the plant community. Cheatgrass, alyssum, and other non-native species are present on the site especially along its lower slopes. This site occurs on very steep (50 to 85%) slopes with an aspect that is typically northeasterly. It is usually found directly below vertical canyon rims and above valley floors. Its soils are extremely stony and/or gravelly, somewhat limiting site production. The primary disturbance mechanisms are shrub layer density, the amount of invasive species present, weather fluctuation, and fire. The current potential state is still self sustaining but may be losing its resistance to change due to a lowered resistance to natural disturbances and less resilience following those disturbances. When natural disturbances occur, the rate of recovery can be quite variable. Reference State: Plant communities influenced by shrub canopy density, long term weather fluctuations, and periodic fire. Indicators: A community dominated by basin big sagebrush and Salina wildrye. The density of the shrub canopy determines the amount and composition of the other native and introduced grasses and forbs that may be present. Feedbacks: Natural fluctuations in weather patterns that allow for a self sustaining shrub and native grass community. Prolonged drought, more frequent fires, or other disturbances that may allow for the increase of invasive species. At-risk Community Phase: All communities are at risk when native plants are stressed and nutrients become available for invasive plants to increase. Trigger: The establishment of invasive plant species. Few disturbed sites have been located to date and so little data exists regarding them.

Community 2.1
Basin Big Sagebrush, Salina Wildrye Community Phase.

Figure 5. Community Phase 2.1

Figure 6. Community Phase 2.1

This community phase is characterized by a shrub layer often dominated by basin big sagebrush. Wyoming big sagebrush, shadscale and slender buckwheat are other common shrubs. Salina wildrye is typically the dominant grass. Other grasses include Indian ricegrass, and bluebunch wheatgrass are still present but may be somewhat reduced. Non-native grasses and forbs are present on site including cheatgrass, alyssum and various mustards. Other grasses, shrubs, and forbs are also often present. Air dry composition of this site is approximately 15 percent forbs, 25 percent grasses, and 60 percent shrubs. Bare ground is variable (2-20%) depending on biological crust cover, (1-5%) and surface rock fragments (40-60%). Biological crust is typically madeup of cyanobacteria. The following tables provide an example the typical vegetative floristics of a community phase 2.1 plant community.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	200	275	325
Grass/Grasslike	175	225	250
Forb	75	100	125
Total	**450**	**600**	**700**

Table 8. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	35-50%
Grass/grasslike foliar cover	25-30%
Forb foliar cover	15-20%
Non-vascular plants	0%

Biological crusts	0%
Litter	2-5%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	30-50%

Community 2.2
Basin Big Sagebrush Community Phase.

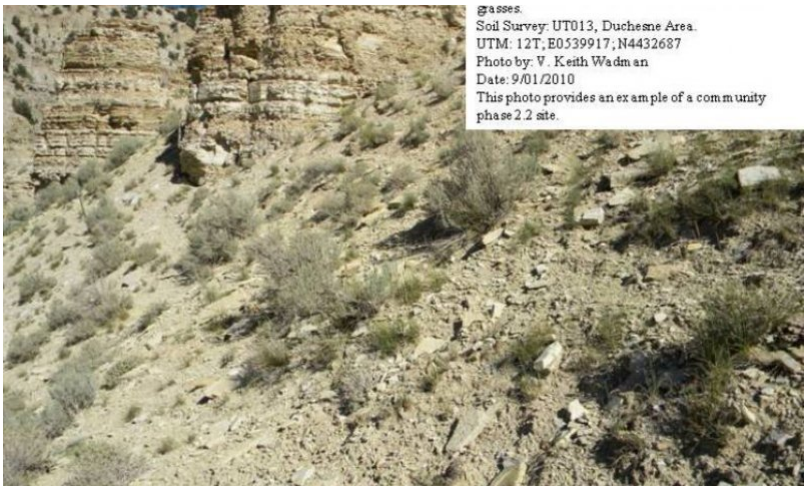


Figure 8. Community Phase 2.2

This community phase is characterized by a shrub layer often dominated by basin big sagebrush. Wyoming big sagebrush, shadscale and slender buckwheat are other common shrubs. Salina wildrye is present in small amounts. Other grasses include Indian ricegrass, and bluebunch wheatgrass are reduced or missing. Non-native species including cheatgrass, alyssum, and various mustards are present and may dominate the site. Other perennial grasses, shrubs, and forbs are present in various amounts. Air dry composition of this site is approximately 15 percent forbs, 15 percent grasses, and 70 percent shrubs. Bare ground is variable (2-20%) depending on biological crust cover, (1-5%) and surface rock fragments (40-60%). Biological crust is typically madeup of cyanobacteria. The following tables provide an example the typical vegetative floristics of a community phase 2.2 plant community.

Table 9. Annual production by plant type

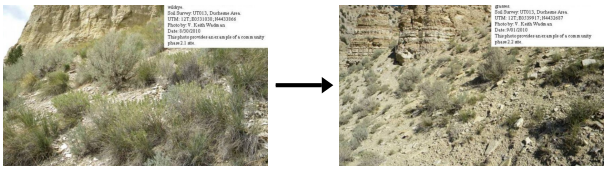
Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	200	275	325
Grass/Grasslike	175	225	250
Forb	75	100	125
Total	**450**	**600**	**700**

Table 10. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	50-60%
Grass/grasslike foliar cover	10-15%
Forb foliar cover	15-20%
Non-vascular plants	0%

Biological crusts	0%
Litter	2-5%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	30-50%

Pathway 2.1A
Community 2.1 to 2.2

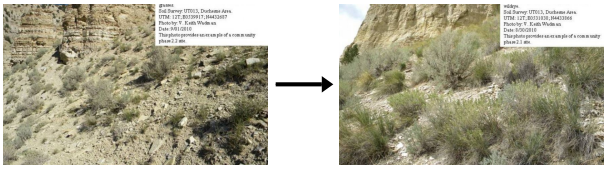


Basin Big Sagebrush, Salina Wildrye Community Phase.

Basin Big Sagebrush Community Phase.

This community pathway occurs when drought and/or long term improper livestock grazing reduces native perennial grasses and allows shrubs to increase. Non-native species often increase and may dominate the herbaceous layer.

Pathway 2.2A
Community 2.2 to 2.1



Basin Big Sagebrush Community Phase.

Basin Big Sagebrush, Salina Wildrye Community Phase.

This community pathway occurs when normal or wet weather pattern combined with carefully managed livestock grazing allows native perennial grasses to increase. Non-native species remain but become less dominant on the site.

Transition T1A
State 1 to 2

This transitional pathway occurs when drought and/or improper livestock grazing causes the perennial herbaceous community to become significantly reduced allowing non-native species such as cheatgrass, alyssum, Russian thistle and other invasive weeds to become established. Broom snakeweed may also increase during this time. Once invasive species occupy the site, a threshold has been crossed. Cheatgrass has been known to become established in healthy communities on this site, however.

Additional community tables

Table 11. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant Grasses**			150–200	
	saline wildrye	LESA4	*Leymus salinus*	100–125	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	60–90	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	60–90	–

	Indian ricegrass	ACHY	*Achnatherum hymenoides*	60–90	
2	**Sub-Dominant Grasses**			100–140	
	blue grama	BOGR2	*Bouteloua gracilis*	20–40	–
	squirreltail	ELEL5	*Elymus elymoides*	20–40	–
	James' galleta	PLJA	*Pleuraphis jamesii*	20–40	–
	Sandberg bluegrass	POSE	*Poa secunda*	20–40	–
Forb					
3	**Forbs**			60–90	
	low pussytoes	ANDI2	*Antennaria dimorpha*	10–20	–
	Holboell's rockcress	ARHO2	*Arabis holboellii*	10–20	–
	woollypod milkvetch	ASPU9	*Astragalus purshii*	10–20	–
	aridland goosefoot	CHDE	*Chenopodium desiccatum*	10–20	–
	narrowstem cryptantha	CRGR3	*Cryptantha gracilis*	10–20	–
	roundspike cryptantha	CRHU2	*Cryptantha humilis*	10–20	–
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	10–20	–
	scarlet gilia	IPAG	*Ipomopsis aggregata*	10–20	–
	hoary tansyaster	MACA2	*Machaeranthera canescens*	10–20	–
	rock goldenrod	PEPU7	*Petradoria pumila*	10–20	–
	Whipple's penstemon	PEWH	*Penstemon whippleanus*	10–20	–
	spiny phlox	PHHO	*Phlox hoodii*	10–20	–
	longleaf phlox	PHLO2	*Phlox longifolia*	10–20	–
	basindaisy	PLIN7	*Platyschkuhria integrifolia*	10–20	–
	woolly plantain	PLPA2	*Plantago patagonica*	10–20	–
	stemless mock goldenweed	STAC	*Stenotus acaulis*	10–20	–
	longstalk clover	TRLO	*Trifolium longipes*	10–20	–
	American vetch	VIAM	*Vicia americana*	10–20	–
Shrub/Vine					
4	**Dominant Shrubs**			125–225	
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	100–150	–
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	60–90	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	60–90	–
5	**Sub-Dominant Shrubs**			80–120	
	prairie sagewort	ARFR4	*Artemisia frigida*	10–20	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	10–20	–
	mormon tea	EPVI	*Ephedra viridis*	10–20	–
	slender buckwheat	ERMI4	*Eriogonum microthecum*	10–20	–
	spiny hopsage	GRSP	*Grayia spinosa*	10–20	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	10–20	–
	rockspirea	HODU	*Holodiscus dumosus*	10–20	–
	Mexican cliffrose	PUME	*Purshia mexicana*	10–20	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	10–20	–
	blue elderberry	SANIC5	*Sambucus nigra ssp. cerulea*	10–20	–
	narrowleaf yucca	YUAN2	*Yucca angustissima*	10–20	–

Table 12. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant Grasses**			150–200	
	saline wildrye	LESA4	*Leymus salinus*	100–125	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	40–60	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	40–60	–
2	**Sub-Dominant Grasses**			100–140	
	blue grama	BOGR2	*Bouteloua gracilis*	20–40	–
	cheatgrass	BRTE	*Bromus tectorum*	20–40	–
	squirreltail	ELEL5	*Elymus elymoides*	20–40	–
	James' galleta	PLJA	*Pleuraphis jamesii*	20–40	–
	Sandberg bluegrass	POSE	*Poa secunda*	20–40	–
Forb					
3	**Forbs**			60–90	
	desert madwort	ALDE	*Alyssum desertorum*	10–20	–
	annual ragweed	AMAR2	*Ambrosia artemisiifolia*	10–20	–
	low pussytoes	ANDI2	*Antennaria dimorpha*	10–20	–
	Holboell's rockcress	ARHO2	*Arabis holboellii*	10–20	–
	woollypod milkvetch	ASPU9	*Astragalus purshii*	10–20	–
	aridland goosefoot	CHDE	*Chenopodium desiccatum*	10–20	–
	narrowstem cryptantha	CRGR3	*Cryptantha gracilis*	10–20	–
	roundspike cryptantha	CRHU2	*Cryptantha humilis*	10–20	–
	herb sophia	DESO2	*Descurainia sophia*	10–20	–
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	10–20	–
	scarlet gilia	IPAG	*Ipomopsis aggregata*	10–20	–
	African mustard	MAAF	*Malcolmia africana*	10–20	–
	hoary tansyaster	MACA2	*Machaeranthera canescens*	10–20	–
	rock goldenrod	PEPU7	*Petradoria pumila*	10–20	–
	Whipple's penstemon	PEWH	*Penstemon whippleanus*	10–20	–
	spiny phlox	PHHO	*Phlox hoodii*	10–20	–
	longleaf phlox	PHLO2	*Phlox longifolia*	10–20	–
	basindaisy	PLIN7	*Platyschkuhria integrifolia*	10–20	–
	woolly plantain	PLPA2	*Plantago patagonica*	10–20	–
	Russian thistle	SAKA	*Salsola kali*	10–20	–
	tall tumblemustard	SIAL2	*Sisymbrium altissimum*	10–20	–
	stemless mock goldenweed	STAC	*Stenotus acaulis*	10–20	–
	longstalk clover	TRLO	*Trifolium longipes*	10–20	–
	American vetch	VIAM	*Vicia americana*	10–20	–
Shrub/Vine					
4	**Dominant Shrubs**			125–225	
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	100–150	–

	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	60–90	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	60–90	–
5	**Sub-Dominant Shrubs**			80–120	
	prairie sagewort	ARFR4	*Artemisia frigida*	10–20	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	10–20	–
	mormon tea	EPVI	*Ephedra viridis*	10–20	–
	slender buckwheat	ERMI4	*Eriogonum microthecum*	10–20	–
	spiny hopsage	GRSP	*Grayia spinosa*	10–20	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	10–20	–
	rockspirea	HODU	*Holodiscus dumosus*	10–20	–
	Mexican cliffrose	PUME	*Purshia mexicana*	10–20	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	10–20	–
	blue elderberry	SANIC5	*Sambucus nigra ssp. cerulea*	10–20	–
	narrowleaf yucca	YUAN2	*Yucca angustissima*	10–20	–

Table 13. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant Grasses**			100–120	
	saline wildrye	LESA4	*Leymus salinus*	40–60	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	20–30	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	20–30	–
2	**Sub-Dominant Grasses**			60–80	
	cheatgrass	BRTE	*Bromus tectorum*	100–150	–
	squirreltail	ELEL5	*Elymus elymoides*	10–20	–
	James' galleta	PLJA	*Pleuraphis jamesii*	10–20	–
	Sandberg bluegrass	POSE	*Poa secunda*	10–20	–
	blue grama	BOGR2	*Bouteloua gracilis*	10–20	–
Forb					
3	**Forbs**			60–90	
	desert madwort	ALDE	*Alyssum desertorum*	10–20	–
	annual ragweed	AMAR2	*Ambrosia artemisiifolia*	10–20	–
	low pussytoes	ANDI2	*Antennaria dimorpha*	10–20	–
	Holboell's rockcress	ARHO2	*Arabis holboellii*	10–20	–
	woollypod milkvetch	ASPU9	*Astragalus purshii*	10–20	–
	aridland goosefoot	CHDE	*Chenopodium desiccatum*	10–20	–
	narrowstem cryptantha	CRGR3	*Cryptantha gracilis*	10–20	–
	roundspike cryptantha	CRHU2	*Cryptantha humilis*	10–20	–
	herb sophia	DESO2	*Descurainia sophia*	10–20	–
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	10–20	–
	scarlet gilia	IPAG	*Ipomopsis aggregata*	10–20	–
	African mustard	MAAF	*Malcolmia africana*	10–20	–

	noary tansyaster	MACA2	*Machaeranthera canescens*	10–20	–
	spiny phlox	PHHO	*Phlox hoodii*	10–20	–
	longleaf phlox	PHLO2	*Phlox longifolia*	10–20	–
	basindaisy	PLIN7	*Platyschkuhria integrifolia*	10–20	–
	woolly plantain	PLPA2	*Plantago patagonica*	10–20	–
	Russian thistle	SAKA	*Salsola kali*	10–20	–
	tall tumblemustard	SIAL2	*Sisymbrium altissimum*	10–20	–
	stemless mock goldenweed	STAC	*Stenotus acaulis*	10–20	–
	longstalk clover	TRLO	*Trifolium longipes*	10–20	–
	American vetch	VIAM	*Vicia americana*	10–20	–
	rock goldenrod	PEPU7	*Petradoria pumila*	10–20	–
	Whipple's penstemon	PEWH	*Penstemon whippleanus*	10–20	–
Shrub/Vine					
4	**Dominant Shrubs**			200–325	
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	150–200	–
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	100–120	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	80–100	–
5	**Sub-Dominant Shrubs**			80–120	
	prairie sagewort	ARFR4	*Artemisia frigida*	10–20	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	10–20	–
	mormon tea	EPVI	*Ephedra viridis*	10–20	–
	slender buckwheat	ERMI4	*Eriogonum microthecum*	10–20	–
	spiny hopsage	GRSP	*Grayia spinosa*	10–20	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	10–20	–
	rockspirea	HODU	*Holodiscus dumosus*	10–20	–
	Mexican cliffrose	PUME	*Purshia mexicana*	10–20	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	10–20	–
	blue elderberry	SANIC5	*Sambucus nigra ssp. cerulea*	10–20	–
	narrowleaf yucca	YUAN2	*Yucca angustissima*	10–20	–

Animal community

--Wildlife Interpretation--
The very steep slopes and scarcity of water on this site limits its species richness and the abundance of large mammals. It does provide limited browsing opportunities for mule deer and elk. Birds, bats, lizards, snakes and rodents are quite common. Several species of birds can be found using this site. Golden eagles and red-tailed hawks are common as well as great horned-owls. Other species typical of mixed forest areas including black-chinned and rufous hummingbirds, several fly catchers, wood peckers, and corvids will use this site for nesting and foraging. Several species of rodents occupy this site including desert cottontail, black tailed jack rabbit, Colorado chipmunk, white–tailed Antelope squirrel, Apache pocket mouse, and several species of Peromyscus. Bats (Myotis, Pipisturellus, and others) can be observed in this ecological site, but are likely limited to areas near water or canyons.

--Grazing Interpretations—
This sites plant community primarily consists of a shrub, perennial bunchgrass community growing on very steep slopes. Common shrubs include Wyoming and basin big sagebrush, shadscale and bastard sage. Grasses include Salina wildrye, Indian ricegress and bluebunch wheatgrass.

This sites very steep slopes seriously limit its use for livestock grazing. Its lack natural perennial water sources also reduces its suitability. A grazing extent line is often evident where livestock are not able to reach the sites higher slopes. Mule deer and Rocky Mountain Elk often utilize this site, and wildlife browsing on palatable shrub species is common.

Hydrological functions

The soils associated with this ecological site are generally in Hydrologic Soil Group B (NRCS National Engineering Handbook). Once these soils become saturated, hoewver, because of their steep slopes, run off potential is high. Hydrological groups are used in equations that estimate runoff from rainfall. These estimates are needed for solving hydrologic problems that arise in planning watershed-protection and flood-prevention projects and for designing structures for the use, control and disposal of water. Heavy grazing can alter the hydrology by decreasing plant cover and increasing bare ground. Fire can also affect hydrology, but its affect is variable. Fire intensity, fuel type, soil, climate, and topography can each have different influences. Fires can increase areas of bare ground and hydrophobic layers that reduce infiltration and increase runoff (National Range and Pasture Handbook, 2003).

Recreational uses

Recreation activities include aesthetic value and fair opportunities for hiking and hunting. In good condition there are several forbs and shrubs that bloom in the spring. Steep slopes limit this site’s ability to be used for vacation homes, other residences, or deep ponds.

Wood products

None.

Other information

--Poisonous and Toxic Plant Communities--
Toxic plants associated with this site include woolly locoweed, broom snakeweed, and Russian thistle.

Woolly locoweed is toxic to all classes of livestock and wildlife. Locoweed is palatable and has similar nutrient value to alfalfa, which may cause animals to consume it even when other forage is available. Locoweed contains swainsonine (indolizdine alkaloid) and is poisonous at all stages of growth. Poisoning will become evident after 2-3 weeks of continuous grazing and is associated with 4 major symptoms: 1) neurological damage, 2) emaciation, 3) reproductive failure and abortion, and 4) congestive heart failure linked with “high mountain disease”.

Broom snakeweed contains steroids, terpenoids, saponins, and flavones that can cause abortions or reproductive failure in sheep and cattle, however, cattle are most susceptible. These toxins are most abundant during active growth and leafing stage. Cattle and sheep generally will only graze broom snakeweed when other forage is unavailable, typically in winter when toxicity levels are at their lowest (Knight and Walter, 2001).

Russian thistle is an invasive toxic plant, causing nitrate and to a lesser extent oxalate poisoning, which affects all classes of livestock. The buildup of nitrates in these plants is highly dependent upon environmental factors such as after a rain storm, during a drought, during periods with cool/cloudy days, and when growing on soils high in nitrogen and low in sulfur and phosphorus. Nitrate collects in the stems and can persist throughout the growing season. Clinical signs of nitrate poisoning include drowsiness, weakness, muscular tremors, increased heart and respiratory rates, staggering gait, and death. Conversely, oxalate poisoning causes kidney failure; clinical signs include muscle tremors, tetany, weakness, and depression. Poisoning generally occurs when livestock consume and are not accustomed to grazing oxalate-containing plants. Animals with prior exposure to oxalates have increased numbers of oxalate-degrading rumen microflora, and thus, are able to degrade the toxin before clinical poisoning can occur.

--Invasive Plant Communities--
Generally, as ecological conditions deteriorate and perennial vegetation decreases due to disturbance (fire, drought, off road vehicle overuse, erosion, etc.) annual forbs and grasses may invade the site. Of particular concern in semi-

arid environments are annual invaders including cheatgrass, Russian thistle, alyssum and annual mustards. The presence of these species will depend on soil properties and moisture availability; however, these invaders are highly adaptive and can flourish in many locations. Once established, complete removal is difficult, but suppression may be possible.

--Fire Ecology--
The ability for an ecological site to carry fire depends primarily on its' present fuel load and plant moisture content. Sites with small fuel loads will burn more slowly and less intensely than sites with large fuel loads. Most research agrees that historic fire return intervals are at a minimum 100 years, indicating that fire may have not played an important role in short term community dynamics. Fires are more common when plants are stressed or dead due to drought. Sagebrush on this site reestablish either by seeds dispersed from adjacent unburned patches or by unburned seeds found at the burn site. Continuous (every 20-40 years) burning of these ecological sites can result in herbaceous dominated communities, due to the relatively fast recovery of grasses and forbs shrubs when compared to shrubs. If invasive annual grasses are allowed to establish, fires may become more frequent, inhibiting the site’s ability to recover.

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Contributors

V. Keith Wadman

Approval

Kirt Walstad, 2/22/2022

Rangeland health reference sheet

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

Author(s)/participant(s)	Jacob Owens (NRCS, Shane Green (NRCS); adapted to this site by V. Keith Wadman, (NRCS Retired).
Contact for lead author	shane.green@ut.usda.gov
Date	08/15/2011
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Very few. Due to the surface rock fragments on this site, traditional rill formation is reduced. The overall gravelly to channery surface is expected to be resistant to rill formation and accelerated erosion in general. Where rills do occur, they may extend down entire slope.

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2. **Presence of water flow patterns:** Due to the steep slopes, flow patterns are present and tend to be very sinuous and wind around rock fragments and perennial plant bases. They show some evidence of erosion with fines and litter depositing against the uphill side of gravel, rocks and plants. During episodic precipitation events e.g. thunderstorms, these sites are expected to shed large volumes of water to adjacent ecological sites.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals may form at the base of plants that occur on the edge of primary flow patterns and rills. Interspaces between any well developed biological soil crusts resemble pedestals and may be up to 2 inches high. Terracettes are present. Debris dams of small to medium sized litter (up to 2 inches in diameter) may form in water flow patterns, rills, and gullies. These debris dams may accumulate smaller litter (leaves, grass and forb stems).

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 25 – 40 %. Most bare ground is associated with water flow patterns, rills, and gullies. Soil is covered by up to 50 percent rock fragments. Any areas with well developed biological soil crusts should not be counted as bare ground. Poorly developed biological soil crusts that are interpreted as functioning as bare ground (therefore they would be susceptible to raindrop splash erosion) should be recorded as bare ground. Ground cover is based on first raindrop impact, and bare ground is the opposite of ground cover.

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5. **Number of gullies and erosion associated with gullies:** Few gullies may be present. Length often extends from exposed bedrock until gully reaches a stream or an area where water and sediment accumulate, but they may be wide and shallow and armored with very large rocks.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None.

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7. **Amount of litter movement (describe size and distance expected to travel):** Due to the steepness of slope being between 50 to 80 percent, down slope redistribution of any incident litter caused by water is expected. Deposition would likely occur at points of obstruction such as the uphill side of gravel, rocks and plants, especially following major storm events. Fine litter is moved with even moderate precipitation events and spring runoff. Woody stems may be washed from site. Gullies may remove accumulated litter from under trees.

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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):** 80 to 90% of this site should have an erosion rating of 3 or 4. 10 to 20% may have a rating of 2 to 3. The average should be a 4. Surface texture is boulderly sandy loam to very channery sandy loam. Vegetation cover, litter, biological soil crusts and surface rock reduce erosion.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface is 6 inches deep. Structure is moderate, medium grandular. Color is dark brown (10YR 3/3). The A horizon would be expected to be more strongly developed under plant canopies. It is important if you are sampling to observe the A horizon under plant canopies as well as the interspaces. 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:** Spatial distribution of plants and/or well developed biological soil crusts (where present) intercept raindrops reducing splash erosion and provide areas of surface detention to store water allowing additional time for infiltration. Crowns of shrubs and accumulating litter at base of shrubs appear to create a micro-topography that may enhance development of water flow patterns below the drip line of the canopy. Significant increases in shrub canopy reduces understory vegetation causing an associated increase in runoff.

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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. There may be layers of calcium carbonate, gravel, cobbles or other naturally occurring hard layers found in the soil subsurface. These should not be considered to be compaction layers.

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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: Dominance by average annual production: Shrubs (basin and Wyoming big sage, shadscale)> Cool season perennial grasses (Salina wildrye, Indian ricegrass, bluebunce wheatgrass).

    Sub-dominant: Shrubs (rockspirea, bastard sage) > Grasses (bottlebrush squirreltail, James galleta).

    Other: Biological soil crust is variable in it’s expression where present on this site and is measured as a component of

ground cover.

Additional: Following a recent disturbance such as fire, drought, or insects that removes woody vegetation, forbs and perennial grasses (herbaceous species) may dominate the community for a time. If a disturbance has not occurred for an extended period of time, woody species may continue to increase crowding out the perennial herbaceous understory species. In either case, these conditions would reflect a functional community phase 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):** In general, a mix of age classes may be expected with a few dead and decadent plants present.

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14. **Average percent litter cover (%) and depth (in):** Litter cover 5-10%. Depth is highly variability due to slope and the stability of the soil surface.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 550-650 #/acre on an average year.

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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:** Possible invaders or increasers on this site are cheatgrass, alyssum and mustard species.

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17. **Perennial plant reproductive capability:** All perennial plants should have the ability to reproduce sexually or asexually in most years, except in drought years.
