USDA Natural Resources Conservation Service

Ecological site R035XY260UT
Semidesert Very Steep Stony Loam (Salina Wildrye)

Accessed: 05/03/2024

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.

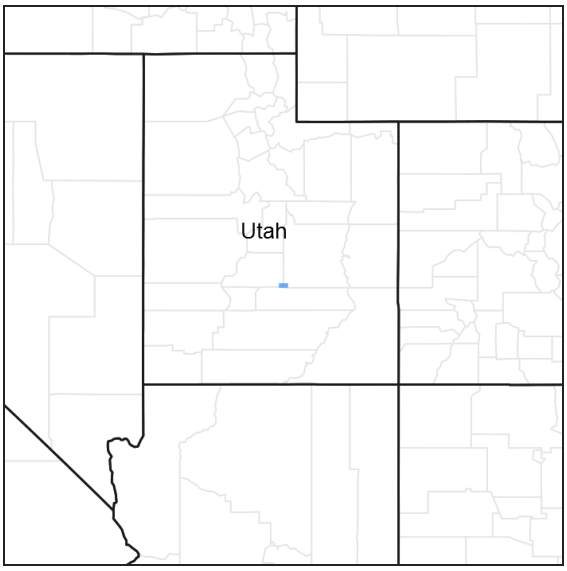


Figure 1. Mapped extent

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): 035X–Colorado Plateau

Site concept: The semidesert very steep stony loam ecological site is a shrub/grass savanah that occurs primarily on very steep, very rocky slopes of the northeastern Colorado Plateaus in Southeastern Utah. It developed in a continental climate receiving 7-11 inches of mostly late-summer precipitation annually. Soils are poorly developed and very rocky throughout. This site produces between 150 and 450 pounds of vegetation annually. The primary drivers of vegetation change are soil moisture and cheatgrass establishment. The soil temperature regime is mesic and the soil moisture regime is ustic aridic. The historic climax plant community is dominated by Salina wildrye, Indian ricegrass and shadscale. This site has been documented primarily in Capitol Reef and Canyonlands National Parks.

Classification relationships

Modal Soil: Nihill — loamy-skeletal, mixed (calcareous), mesic Ustic Torriorthents

Associated sites

R035XY122UT	**Desert Shallow Loam (Shadscale)**
R035XY124UT	**Desert Shallow Clay (Mat Saltbush)**

R035XY126UT	**Desert Shallow Gypsum (Torrey's Jointfir)**
R035XY215UT	**Semidesert Sandy Loam (4-Wing Saltbush)**
R035XY242UT	**Semidesert Gravelly Loam (Shadscale)**

Similar sites

R035XY263UT	**Semidesert Very Steep Stony Loam (Two-Needle Pinyon, Utah Juniper)**

Table 1. Dominant plant species

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

Physiographic features

This site is located on steep bouldery or stony hillsides, structural benches, and escarpments at elevations between 4900 and 6800 feet. It is usually found on slopes greater than 35 percent, but has been documented on gentler slopes as well. This site is not subject to flooding or ponding due to the steep terrain, and runoff from this site is usually supplied to adjacent ecological sites. It occurs on all aspects, though plant community composition may vary somewhat on different aspects (refer to the plant community section for more information about aspect effects on plant community composition).

Table 2. Representative physiographic features

Landforms	(1) Structural bench (2) Hill (3) Escarpment
Flooding frequency	None
Ponding frequency	None
Elevation	1,494–2,073 m
Slope	25–65%
Ponding depth	0 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate of this site is characterized by cool winters and hot summers with monsoonal rainstorms from July to October. Large fluctuations in daily temperature are common. Precipitation ranges from 7-11 inches annually with about 50 percent of the moisture occuring from July to October. Snow packs are generally light and not persistent, however the slight increase in snowpack on north-facing slopes may account for Salina wildrye being more dominant on northern aspects within this site.

--Notes on Climate Station Data--
The climate data below was taken from the Western Regional Climate Center database. (http://www.wrcc.dri.edu/summary/maput.html). The climate stations are within the semidesert zones of MLRA 35 and are the nearest stations to this ecological site.

Table 3. Representative climatic features

Frost-free period (average)	182 days
Freeze-free period (average)	215 days

Precipitation total (average)	279 mm

Influencing water features

Due to steep slopes and extreme distance from water, there are no water features influencing this site.

Soil features

The soils of this site are moderately-deep to deep and well-drained. They were formed from alluvium and residuum derived from sandstone and shale, and typically have a mantle of basalt or sandstone boulders/stones on the soil surface. Surface textures are usually sandy loams or fine sandy loams with greater than 35 percent rock fragments. These soils are poorly or moderately developed with light grey or tan surface colors. The soil temperature regime is mesic and the soil moisture regime is ustic aridic. These soils are generally nonsaline with 5-30 percent calcium carbonate. The water holding capacity ranges from 1.8 to 3.8 inches of water in the upper 40 inches of soil.

This site is correlated to the following soil components (Map Unit Symbols in parentheses): UT685—Capital Reef National Park Soil Survey — Clapper (260): Happle Family (110, 120, 200, 260).

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone and shale (2) Glaciofluvial deposits–basalt
Surface texture	(1) Extremely stony fine sandy loam (2) Extremely stony sandy loam (3) Fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Soil depth	51–152 cm
Surface fragment cover <=3"	16–21%
Surface fragment cover >3"	37–41%
Available water capacity (0-101.6cm)	4.57–9.65 cm
Calcium carbonate equivalent (0-101.6cm)	5–30%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	5–10
Soil reaction (1:1 water) (0-101.6cm)	7.9–9
Subsurface fragment volume <=3" (Depth not specified)	15–37%
Subsurface fragment volume >3" (Depth not specified)	20–40%

Ecological dynamics

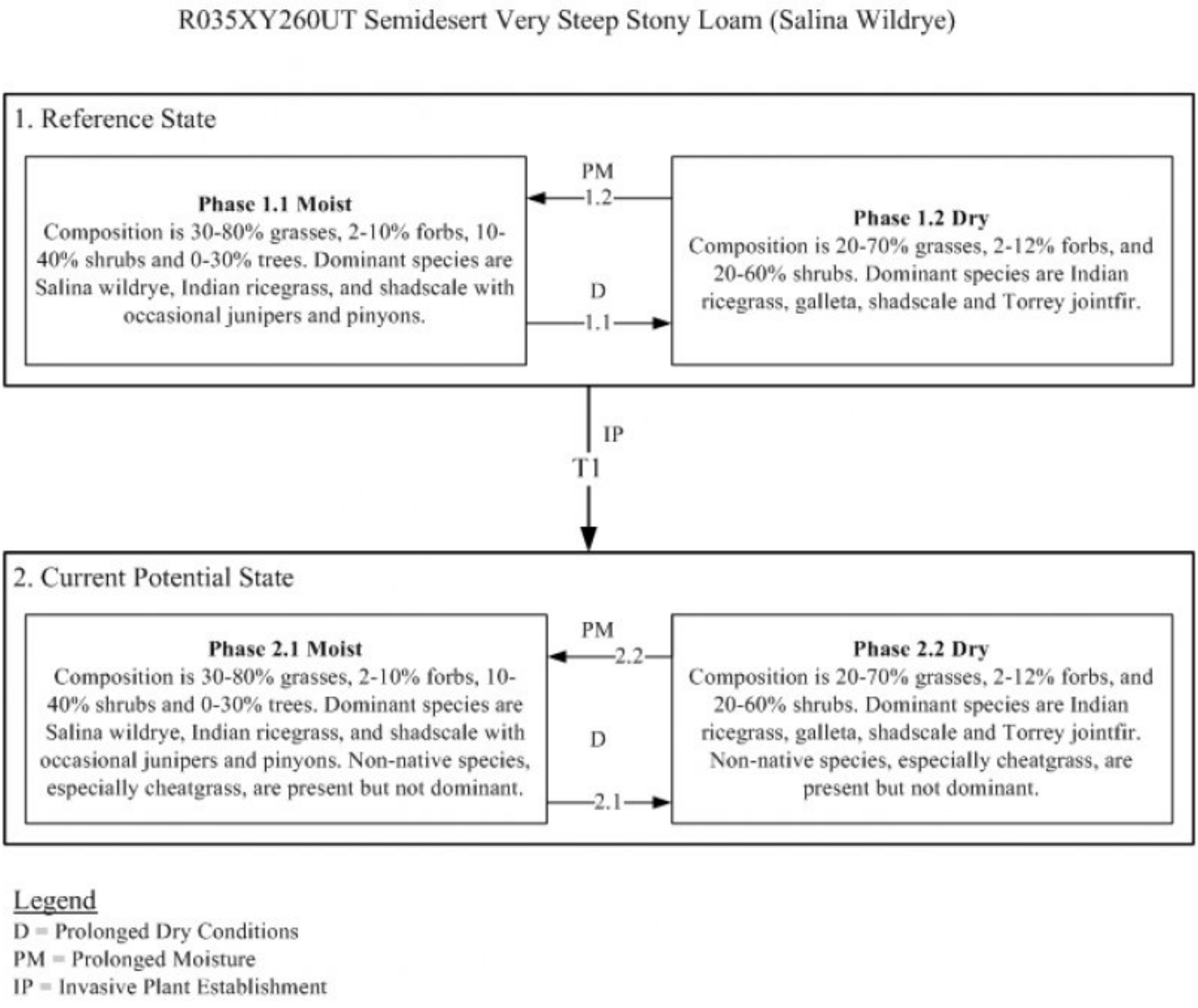
This site developed under the Colorado Plateau climatic conditions and included minimal influences from fire and native herbivory. Due to steep slopes, sparse vegetation, fire barriers (boulders), few lightning storms, and warm season vegetation being green during the storm season, the historic fire return interval is expected to be greater than 100 years on this site and likely did not play a major role in vegetation changes in the reference state.

Variability in the plant community composition of the reference state is predominantly influenced by soil moisture. The moist phase (more common on north facing slopes) is dominated by Salina wildrye, galleta and shadscale, with the occasional Utah juniper occurring under moist conditions. The dryer phase (more common on south facing slopes) is dominated by Indian ricegrass, galleta, Torrey jointfir and shadscale, typically without Utah juniper. The moist phase often has higher biological crust cover than the dry phase.

Domestic livestock grazing and European settlement have had little effect on the ecological dynamics of this site, except for the introduction of non-native invasive plant species into the system, especially cheatgrass. However, due to steep slopes and rocky terrain, the occurrence of human induced disturbances (such as improperly managed livestock grazing, off highway vehicle overuse, and other potential surface disturbances caused by recreational activities) is rare. The lack of anthropogenic disturbance coupled with a relatively high resistance to erosion allows the site to maintain native vegetation and subsequently retain resilience against cheatgrass dominance.

The following state-and-transition model does not necessarily depict all the states, community phases, or transitions that could be possible on this site, but it does show the plant communities that have been documented to occur there. As more data is collected, plant communities may be added or revised to better reflect the dynamics of the system. This model was developed using range data collected in 2006 and 2007 in Canyonlands National Park, as well as data collected in 2010 in Capitol Reef National Park, as part of a national park soil survey update in Southeastern Utah. Both ocular estimates and quantitative data were used in the development of the model.

State and transition model



State 1
Reference State

The reference state was determined by documenting rangeland relic areas that have been protected from excessive disturbance, such as grazing and recreation. Historical accounts were also considered. The reference state represents the natural range of variability in the plant community dynamics of this ecological site. This state includes the biotic community that can establish on the ecological site if all successional sequences were completed under the present environmental conditions, without interferences by man; natural disturbances are inherent in its development. This state is dominated by native perennial warm season and cool season grasses, shadscale, and native annual and perennial forbs. Perennial warm and cool season grass composition depends primarily on slope aspect or soil moisture content. If present, Utah juniper is sparse and most common under relatively moist soil conditions (usually north-facing slopes). Soil moisture is the most important driver of plant community change in this state. When natural disturbances occur, the rate of recovery is relatively rapid due to niches being filled with highly adapted native vegetation.

Community 1.1
Moist phase

National Park. Photo taken by Dana Truman (2006).

Figure 4. Phase 1.1

This plant community phase is characterized by perennial warm and cool season grasses and native shrubs. The dominant cool season grasses include Salina wildrye and Indian ricegrass and the dominant warm season grass is galleta. Dominant native shrubs include shadscale and Torrey jointfir, with some Utah juniper present at times. Forb composition is variable but gooseberryleaf globemallow is expected to be found in this phase. Other shrubs, forbs, and grasses may be present and cover is variable. Bare ground (10-25%) and biological crust (0-20%) are low due to high surface rock fragments. Biological crust is more common in this community phase than in phase 1.2 and is characterized by isolated or continuous lichen and moss pinnacles.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	84	196	336
Shrub/Vine	56	112	168
Tree	–	11	45
Forb	6	28	45
Total	**146**	**347**	**594**

Table 6. Ground cover

Tree foliar cover	0-10%
Shrub/vine/liana foliar cover	5-15%
Grass/grasslike foliar cover	10-30%

Forb foliar cover	1-5%
Non-vascular plants	0%
Biological crusts	0-20%
Litter	2-5%
Surface fragments >0.25" and <=3"	15-20%
Surface fragments >3"	35-40%
Bedrock	0%
Water	0%
Bare ground	10-25%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	0-5%	1-5%
>0.15 <= 0.3	–	0-10%	5-15%	0-3%
>0.3 <= 0.6	–	5-15%	5-20%	0-3%
>0.6 <= 1.4	0-3%	0-10%	–	0-2%
>1.4 <= 4	0-10%	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Community 1.2
Dry phase

Figure 6. Phase 1.2

This plant community phase is characterized by perennial warm and cool season grasses and native shrubs. The dominant cool season grass is Indian ricegrass, and the dominant warm season grass is galleta. Dominant shrubs are shadscale and Torrey jointfir. Forb composition is variable. Other shrubs, forbs, and grasses may be present and cover is variable. Bare ground (10-30%) and biological crust (0-10%) are low due to high surface rock fragments. Biological crust is characterized as crustless or by light cyanobacteria to isolated lichen and moss pinnacles with little continuity.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	84	168	252
Shrub/Vine	56	112	168
Forb	6	17	34
Total	**146**	**297**	**454**

Table 9. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	10-20%
Grass/grasslike foliar cover	10-25%
Forb foliar cover	1-5%
Non-vascular plants	0%
Biological crusts	0-10%
Litter	2-7%
Surface fragments >0.25" and <=3"	15-20%
Surface fragments >3"	35-40%
Bedrock	0%
Water	0%
Bare ground	10-30%

Table 10. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	0-5%	1-5%
>0.15 <= 0.3	–	0-10%	5-15%	0-3%
>0.3 <= 0.6	–	5-15%	5-20%	0-3%
>0.6 <= 1.4	–	0-10%	–	0-2%
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Pathway 1.1
Community 1.1 to 1.2

Moist phase **Dry phase**

This pathway occurs when soil moisture decreases, favoring plants species that can tolerate dryer conditions. Events leading to this pathway may include extended periods of drought and/or increased temperatures.

Pathway 1.2
Community 1.2 to 1.1

Dry phase | Moist phase

This pathway occurs when events favor plant species with higher cool-season moisture requirements such as Salina wildrye. Events may include extended periods of higher than normal precipitation and may be coupled with cooler temperatures.

State 2
Current Potential State

This state is very similar to the reference state in nutrient cycling and disturbance regime; however it now includes invasive plant species, particularly cheatgrass. This state is dominated by native perennial warm and cool season grasses, shadscale, and native annual and perennial forbs. Invasive plants are present but not dominant. Perennial warm and cool season grass composition depends primarily on slope, aspect and soil moisture. If present, Utah juniper is sparse and most common under relatively moist soil conditions (usually north and east-facing slopes). Soil moisture is the most important driver of plant community change in this state. This state has lower resistance to disturbances and resilience after disturbance than the reference state. Invasive plants are beginning to fill the niches and establish on the site.

Community 2.1
Moist Phase with Invasives

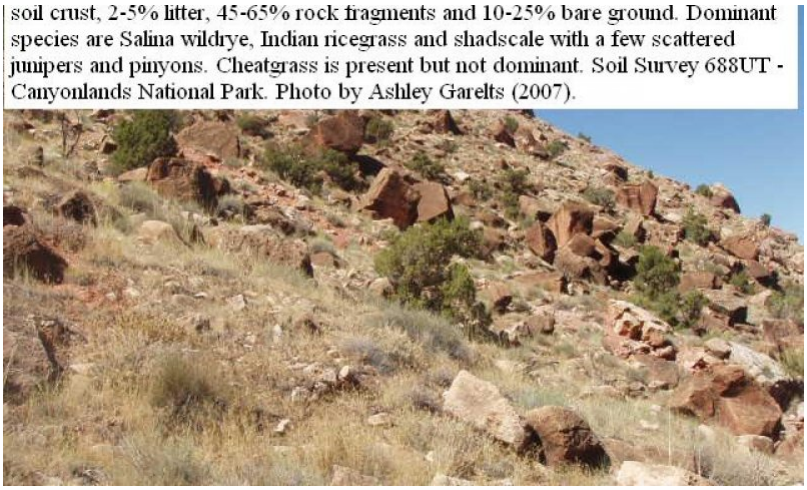


Figure 8. Phase 2.1

This plant community phase is characterized by perennial warm and cool season grasses and native shrubs. The dominant cool season grasses are Salina wildrye and Indian ricegrass, and the dominant warm season grass is galleta. Dominant native shrubs include shadscale and Torrey jointfir, with some Utah juniper present at times. Forb composition is variable but gooseberryleaf globemallow is expected to be found in this phase. Cheatgrass or other non-native species are present but not dominant. Other shrubs, forbs, and grasses may be present and cover is variable. Bare ground (10-25%) and biological crust (0-20%) are low due to high surface rock fragments. Biological crust is more common in this community phase than in phase 1.2 and is characterized by isolated or continuous lichen and moss pinnacles.

Table 11. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	84	196	336
Shrub/Vine	56	112	168
Tree	–	11	45
Forb	6	28	45
Total	**146**	**347**	**594**

Table 12. Ground cover

Tree foliar cover	0-10%
Shrub/vine/liana foliar cover	5-15%
Grass/grasslike foliar cover	10-30%
Forb foliar cover	1-5%
Non-vascular plants	0%
Biological crusts	0-20%
Litter	2-5%
Surface fragments >0.25" and <=3"	15-20%
Surface fragments >3"	35-40%
Bedrock	0%
Water	0%
Bare ground	10-25%

Table 13. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	0-5%	1-5%
>0.15 <= 0.3	–	0-10%	5-15%	0-3%
>0.3 <= 0.6	–	5-15%	5-20%	0-3%
>0.6 <= 1.4	0-3%	0-10%	–	0-2%
>1.4 <= 4	0-10%	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Community 2.2
Dry Phase with Invasives

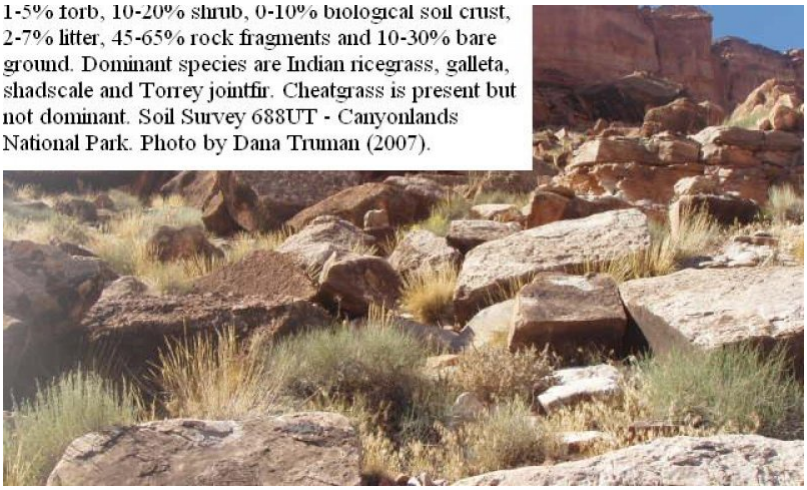


Figure 10. Phase 2.2

This plant community phase is characterized by perennial warm and cool season grasses and native shrubs. The dominant cool season grass is Indian ricegrass, and the dominant warm season grass is galleta. Dominant shrubs are shadscale and Torrey jointfir. Forb composition is variable. Cheatgrass or other non-native species are present but not dominant. Other shrubs, forbs, and grasses may be present and cover is variable. Bare ground (10-30%) and biological crust (0-10%) are low due to high surface rock fragments. Biological crust is characterized as crustless or by light cyanobacteria to isolated lichen and moss pinnacles with little continuity.

Table 14. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	84	168	252
Shrub/Vine	56	112	168
Forb	6	17	34
Total	**146**	**297**	**454**

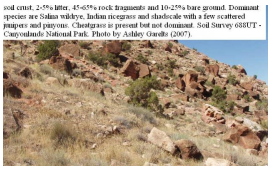
Table 15. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	10-20%
Grass/grasslike foliar cover	10-25%
Forb foliar cover	1-5%
Non-vascular plants	0%
Biological crusts	0-10%
Litter	2-7%
Surface fragments >0.25" and <=3"	15-20%
Surface fragments >3"	35-40%
Bedrock	0%
Water	0%
Bare ground	10-30%

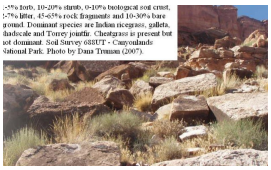
Table 16. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	0-5%	1-5%
>0.15 <= 0.3	–	0-10%	5-15%	0-3%
>0.3 <= 0.6	–	5-15%	5-20%	0-3%
>0.6 <= 1.4	–	0-10%	–	0-2%
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Pathway 2.1
Community 2.1 to 2.2



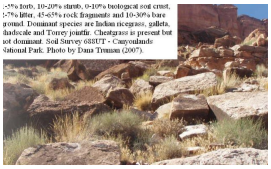
Moist Phase with Invasives



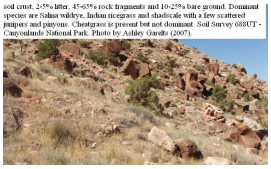
Dry Phase with Invasives

This pathway occurs when soil moisture decreases, favoring plants species that can tolerate dryer conditions. Events leading to this pathway may include extended periods of drought and/or increased temperatures.

Pathway 2.2
Community 2.2 to 2.1



Dry Phase with Invasives



Moist Phase with Invasives

This pathway occurs when events favor plant species with higher cool-season moisture requirements such as Salina wildrye. Events may include extended periods of higher than normal precipitation and may be coupled with cooler temperatures.

Transition 1
State 1 to 2

This transition occurs when cheatgrass and/or other invasive plant species are dispersed to the site and allowed to germinate, establish and reproduce on site. Events triggering this transition may include improperly managed livestock grazing or recreational activities that disperse non-native seeds to safe microsites that are suitable for establishment of the invaders. Invasive species are also known to establish in undisturbed native plant communities due to their ability to adapt and compete with native vegetation. Eradication of these species once established is considered infeasible. At-risk Community Phase – All communities are at risk of invasive plant establishment. Trigger – Dispersal, germination and establishment of invasive species.

Additional community tables

Table 17. Community 1.1 plant community composition

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

Shrub/Vine					
0	**Dominant Shrubs**			11–90	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	11–90	2–8
3	**Sub-Dominant Shrubs**			45–157	
	Torrey's jointfir	EPTO	*Ephedra torreyana*	0–34	0–5
	blackbrush	CORA	*Coleogyne ramosissima*	0–34	0–4
	Bigelow sage	ARBI3	*Artemisia bigelovii*	0–34	0–4
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–22	0–3
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–22	0–3
	Apache plume	FAPA	*Fallugia paradoxa*	0–11	0–2
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–11	0–2
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–11	0–2
	littleleaf mock orange	PHMI4	*Philadelphus microphyllus*	0–11	0–2
	roundleaf buffaloberry	SHRO	*Shepherdia rotundifolia*	0–11	0–2
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–11	0–2
	mormon tea	EPVI	*Ephedra viridis*	0–11	0–2
	narrowleaf yucca	YUAN2	*Yucca angustissima*	0–6	0–1
Grass/Grasslike					
0	**Dominant Grasses**			56–280	
	saline wildrye	LESAS	*Leymus salinus ssp. salinus*	28–224	2–16
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	6–56	1–4
1	**Sub-Dominant Grasses**			11–84	
	blue grama	BOGR2	*Bouteloua gracilis*	0–39	0–4
	James' galleta	PLJA	*Pleuraphis jamesii*	0–28	0–4
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–17	0–2
	desert needlegrass	ACSP12	*Achnatherum speciosum*	0–17	0–1
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–11	0–2
	Grass, perennial	2GP	*Grass, perennial*	0–11	0–1
	Sandberg bluegrass	POSE	*Poa secunda*	0–11	0–1
	purple threeawn	ARPU9	*Aristida purpurea*	0–6	0–1
	squirreltail	ELEL5	*Elymus elymoides*	0–6	0–1
Forb					
2	**Sub-Dominant Forbs**			6–45	
	desert princesplume	STPI	*Stanleya pinnata*	0–22	0–2
	gooseberryleaf globemallow	SPGR2	*Sphaeralcea grossulariifolia*	6–11	1–2
	Forb, perennial	2FP	*Forb, perennial*	0–11	0–2
	Forb, annual	2FA	*Forb, annual*	0–11	0–1
	woolly locoweed	ASMO7	*Astragalus mollissimus*	0–6	0–1
	pretty buckwheat	ERBI	*Eriogonum bicolor*	0–6	0–1
	nodding buckwheat	ERCE2	*Eriogonum cernuum*	0–6	0–1
	Navajo fleabane	ERCOC3	*Erigeron concinnus var. concinnus*	0–6	0–1
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–6	0–1

	spiny phlox	PHHO	*Phlox hoodii*	0–6	0–1
Tree					
4	**Trees**			0–45	
	Utah juniper	JUOS	*Juniperus osteosperma*	0–45	0–6
	twoneedle pinyon	PIED	*Pinus edulis*	0–22	0–3
	singleleaf ash	FRAN2	*Fraxinus anomala*	0–6	0–1

Table 18. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
0	**Dominant Shrubs**			17–90	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	11–90	2–8
	Torrey's jointfir	EPTO	*Ephedra torreyana*	6–17	1–2
3	**Sub-Dominant Shrubs**			45–157	
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–34	0–4
	Bigelow sage	ARBI3	*Artemisia bigelovii*	0–34	0–4
	blackbrush	CORA	*Coleogyne ramosissima*	0–22	0–3
	mormon tea	EPVI	*Ephedra viridis*	0–17	0–2
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–11	0–2
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–11	0–2
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–11	0–2
	narrowleaf yucca	YUAN2	*Yucca angustissima*	0–6	0–1
Grass/Grasslike					
0	**Dominant Grasses**			39–196	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	28–140	4–15
	James' galleta	PLJA	*Pleuraphis jamesii*	11–73	2–10
1	**Sub-Dominant Grasses**			11–73	
	desert needlegrass	ACSP12	*Achnatherum speciosum*	0–34	0–2
	purple threeawn	ARPU9	*Aristida purpurea*	0–11	0–1
	Grass, perennial	2GP	*Grass, perennial*	0–11	0–1
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–11	0–1
	low woollygrass	DAPU7	*Dasyochloa pulchella*	0–6	0–1
Forb					
2	**forbs**			6–34	
	Utah juniper	JUOS	*Juniperus osteosperma*	0–45	0–6
	twoneedle pinyon	PIED	*Pinus edulis*	0–22	0–3
	desert princesplume	STPI	*Stanleya pinnata*	0–22	0–2
	Forb, perennial	2FP	*Forb, perennial*	0–11	0–2
	Forb, annual	2FA	*Forb, annual*	0–11	0–1
	gooseberryleaf globemallow	SPGR2	*Sphaeralcea grossulariifolia*	0–11	–
	woolly locoweed	ASMO7	*Astragalus mollissimus*	0–6	0–1
	nodding buckwheat	ERCE2	*Eriogonum cernuum*	0–6	0–1
	Navajo fleabane	ERCOC3	*Erigeron concinnus var. concinnus*	0–6	0–1
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–6	0–1
	spiny phlox	PHHO	*Phlox hoodii*	0–6	0–1
	singleleaf ash	FRAN2	*Fraxinus anomala*	0–6	0–1

Table 19. Community 2.1 plant community composition

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

Shrub/Vine					
0	**Dominant Shrubs**			11–90	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	11–90	2–8
3	**Sub-Dominant Shrubs**			45–157	
	Torrey's jointfir	EPTO	*Ephedra torreyana*	0–34	0–5
	blackbrush	CORA	*Coleogyne ramosissima*	0–34	0–4
	Bigelow sage	ARBI3	*Artemisia bigelovii*	0–34	0–4
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–22	0–3
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–22	0–3
	Apache plume	FAPA	*Fallugia paradoxa*	0–11	0–2
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–11	0–2
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–11	0–2
	littleleaf mock orange	PHMI4	*Philadelphus microphyllus*	0–11	0–2
	roundleaf buffaloberry	SHRO	*Shepherdia rotundifolia*	0–11	0–2
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–11	0–2
	mormon tea	EPVI	*Ephedra viridis*	0–11	0–2
	narrowleaf yucca	YUAN2	*Yucca angustissima*	0–6	0–1
Grass/Grasslike					
0	**Dominant Grasses**			56–280	
	saline wildrye	LESAS	*Leymus salinus ssp. salinus*	28–224	2–16
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	6–56	1–4
1	**Sub-Dominant Grasses**			11–84	
	blue grama	BOGR2	*Bouteloua gracilis*	0–39	0–4
	James' galleta	PLJA	*Pleuraphis jamesii*	0–28	0–4
	cheatgrass	BRTE	*Bromus tectorum*	6–22	1–8
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–17	0–2
	desert needlegrass	ACSP12	*Achnatherum speciosum*	0–17	0–1
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–11	0–2
	Grass, perennial	2GP	*Grass, perennial*	0–11	0–1
	Sandberg bluegrass	POSE	*Poa secunda*	0–11	0–1
	purple threeawn	ARPU9	*Aristida purpurea*	0–6	0–1
	squirreltail	ELEL5	*Elymus elymoides*	0–6	0–1
Forb					
2	**Sub-Dominant Forbs**			6–45	
	desert princesplume	STPI	*Stanleya pinnata*	0–22	0–2
	gooseberryleaf globemallow	SPGR2	*Sphaeralcea grossulariifolia*	6–11	1–2
	Forb, perennial	2FP	*Forb, perennial*	0–11	0–2
	Forb, annual	2FA	*Forb, annual*	0–11	0–1
	woolly locoweed	ASMO7	*Astragalus mollissimus*	0–6	0–1
	pretty buckwheat	ERBI	*Eriogonum bicolor*	0–6	0–1
	nodding buckwheat	ERCE2	*Eriogonum cernuum*	0–6	0–1
	Navajo fleabane	ERCOC3	*Erigeron concinnus var. concinnus*	0–6	0–1

			concinnus		
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–6	0–1
	spiny phlox	PHHO	*Phlox hoodii*	0–6	0–1
Tree					
4	**Trees**			0–45	
	Utah juniper	JUOS	*Juniperus osteosperma*	0–45	0–6
	twoneedle pinyon	PIED	*Pinus edulis*	0–22	0–3
	singleleaf ash	FRAN2	*Fraxinus anomala*	0–6	0–1

Table 20. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
0	**Dominant Shrubs**			17–90	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	11–90	2–8
	Torrey's jointfir	EPTO	*Ephedra torreyana*	6–17	1–2
3	**Sub-Dominant Shrubs**			45–157	
	Bigelow sage	ARBI3	*Artemisia bigelovii*	0–34	0–4
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–34	0–4
	blackbrush	CORA	*Coleogyne ramosissima*	0–22	0–3
	mormon tea	EPVI	*Ephedra viridis*	0–17	0–2
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–11	0–2
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–11	0–2
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–11	0–2
	narrowleaf yucca	YUAN2	*Yucca angustissima*	0–6	0–1
Grass/Grasslike					
0	**Dominant Grasses**			39–196	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	28–140	4–15
	James' galleta	PLJA	*Pleuraphis jamesii*	11–73	2–10
1	**Sub-Dominant Grasses**			11–73	
	desert needlegrass	ACSP12	*Achnatherum speciosum*	0–34	0–2
	cheatgrass	BRTE	*Bromus tectorum*	1–22	1–8
	purple threeawn	ARPU9	*Aristida purpurea*	0–11	0–1
	Grass, perennial	2GP	*Grass, perennial*	0–11	0–1
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–11	0–1
	low woollygrass	DAPU7	*Dasyochloa pulchella*	0–6	0–1
Forb					
2	**forbs**			6–34	
	Utah juniper	JUOS	*Juniperus osteosperma*	0–45	0–6
	twoneedle pinyon	PIED	*Pinus edulis*	0–22	0–3
	desert princesplume	STPI	*Stanleya pinnata*	0–22	0–2
	Forb, perennial	2FP	*Forb, perennial*	0–11	0–2
	Forb, annual	2FA	*Forb, annual*	0–11	0–1
	gooseberryleaf globemallow	SPGR2	*Sphaeralcea grossulariifolia*	0–11	–
	woolly locoweed	ASMO7	*Astragalus mollissimus*	0–6	0–1
	nodding buckwheat	ERCE2	*Eriogonum cernuum*	0–6	0–1
	Navajo fleabane	ERCOC3	*Erigeron concinnus var. concinnus*	0–6	0–1
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–6	0–1
	spiny phlox	PHHO	*Phlox hoodii*	0–6	0–1
	singleleaf ash	FRAN2	*Fraxinus anomala*	0–6	0–1

Animal community

Animal community effects should be the same on both states.

--Wildlife--

Water scarcity, steep slopes, and lack of cover limit the species richness and abundance of large mammals on this site; however, desert bighorn sheep and elk can use these steep rocky slopes, especially when near water sources. This site provides good foraging conditions for wildlife due to availability of nutritious forage, though in many places the populations will be small and have little impact on the vegetation.

The hot climate and lack of water favors small mammals, which have an easier time finding shelter, food, and water to live. Many species of rats, mice, squirrels, bats, and chipmunks can be observed, along with coyotes and foxes.

On north facing or moist sites, where Utah juniper is found birds are the most visible wildlife species that can be observed; however sightings may be rare due to the sparseness of tree canopies. Species may include juniper titmice, scrub jays, pinyon jays, and black throated gray warblers, and sparrows.

On south facing or dryer sites, lizards are most visible and can be observed during the day. Species may include the northern whiptail, desert spiny, and the colorful western collard lizard. (NPS, 2008)

Hydrological functions

Runoff and Soil Loss
The following runoff and soil loss data was generated using the Rangeland Hydrology and Erosion Model Web Tool. See reference below.
Hydrology and erosion are approximately the same for both states in the State and Transition Model. Soil textures range from fine sandy loam to sandy loam and slopes are usually 35-65 percent on this site. Slope does not greatly affect the runoff on this site, but does have an impact on soil loss. Average runoff is typically about 0.25 inches per year, but may be as high as 1.2 inches in a single 100-year storm event.
Soil loss ranges from 0.08(about 35% slope) to 0.18 (about 65% slope) tons per acre on an average year, and from 0.5 (about 35% slope) to 0.8 (about 65% slope) tons per acre during a 100-year storm event. Long-term soil loss is not a concern on this site, but rather the rare storm events (i.e. 25, 50 or 100 year storms) result in significant soil loss that are more likely to impact the soil resource. Average rainfall ranges from 7-11 inches per year, but a single 100-year storm event can generate 2.2 inches of precipitation in a 24-hour period.
Individual bunchgrasses and shrubs are randomly distributed which, along with surface rock, slows down overland flow and promotes on-site infiltration. Interspaces are typically protected by biological soil crusts, rock fragments, or a weak physical soil crust. Soil physical crusts and weak biological crusts (light cyanobacteria) are the most susceptible to water erosion.

NRCS Grazing Lands Technology Institute. 2003. National Range and Pasture Handbook. Fort Worth, TX, USA: US Department of Agriculture, Natural Resources Conservation Service, 190-VI-NRPH.

Southwest Watershed Research Center. 2008. Rangeland Hydrology and Erosion Model Web Tool. Tuscon, Arizona, USA: US Department of Agriculture, Agricultural Research Service. Available at http://apps.tucson.ars.ag.gov/rhem/. Accessed on Dec, 2010.

Recreational uses

Recreation activities include aesthetic value and fair opportunities for hiking. Prospects for camping, hunting, and the use of off-road vehicles is poor, due to steep slopes, lack of wildlife, and rocky/bouldery terrain.

Wood products

None

Other products

None

Other information

--Threatened and Endangered Species--

Plants – Threatened and endangered plant species that may be found on this site include Barneby Reed-mustard (Schoenocrabe barnebyi), Siler Pincushion Cactus (Pediocactus sileri), and Wright Fishhook Cactus (Sclerocactus wrightii). (Utah Division of Wildlife Resources, 2007)

Animals – Currently no known threatened or endangered animal species are known to use this site.

--Invasive Plant Communities--

Generally as ecological conditions deteriorate and perennial vegetation decreases due to disturbance (fire, over grazing, drought, off road vehicle overuse, erosion, etc.) annual forbs and grasses will invade the site. Of particular concern in semi-arid environments are the non-native annual invaders including cheatgrass, Russian thistle, kochia, halogeton, 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. Due to the steep slopes associate with this site, the chance for disturbance is rare and thus possibility for invasion decreases. However, cheatgrass is expected to invade when given the opportunity.

--Fire Ecology--

The ability for an ecological site to carry fire depends primarily on the 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. Many semi-desert plant communities in the Colorado Plateau may have evolved without the influence of fire. However a year of exceptionally heavy winter rains can generate fuels by producing heavy stands of annual forbs and grasses. When fires do occur, the effect on the plant community may be severe due to the harsh environment and slow rate of recovery.

Historically, very little is known about the relationship between Salina wildrye/Indian ricegrass and fire. This plant rarely occurs in pure stands and thus fire regimes most likely depend on adjacent plant communities. The grass dominance of this site would make it more likely to burn if given the opportunity, however will depend on the amount of bare ground and distance between plants. Not much is known on the effect of fire on Salina wildrye but its rhizomes and root crowns are expected to survive fire. It is thought to cover rapidly, especially after a dormant season fire.

Contributors

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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	01/30/2007
Approved by	Shane A. Green
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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2. **Presence of water flow patterns:** Common- flow patterns can 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 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 are common. Without protection from surface gravels, plants will become slightly pedestaled. Pedestals may form at the base of plants that occur on the edge of primary flow patterns and rills, but there should be no exposed roots. Interspaces between any well developed biological soil crusts resemble pedestals and may be up to 2 inches high. Terracettes are common due to slope, terracettes form throughout the site. 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 herbaceous litter.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 10 – 25 %. Most bare ground is associated with water flow patterns, rills, and gullies. Soil is covered by 40 to 80 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 - 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 to very few.

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7. **Amount of litter movement (describe size and distance expected to travel):** 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 litter 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 4 or 5. 10 to 20% may have a rating of 3 to 4. The average should be a 4. Surface texture is gravelly 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 typically 3 inches deep. Structure is typically weak thick platy parting to weak fine subangular blocky. Color is typically strong brown (7.5YR5/6). 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, somewhat reducing splash erosion and provide areas of surface detention to store water allowing additional time for infiltration. (surface rocks influence the runoff and water retention.

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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: examples: Indian ricegrass, Salina Wildrye, Shadscale.

    Sub-dominant: examples: Mormontea, Bigelow sagebrush, forbs

    Other: Perennial and annual forbs can be expected to vary widely in their expression in the plant community based upon departures from average growing conditions.

    Additional: Disturbance regime includes infrequent fire, drought, and insects.
    Dominance by average annual production: Cool season perennial (bunch and rhizomatous) grasses = Non-sprouting shrubs > Sprouting shrubs > forbs > Warm season perennial grasses. Functional/structural groups may appropriately contain non-native species if their ecological function is the same as the native species in the reference state (e.g. Crested wheatgrass and Russian wildrye etc.)
    Biological soil crust is variable in its expression where present on this site and is measured as a component of ground cover.
    Following a recent disturbance such as fire or drought that removes the woody vegetation, forbs and perennial grasses (herbaceous species) may dominate the community. 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 some dead and decadent plants present.

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14. **Average percent litter cover (%) and depth (in):** Litter cover 1-5%. Variability may occur due to weather. Litter cover is generally low and only accumulates beneath mature plants at depths of less than 1 inch.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 150-530 lbs./ac.

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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, halogeton, locoweed, and broom snakeweed.

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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.
