USDA Natural Resources
Conservation Service

Ecological site R035XY103UT
Desert Clay (Castle Valley Saltbush)

Accessed: 05/11/2025

General information

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

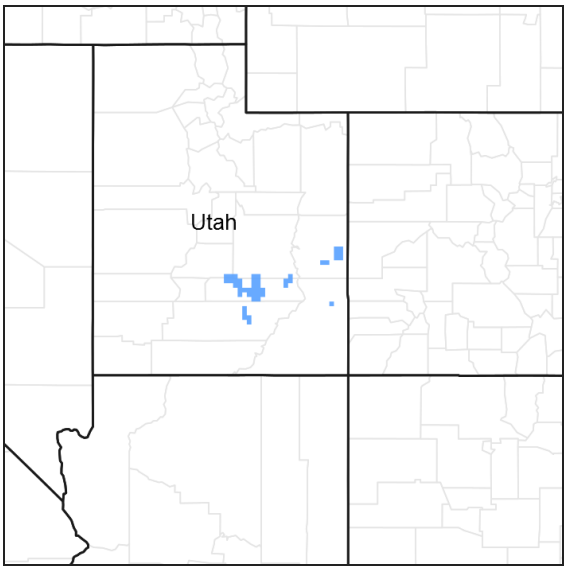


Figure 1. Mapped extent

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

MLRA notes

Major Land Resource Area (MLRA): 035X–Colorado Plateau

This ecological site occurs in the northern portion of MLRA 35, Colorado Plateau Province. It is found principally in the "Canyon Lands" and "High Plateaus of Utah" sections within that MLRA. This geologic area has been stucturally uplifted over time while rivers flowing across it were cutting down into its bedrock. Areas of shale, sandstone, limestone, dolomite, and volcanic rock outcrop are found throughout the region.

Associated sites

R035XY122UT	**Desert Shallow Loam (Shadscale)**
R035XY124UT	**Desert Shallow Clay (Mat Saltbush)**
R035XY130UT	**Desert Shallow Sandy Loam (Shadscale)**
R035XY218UT	**Semidesert Sandy Loam (Blackbrush)**
R035XY243UT	**Semidesert Stony Loam (Blackbrush)**

Similar sites

R035XY124UT	**Desert Shallow Clay (Mat Saltbush)**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex cuneata*
Herbaceous	(1) *Achnatherum hymenoides* (2) *Pleuraphis jamesii*

Physiographic features

This site occurs on hillslopes, structural benches, alluvial fans, valleys, and cuestas. Runoff is medium to high. Slopes typically range from 0-8% but this site has been mapped on slopes as steep as 15%. Elevations are generally 4200 to 5000 ft.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Structural bench (3) Alluvial fan
Flooding frequency	None
Ponding frequency	None
Elevation	4,200–5,000 ft
Slope	0–8%
Water table depth	0 in

Climatic features

The climate is characterized by hot, dry summers, cold winters and moist springs. March through May and August through November are the wettest months of the year with June, July and December through February being the driest. Very little precipitation comes as snow, and this only from December to February. Precipitation is extremely variable from month to month and from year to year but averages between 5-9 inches. Large fluctuations in daily temperatures are typical. Much of the summer precipitation occurs as convection thunderstorms. Some years are so dry that little plant growth occurs, and some plants remain dormant.

Table 3. Representative climatic features

Frost-free period (average)	166 days
Freeze-free period (average)	191 days
Precipitation total (average)	9 in

Influencing water features

Soil features

Soil temperature and moisture regimes are mesic and typic aridic respectively. Typically the surface layer looks very raw with bare soil combined with varying amounts of surface coarse fragments as the dominant features. The surface color is a light grayish clay to clay loam. The soils are typically moderately deep. These soils have 1-10% gypsum and 35-45% clay. Surface rock fragments of soft shale range are 0, but have rarely been observed up to 20 percent. These soils are in the very early stages of soil development.

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

UT631 – Henry Mountains Area – Hanksville
UT633 – Canyonlands Area – Hanksville

UT685 – Capital Reef National Park – Hanksville, Lybrook, Notal, Stent family, Chipeta, Eslendo, Happle;
UT687 – Arches National Park – Persayo

Table 4. Representative soil features

Parent material	(1) Residuum–shale
Surface texture	(1) Clay loam (2) Silty clay loam (3) Very gravelly clay loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Not specified
Soil depth	20–40 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	1.2–5.8 in
Calcium carbonate equivalent (0-40in)	5–15%
Electrical conductivity (0-40in)	8–32 mmhos/cm
Sodium adsorption ratio (0-40in)	10–15
Soil reaction (1:1 water) (0-40in)	7.9–8.4
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This ecological site occurs on moderately deep soils in Major Land Resource Area (MLRA) D35, The Colorado Plateau. The general aspect of the site is represented by a shrub layer that is often dominated by Castle Valley saltbush with a variable herbaceous layer of perennial grasses. Scattered shadscale may also be present. Plant growth starts about March 15th and may continue until about October 15th. Optimum growth on cool season plants occurs in early May with the grasses going dormant early in June. Warm season plants make their optimum growth in late June through August, depending on the available moisture.

Large gaps between plants in relic areas (dicontinuous fuels) indicate that this site may not have historically burned often enough to significantly influence its ecological processes. Until further research indicates that fire was a common ecological driver in this system, this ecological site description will not include fire as a disturbance in the reference state. Modern disturbances such as brush treatments, invasive species, and OHV use, could lower the resilience of this ecological sites plant communities. Disturbances that result in an opportunity for invasive annuals to enter into the system and produce large enough fuel loads for fire to become an ecological driver in the current potential and annual weed states.

The introduction of domestic livestock and the use of fencing and reliable water sources have typically only had a minor influence on the historic disturbance regime associated with this ecological site. Improper livestock grazing, including continuous season long grazing and/or heavy stocking rates, could cause this site to depart from the reference community state by removing perennial grasses. This change could increase the chances of invasion by cheatgrass and invasive annual forbs.

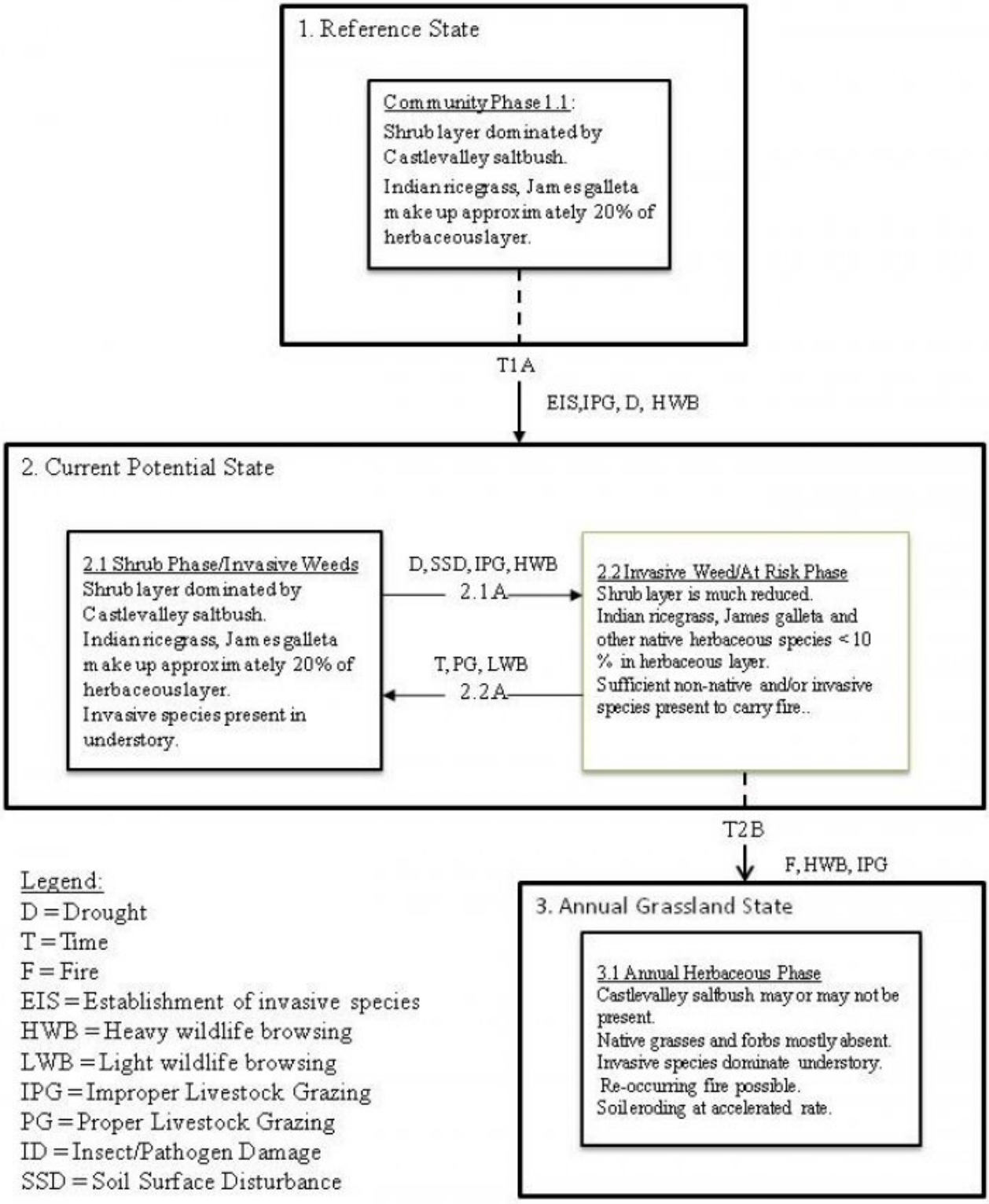
Other natural disturbance mechanisms include wide fluctuations in weather, which can influence the soil/water/vegetation relationships. These fluctuations can facilitate change into different plant community phases.

As vegetative communities respond to harmful management activities or natural influences, thresholds can be crossed. Once this occurs, a return to previous states may not be possible without major energy inputs. The amount of energy needed to affect vegetative shifts depends on present biotic and abiotic features and the desired results.

The following diagram describes some of the most commonly occurring plant communities found on this ecological site. It does not necessarily depict all the communities associated with it. As more data are collected, some of these plant communities may be revised or removed, and new ones may be added. This model was developed using range data collected over the last 30 years in MLRA D35 in southeastern Utah. Both ocular and measured data was collected and utilized.

State and transition model

State and Transition Model
State: Utah
Site Type: Rangeland
MLRA: D-35- Colorado Plateau
R035XY103UT – Desert Clay (Castlevalley saltbush)



State 1
Reference State

This reference state describes the natural biotic communities that may become established on the Desert Clay - Castle Valley saltbush ecological site when all successional sequences are completed under the natural disturbance regime. The reference state is self sustaining and resistant to change due to its high resistance to natural disturbances and high resilience following natural disturbances. When natural disturbances occur, the rate of recovery is variable due to disturbance intensity. This community could become at risk where increased disturbance frequencies allow for the introduction of annual grasses, such as cheatgrass. Once invasive plants become established, return to the reference state may not be possible. Reference State: Community phases influenced by native herbivore grazing, insect herbivory, and weather. Indicators: A sparse perennial cool and warm season grass understory with Castle Valley saltbush forming the dominant visual aspect. Feedbacks: Extended drought and/or improper grazing that result in a reduction of native perennial plant vigor which may cause invasive species to become established in the understory, increased bare spaces, erosion, and soil loss. Properly managed grazing that maintains the perennial bunchgrass understory. At-risk Community Phase: All communities in this state are at risk when native plants are stressed and/or nutrients become available for invasive plants to establish. Trigger: Introduction and establishment of non-native invasive plants such as cheatgrass and Russian thistle.

Community 1.1
Reference Community Phase

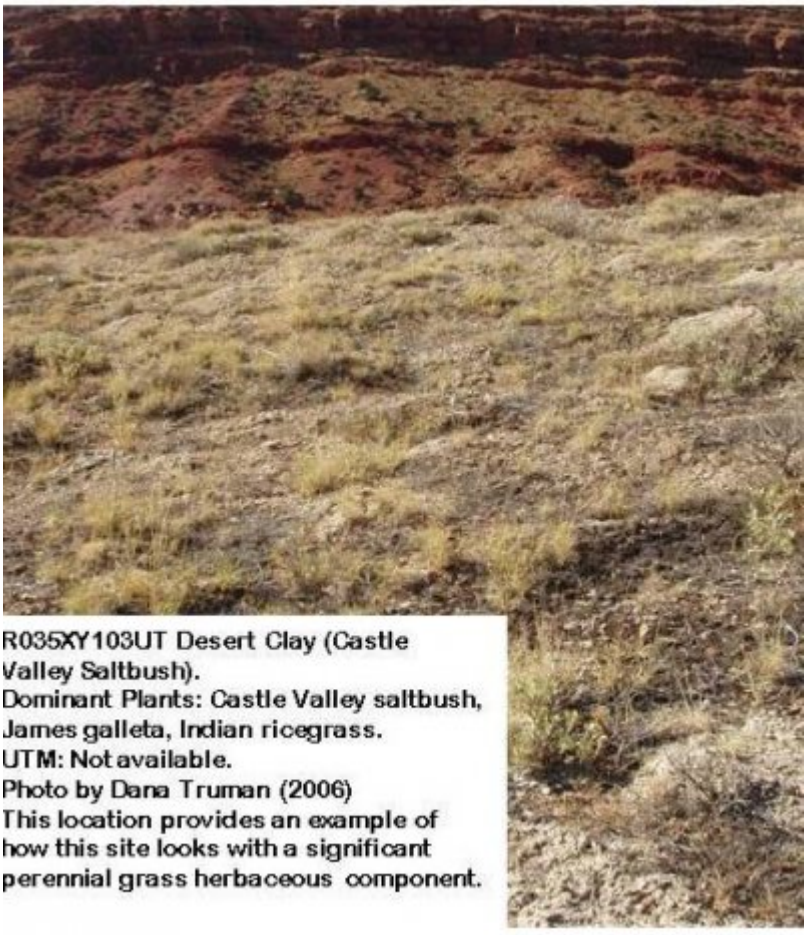


Figure 4. Castle Valley Saltbush With Grasses.

This community is characterized by a Castle Valley saltbush shrub canopy, with perennial native grasses commonly present. Common species include Indian ricegrass, James galleta, and Sandberg bluegrass. Where grass cover increases, shrub interspaces are filled. Other perennial grasses, shrubs, and forbs may or also be present and cover is variable. Bare ground is also variable (20-50%) depending on the number of surface pararock (a weathered piece of shale that is soil parent material) fragments which is also variable (0-90%). Steep hillslopes in this ecological site are often dissected by rills and gullies. The following tables provide an example of the typical vegetative floristics of a commumity 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	125	135	150
Forb	10	20	34
Grass/Grasslike	10	15	25
Total	**145**	**170**	**209**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	10-20%
Grass/grasslike foliar cover	5-10%
Forb foliar cover	1-10%
Non-vascular plants	0%
Biological crusts	0-10%
Litter	0-4%
Surface fragments >0.25" and <=3"	0-20%
Surface fragments >3"	0%
Bedrock	20-40%
Water	0%
Bare ground	20-50%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	0%	0-5%	5-10%	5-5%
>0.5 <= 1	–	5-15%	0-5%	0-15%
>1 <= 2	–	5-10%	0-5%	0-10%
>2 <= 4.5	–	0-5%	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

State 2
Current Potential State

The current potential state is similar to the reference state, except that non-native and/or invasive species are present in all community phases. This state is generally dominated by Castle Valley saltbush and scattered shadscale; however, depending on disturbance history, native grasses, forbs, or other shrubs may dominate the site. Primary disturbance mechanisms include climate fluctuations, native herbivore grazing, domestic livestock grazing, and surface disturbances such as road and pipeline development and off road vehicle (OHV) use. Timing of these disturbances dictates the ecological dynamics that can occur. The current potential state is still self sustaining; but could be losing resistance to change due to increased disturbance and lower resilience following disturbances. Disturbances such as fire are now more likely to occur. Rate of recovery is variable depending on disturbance factors. Indicators: A site dominated by Castle Valley saltbush. James galleta, Indian ricegrass and sand dropseed may also be present. Non-native species are now present in the stand. Feedbacks: Extended

drought resulting in a reduction of native perennial plant vigor. Normal fluctuations in weather allowing for the maintenance of both shrubs and perennial grasses. At-risk Community Phase: This state is at risk when perennial plant cover is reduced and nutrients become available for invasive plants to flourish. Trigger: Spread of invasive plants to fill available niches.

Community 2.1
Valley Saltbush with Grass & Invasive Weeds.

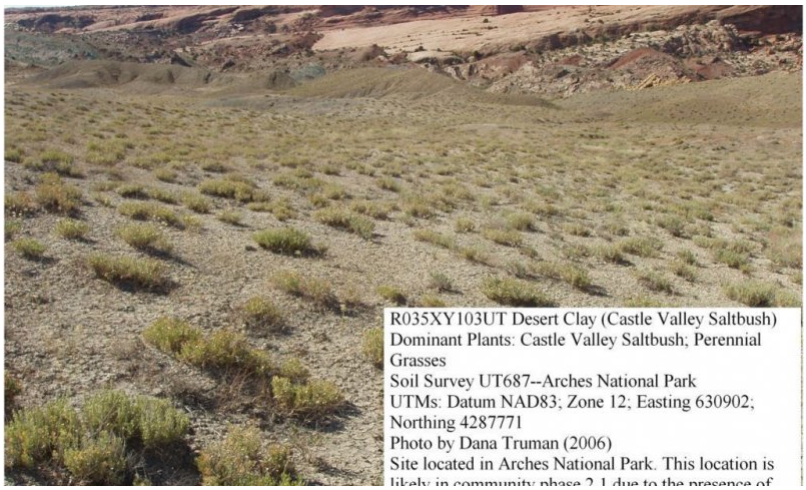


Figure 6. Castle Valley Saltbush with Grasses & Weeds

This community phase is characterized by a Castle Valley saltbush shrub canopy with perennial native grasses present. Invasive plants are also present. Commonly seen grasses include Indian ricegrass, James galleta, Sandberg bluegrass, and cheatgrass. Other grasses, shrubs, and forbs may also be present and cover is variable. Bare ground, rock fragments, and biological crust cover are very similar to community phase 1.1 in their variability and responses to each other. The following tables provide an example of the typical vegetative floristics of a commumity phase 2.1 plant community.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	125	135	150
Grass/Grasslike	5	30	50
Forb	5	20	35
Total	**135**	**185**	**235**

Table 9. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	10-20%
Grass/grasslike basal cover	10-20%
Forb basal cover	1-10%
Non-vascular plants	0%
Biological crusts	0-10%
Litter	0-4%
Surface fragments >0.25" and <=3"	0-20%
Surface fragments >3"	0%
Bedrock	20-40%
Water	0%
Bare ground	20-50%

Table 10. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	0-5%	10-20%	5-10%
>0.5 <= 1	–	5-10%	0-10%	0-5%
>1 <= 2	–	5-15%	0-10%	0-5%
>2 <= 4.5	–	0-5%	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Community 2.2
Invasive Weed/ At Risk Phase

Figure 8. Castle Valley Saltbush at Risk.

This community is at risk of transitioning to an annual grassland. If processes that remove brush (i.e., chemical and mechanical brush treatments, and fire as a result of annual invasives providing a sufficient fuel load) from this site continue to reoccur, this site could potentially become an annual grassland. However, brush removal is not necessary for this site to become dominated by annual grasses. Events that stress perennial plants, such as persistent dry weather, may result in the establishment and dominance of annual invasive forbs and grasses. The risk is likely higher here than in other phases of this state, but the entire state should be considered at risk. This community phase is characterized by an increase in annual invasive grasses and forbs. Length of recovery is dependent upon the severity of the disturbance. Surface rock fragments remain similar to the previous phase. The following tables provide an example of the typical vegetative floristics of a commumity phase 2.2 plant community.

Table 11. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	25	50	120
Shrub/Vine	80	70	100
Forb	0	25	100
Total	**105**	**145**	**320**

Table 12. Ground cover

Tree foliar cover	0%

Shrub/vine/liana foliar cover	5-10%
Grass/grasslike foliar cover	0-40%
Forb foliar cover	0-20%
Non-vascular plants	0%
Biological crusts	0-10%
Litter	0-4%
Surface fragments >0.25" and <=3"	0-20%
Surface fragments >3"	0%
Bedrock	20-40%
Water	0%
Bare ground	20-50%

Table 13. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	0-5%	1-5%	5-10%
>0.5 <= 1	–	5-10%	0-20%	0-5%
>1 <= 2	–	5-15%	0-10%	0-5%
>2 <= 4.5	–	0-5%	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Pathway 2.1A
Community 2.1 to 2.2

Valley Saltbush with Grass & Invasive Weeds.

Invasive Weed/ At Risk Phase

When perennial plants are removed as a result of brush treatments or as perennial plants become stressed due to dry climate, annual invasive grasses and forbs may increase. Brush removal results in a reduction of valley saltbush and an increase in bare ground. As the soil becomes exposed, and the perennial plants are removed, there is more opportunity for cheatgrass and other invasive annuals to dominate the site. Soil stability decreases, and interspaces between perennial native plants increase changing the vegetative dynamics of the site.

Pathway 2.2A
Community 2.2 to 2.1

Invasive Weed/ At Risk Phase

Valley Saltbush with Grass & Invasive Weeds.

Over time without additional disturbance and in the presents of proper livestock management and moderate wildlife browsing, Castle valley saltbush and perennial grasses may increase.

State 3
Annual Grassland State

This annual grassland state occurs when sufficient annual non-native and invasive species occupy the community to allow for fire to periodically burn the site. Shrubs and native perennial herbaceous species are significantly reduced or missing. This State is generally dominated by invasive annual plants such as cheatgrass, halogeton and Russian thistle. Castle Valley saltbush may or may not be present. Annual Weed State: Community phases maintained in a self-sustaining manner by invasive annual weed domination and/or occasional fire. Indicators: A site where ecological processes are driven by cheatgrass and/or other invasive annual forbs. Feedbacks: A self sustaining disturbance regime of invasive annual weed domination and/or occasional fire.

Community 3.1
Annual Herbaceous Phase

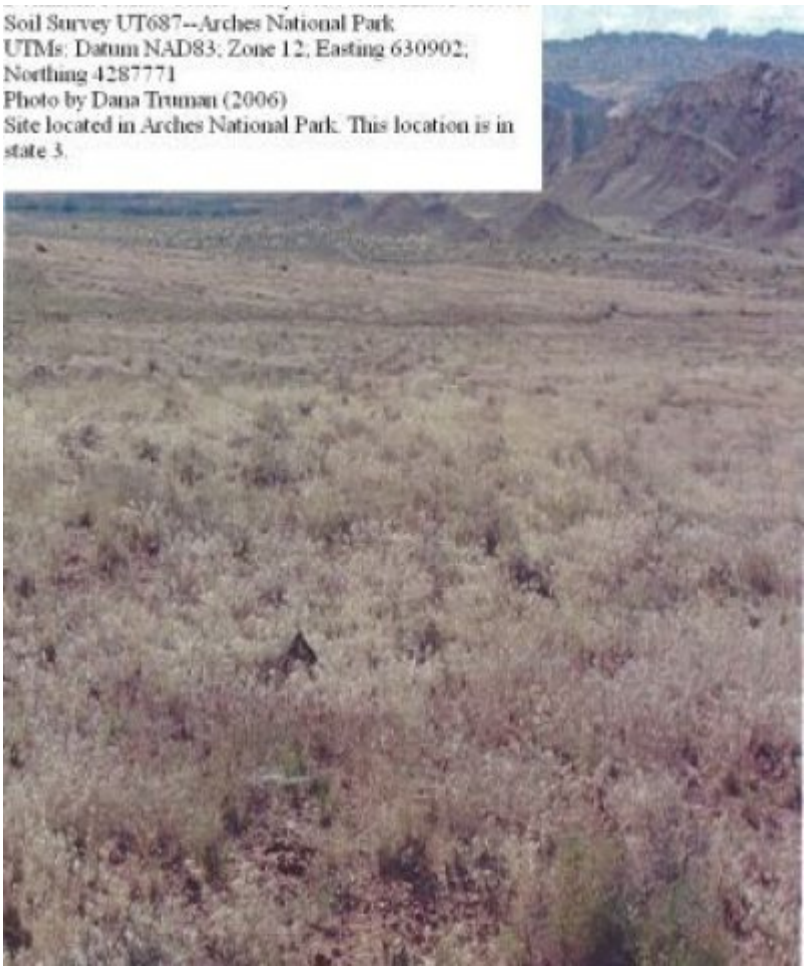


Figure 10. 3.1 Annual Herbaceous Phase

This community phase is characterized by the establishment and persistence of invasive annual grasses and forbs. The species of forbs and annual grasses present are the result of the sufficient disturbance of the community and available seed sources. Due to the low number of sites currently in this state, the ability for this state to convert back to a shrubland is not well understood. The following tables provide an example of the typical vegetative floristics of a commumity phase 3.1 plant community.

Table 14. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	25	50	120
Shrub/Vine	80	70	100
Forb	0	25	100
Total	**105**	**145**	**320**

Table 15. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	5-10%
Grass/grasslike basal cover	0-40%
Forb basal cover	0-20%
Non-vascular plants	0%
Biological crusts	0-10%
Litter	0-4%
Surface fragments >0.25" and <=3"	0-20%
Surface fragments >3"	0%
Bedrock	20-40%
Water	0%
Bare ground	0-50%

Table 16. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	0-5%	1-5%	5-10%
>0.5 <= 1	–	5-10%	0-20%	0-5%
>1 <= 2	–	5-15%	0-10%	0-5%
>2 <= 4.5	–	0-5%	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Transition T1A
State 1 to 2

This transition is from the native perennial warm and cool season grass understory component in the reference state to a state that now contains invasive species. Events that allow for the establishment of invasive plant species include, improper livestock grazing that reduces perennial grasses, prolonged drought, surface disturbances, etc. However, invasive species such as cheatgrass have been known to invade intact perennial plant communities with little to no disturbance. Once invasive species are found in the plant community a threshold has been crossed.

Transition T2A
State 2 to 3

This transition is from the Current Potential State Community 2.2 - Invasive Weed/At Risk Phase to State 3 -

Annual Grassland Phase which is dominated by annual invasive plants. This transition occurs as events favor the increased establishment and dominance of annual invasive plants. Typically, this occurs as a series of fires leads to an increase in cheatgrass and a subsequent decrease in the fire return interval. Once invasive plant species drive the ecological dynamics of the site a threshold has been crossed.

Additional community tables

Table 17. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
0	**Dominant Shrubs**			125–140	
	valley saltbush	ATCU	*Atriplex cuneata*	20–140	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	2–30	–
3	**Sub-Dominant Shrubs**			0–30	
	Bigelow sage	ARBI3	*Artemisia bigelovii*	0–10	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–10	–
	mat saltbush	ATCO4	*Atriplex corrugata*	0–10	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–10	–
	Torrey's jointfir	EPTO	*Ephedra torreyana*	0–10	–
	crispleaf buckwheat	ERCO14	*Eriogonum corymbosum*	0–10	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–10	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0–10	–
	seepweed	SUAED	*Suaeda*	0–10	–
Grass/Grasslike					
0	**Dominant Grasses**			5–20	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	2–15	–
	James' galleta	PLJA	*Pleuraphis jamesii*	2–15	–
1	**Sub-Dominant Grasses**			5–10	
	alkali sacaton	SPAI	*Sporobolus airoides*	0–10	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–2	–
Forb					
2	**Forbs**			10–34	
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–15	–
	onion	ALLIU	*Allium*	0–8	–
	basin fleabane	ERPU9	*Erigeron pulcherrimus*	0–6	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–5	–
	hourglass peaseed	SPCO3	*Sphinctospermum constrictum*	0–5	–
	annual Townsend daisy	TOAN	*Townsendia annua*	0–5	–
	woolly plantain	PLPA2	*Plantago patagonica*	0–4	–
	nakedstem sunray	ENNU	*Enceliopsis nudicaulis*	0–2	–
	tufted evening primrose	OECA10	*Oenothera caespitosa*	0–2	–
	buckwheat	ERIOG	*Eriogonum*	0–1	–
	gilia	GILIA	*Gilia*	0–1	–
	rusty lupine	LUPU	*Lupinus pusillus*	0–1	–
	whitestem blazingstar	MEAL6	*Mentzelia albicaulis*	0–1	–
	sandhill amaranth	AMAR	*Amaranthus arenicola*	0–1	–
	annual ragweed	AMAR2	*Ambrosia artemisiifolia*	0–1	–
	Mojave cleomella	CLOB	*Cleomella obtusifolia*	0–1	–
	twisted cleomella	CLPL2	*Cleomella plocasperma*	0–1	–
	cryptantha	CRYPT	*Cryptantha*	0–1	–

Table 18. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
0	**Dominant Shrubs**			125–140	
	valley saltbush	ATCU	*Atriplex cuneata*	0–140	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	5–30	–
3	**Sub-Dominant Shrubs**			0–30	
	Bigelow sage	ARBI3	*Artemisia bigelovii*	0–10	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–10	–
	mat saltbush	ATCO4	*Atriplex corrugata*	0–10	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–10	–
	Torrey's jointfir	EPTO	*Ephedra torreyana*	0–10	–
	crispleaf buckwheat	ERCO14	*Eriogonum corymbosum*	0–10	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–10	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0–10	–
	seepweed	SUAED	*Suaeda*	0–10	–
Grass/Grasslike					
0	**Dominant Grasses**			5–50	
	cheatgrass	BRTE	*Bromus tectorum*	2–20	–
	James' galleta	PLJA	*Pleuraphis jamesii*	2–15	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	2–15	–
1	**Sub-Dominant Grasses**			2–12	
	alkali sacaton	SPAI	*Sporobolus airoides*	0–10	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–2	–
Forb					
2	**Forbs**			5–35	
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–12	–
	onion	ALLIU	*Allium*	0–8	–
	basin fleabane	ERPU9	*Erigeron pulcherrimus*	0–6	–
	annual Townsend daisy	TOAN	*Townsendia annua*	0–5	–
	woolly plantain	PLPA2	*Plantago patagonica*	0–4	–
	Russian thistle	SALSO	*Salsola*	0–3	–
	saltlover	HALOG	*Halogeton*	0–3	–
	nakedstem sunray	ENNU	*Enceliopsis nudicaulis*	0–2	–
	tufted evening primrose	OECAC2	*Oenothera caespitosa ssp. caespitosa*	0–2	–
	rusty lupine	LUPU	*Lupinus pusillus*	0–1	–
	whitestem blazingstar	MEAL6	*Mentzelia albicaulis*	0–1	–
	gilia	GILIA	*Gilia*	0–1	–
	buckwheat	ERIOG	*Eriogonum*	0–1	–
	annual ragweed	AMAR2	*Ambrosia artemisiifolia*	0–1	–
	twisted cleomella	CLPL2	*Cleomella plocasperma*	0–1	–
	cryptantha	CRYPT	*Cryptantha*	0–1	–

Table 19. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
0	**atcu**			5–100	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	0–30	–
3	**Sub-Dominant Shrubs**			0–15	
	Bigelow sage	ARBI3	*Artemisia bigelovii*	0–10	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–10	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–10	–
	Torrey's jointfir	EPTO	*Ephedra torreyana*	0–10	–
	crispleaf buckwheat	ERCO14	*Eriogonum corymbosum*	0–10	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–10	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0–10	–
	seepweed	SUAED	*Suaeda*	0–10	–
	mat saltbush	ATCO4	*Atriplex corrugata*	0–5	–
Grass/Grasslike					
0	**Dominant Grass**			20–120	
	cheatgrass	BRTE	*Bromus tectorum*	20–100	–
	James' galleta	PLJA	*Pleuraphis jamesii*	0–10	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–10	–
Forb					
2	**Forbs**			0–100	
	prickly Russian thistle	SATR12	*Salsola tragus*	0–20	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–20	–
	Townsend daisy	TOWNS	*Townsendia*	0–15	–
	saltlover	HALOG	*Halogeton*	0–10	–
	onion	ALLIU	*Allium*	0–10	–
	woolly plantain	PLPA2	*Plantago patagonica*	0–4	–
	nakedstem sunray	ENNU	*Enceliopsis nudicaulis*	0–2	–
	annual ragweed	AMAR2	*Ambrosia artemisiifolia*	0–1	–
	spiderflower	CLEOM	*Cleome*	0–1	–
	cryptantha	CRYPT	*Cryptantha*	0–1	–
	whitestem blazingstar	MEAL6	*Mentzelia albicaulis*	0–1	–
	buckwheat	ERIOG	*Eriogonum*	0–1	–

Table 20. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
0	**Dominant Shrubs**			80–100	
	valley saltbush	ATCU	*Atriplex cuneata*	0–100	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	0–30	–
3	**Sub-Dominant Shrubs**			0–15	
	Bigelow sage	ARBI3	*Artemisia bigelovii*	0–5	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–5	–
	mat saltbush	ATCO4	*Atriplex corrugata*	0–5	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–5	–
	Torrey's jointfir	EPTO	*Ephedra torreyana*	0–5	–
	crispleaf buckwheat	ERCO14	*Eriogonum corymbosum*	0–5	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–5	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0–5	–
	seepweed	SUAED	*Suaeda*	0–5	–
Grass/Grasslike					
0	**Dominant Grasses**			0–10	
	cheatgrass	BRTE	*Bromus tectorum*	20–100	–
	James' galleta	PLJA	*Pleuraphis jamesii*	0–10	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–10	–
Forb					
1	**Forbs**			0–100	
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–20	–
	Russian thistle	SALSO	*Salsola*	0–20	–
	prickly Russian thistle	SATR12	*Salsola tragus*	0–20	–
	annual Townsend daisy	TOAN	*Townsendia annua*	0–15	–
	saltlover	HALOG	*Halogeton*	0–10	–
	onion	ALLIU	*Allium*	0–10	–
	basin fleabane	ERPU9	*Erigeron pulcherrimus*	0–3	–
	annual ragweed	AMAR2	*Ambrosia artemisiifolia*	0–2	–
	tufted evening primrose	OECA10	*Oenothera caespitosa*	0–2	–
	woolly plantain	PLPA2	*Plantago patagonica*	0–2	–
	nakedstem sunray	ENNU	*Enceliopsis nudicaulis*	0–2	–
	rusty lupine	LUPU	*Lupinus pusillus*	0–1	–
	whitestem blazingstar	MEAL6	*Mentzelia albicaulis*	0–1	–
	twisted cleomella	CLPL2	*Cleomella plocasperma*	0–1	–
	cryptantha	CRYPT	*Cryptantha*	0–1	–
	gilia	GILIA	*Gilia*	0–1	–
	buckwheat	ERIOG	*Eriogonum*	0–1	–

Animal community

--Threatened and Endangered Species--
This section will be populated as more information becomes available.

--Wildlife Interpretation--
Small herds of mule deer and pronghorn antelope may graze or browse on these sites, especially when located near water sources and in the winter. The hot summers and a lack of water often favors small mammals, which may have an easier time finding shelter, food, and water to live. Several species of rats, mice, squirrels, bats, and chipmunks have been observed using this site, along with coyotes and foxes. Lizards can often be observed during the day. Common lizard species include the northern whiptail, desert spiny, and the colorful western collard lizard. (NPS.gov, 2008)

--Grazing Interpretations--
This site has somewhat limited potential for some classes of livestock grazing. It is primarily composed of shrubs, with the majority of canopy cover being attributed to Castle Valley saltbush. This saltbush can serve as forage for livestock, especially as winter range. When present, grasses, primarily Indian ricegrass and James galleta, can provide good forage for horses, cattle, and sheep; however, many times these species are not abundant enough to support livestock. Grazing must be carefully planned and managed to prevent damage to the site. Before making specific grazing management recommendations, an onsite evaluation should be conducted as part of a science based grazing management plan.

Hydrological functions

The soils associated with this ecological site are generally in Hydrologic Soil Group C due to their moderate to high runoff potential, and loamy textures (NRCS National Engineering Handbook). Hydrologic 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. Surface disturbance can alter the hydrology by decreasing plant cover and increasing bare ground. Fire can also affect hydrology, but it is rare on this site. Fire intensity, fuel type, soil, climate, and topography can each have different influences. (National Range and Pasture Handbook, 2003)

Recreational uses

Recreation activities include aesthetic value and good opportunities for hiking, horseback riding, and off-road vehicle use. Camp sites are usually limited due to lack of sheltering trees or rock outcrops.

Wood products

None

Other information

--Poisonous and Toxic Plant Communities--
Russian thistle can be an invasive toxic plant on this site, causing nitrate and to a lesser extent oxalate poisoning, which affects all classes of livestock. Livestock rarely consume this plant species unless other forage is not available. 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 on soils high in nitrogen and low in sulfur and phosphorus. Nitrate collects in the plant 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 (Knight and Walter, 2001).

--Invasive Plant Communities--
As ecological conditions deteriorate and native vegetation decreases due to disturbance (fire, improper livestock grazing, drought, off road vehicle overuse, erosion, etc.) invasive species can establish on the site. Of particular concern in arid environments are the non-native annual invaders including cheatgrass, Russian thistle, kochia, halogeton, common sunflower and 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 any 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.

This ecological site like many found in desert communities in the Colorado Plateau may have evolved without a significant influence of fire. However a year of exceptionally heavy winter rains can generate fuels by producing heavy stands of annual forbs and grasses.

Because this ecological site is comprised of scattered low stature Castle Valley saltbush plants with bare interspaces to patchy occurrence of grasses, it is unlikely to carry a fire unless high winds, high temperature, and low humidity are present. Most Atriplex species, however, are root sprouters and re-establish rapidly on burned sites. Because of this ability to resist burning and reestablish after a burn event, burning may be a viable brush management tool.

Inventory data references

This site description was adapted from the existing range site description.

It was updated with photos and a state and transition model using data collected during the Arches National Park Soil Survey. Only a small portion of this ecological site was inventoried during the survey. This site description will need to be updated as more data is collected.

By looking at the existing plants data found in NASIS, we have discovered that areas correlated to this site do not always contain valley saltbush. It appears that areas with shallower soils are dominated by Valley saltbush, while areas with deeper soils, are dominated by other shrubs (typically shadscale). In Arches, this site was inventoried for the purpose of preparing this site description. Soils correlated to this site in the Arches survey are shallower than soils typical of this site.

Other references

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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.

Author(s)/participant(s)	Jacob Owens (NRCS), V. Keith Wadman (NRCS, Ret.)
Contact for lead author	shane.green@ut.usda.gov
Date	12/11/2009
Approved by	Shane A. Green
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Very common. Rills present could be 15 or more feet long. They could be 2-3 inches deep. As surface coarse fragments increase, rills become shorter and may not be as deep.

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2. **Presence of water flow patterns:** Very common throughout the site. They are expected to be long and connected into drainage networks. Evidence of flow will increase with slope. As surface coarse fragments increase, flow patterns become less evident and may not be as deep.

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3. **Number and height of erosional pedestals or terracettes:** Plants may show some pedestalling (up to .5 inch) on their down slope side. Terracettes should be few and stable. Interspaces between well developed biological soil crusts may resemble pedestals but they are actually a characteristic of the crust formation.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 20 – 55% depending on surface rock or pararock fragments. Ground cover is based on the first raindrop impact, and bare ground is the inverse of ground cover. Ground cover + bare ground = 100%. 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.

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5. **Number of gullies and erosion associated with gullies:** Present. May be found where adjacent sites/watershed provides concentrated flows into the site. Gullies should show only minor signs of active erosion and should be somewhat stabilized with perennial vegetation. Gullies may show slightly more indication of erosion as slope steepens, or as the site occurs adjacent to sites where runoff accumulation occurs.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** No evidence of wind generated soil movement. Wind caused blowouts and deposition are not expected to be present.

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7. **Amount of litter movement (describe size and distance expected to travel):** Some down slope redistribution caused by water. Some litter removal may occur in flow patterns and rills with deposition occurring at points of obstruction, especially following major storm events. Litter movement will increase with slope.

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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 3 to 4 under plant canopies and a rating of 2 to 3 in the interspaces using the soil stability kit test. The average should be a 3. Surface texture is silty clay loam. Vegetation cover, litter, biological soil crusts and surface rock reduce erosion.

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Structure is weak fine subangular blocky. Surface color is light gray. 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:** Vascular plants are expected to break raindrop impact and splash erosion reducing splash erosion but not eliminating it. Spatial distribution of vascular plants slows runoff somewhat by obstructing surface flows to help create sinuous flow patterns that dissipate energy and allow time for some infiltration. Natural erosion would be expected in most storms and spring 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

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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: Castle valley saltbush.

    Sub-dominant: Perennial grasses and mat saltbush.

    Other: Dominance by average annual production: Non-sprouting shrubs > Warm season perennial grasses > Cool season perennial bunchgrasses > perennial and annual native forbs. Biological soil crust is variable in its expression where present on this site and is measured as a component of ground cover.

    Additional: Perennial and annual forbs can be expected to vary widely in their expression in the plant community based upon departures from average growing conditions. 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. Siberian Wheatgrass, Forage kochia etc.)

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** All age classes of perennial grasses should be present on an average to above average precipitation year with age class expression likely subdued during below average years, or on sites with high (usually greater than 65%) similarity index (late seral to historic climax). 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):** Variability may occur due to weather.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 150-200 #/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:** Russian thistle, halogeton, kochia, common sunflower, and annual mustards.

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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.
