USDA Natural Resources Conservation Service

Ecological site R035XY142UT
Desert Very Shallow Gypsum (Torrey's Jointfir)

Accessed: 05/21/2025

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.

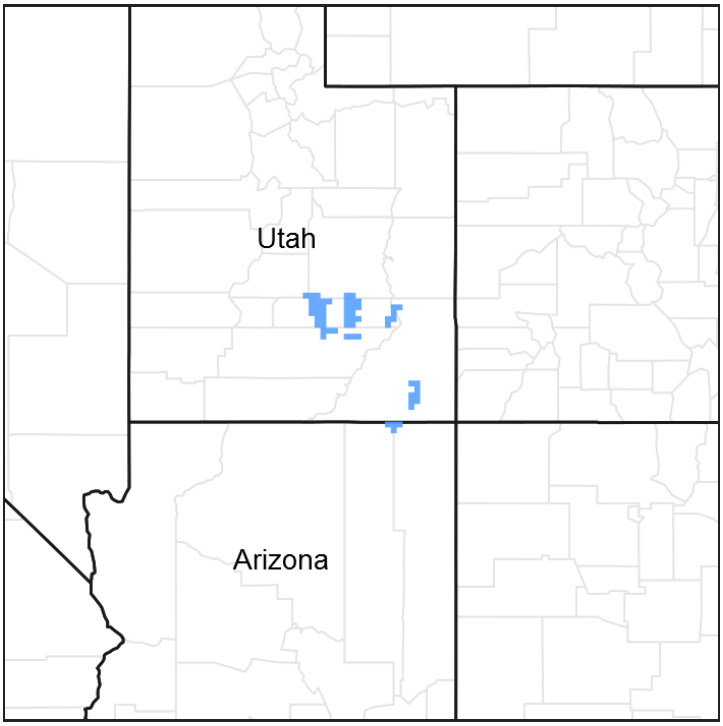


Figure 1. Mapped extent

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 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. In most areas elevation is 4,250 to 4,950 feet but can range from 3,500 to over 10,000 feet on mountains located within the MLRA.

Classification relationships

Modal Soil: Raplee VFSL — coarse-loamy, gypsic, mesic Typic Torriorthents

Type Location: West of Comb Wash between HWY. 163 and the Mormon Trail.

Associated sites

R035XY106UT	**Desert Gypsum Loam (Torrey's Jointfir)**
R035XY115UT	**Desert Sand (Sand Sagebrush)**
R035XY118UT	**Desert Sandy Loam (Fourwing Saltbush)**
R035XY215UT	**Semidesert Sandy Loam (4-Wing Saltbush)**
R035XY263UT	**Semidesert Very Steep Stony Loam (Two-Needle Pinyon, Utah Juniper)**

Similar sites

R035XY106UT	**Desert Gypsum Loam (Torrey's Jointfir)**
R035XY126UT	**Desert Shallow Gypsum (Torrey's Jointfir)**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Ephedra torreyana* (2) *Atriplex confertifolia*
Herbaceous	(1) *Pleuraphis jamesii*

Physiographic features

This site occurs on pediments, structural benches, hills, valleys, alluvial fans, and ridges. Run off is medium to very high. Slopes typically range from 2-50%. Elevations are generally 4300-6800 feet.

Table 2. Representative physiographic features

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

Ponding frequency	None
Elevation	4,300–6,800 ft
Slope	2–50%
Aspect	Aspect is not a significant factor

Climatic features

The climate is characterized by hot summers and cool to warm winters. Large fluctuations in daily temperatures are common. Mean annual high temperatures range from 52-59 degrees Fahrenheit and mean annual low temperatures range from 46-52 degrees Fahrenheit. Approximately 70% occurs as rain from March through October. On the average, April, May, and June are the driest months and August, September, and October are the wettest months. Precipitation is extremely variable from month to month and from year to year but averages between 5-10 inches. Much of the precipitation occurs as convection thunderstorms.

Table 3. Representative climatic features

Frost-free period (average)	172 days
Freeze-free period (average)	196 days
Precipitation total (average)	10 in

Influencing water features

Due to its landscape position, this site is not typically influenced by streams or wetlands. Ephemeral washes may cross this site, but these washes olny carry water during intense storms. As a result, production may increase and composition may differ near washes, but they do not support riparian-obligate vegetation.

Soil features

The soils are mostly shallow but in some locations can be very deep (79") over gypsum. They are well to excessively drained. The dry surface color is typically light reddish brown and soil surface fragments range from 2-30%. The soil temperature and moisture regimes are mesic and typic aridic respectively. Soil textures are variable but are high in gypsum. Water and wind erosion hazard is severe. Runoff is high. Average annual soil loss in potential is approximately 5 tons/acre.

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

UT623 – Emery Area – Goblin

UT631 – Henry Mountains Area – Goblin
UT638 – San Juan County – Robroost
UT685 – Capital Reef National Park – Goblin
UT688 – Canyonlands National Park – Goblin

Typical Profile:
A – 0-3 inches; loamy; moderately alkaline
Cy – 3-12 inches; loamy; moderately calcareous; moderately alkaline
Cr – 12+ inches; gypsiferous shale

Table 4. Representative soil features

Parent material	(1) Alluvium–rock gypsum (2) Residuum–sandstone and shale
Surface texture	(1) Loam (2) Channery loam (3) Very fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	5–20 in
Surface fragment cover <=3"	5–28%
Surface fragment cover >3"	0–3%
Available water capacity (0-40in)	1.5–2.1 in
Calcium carbonate equivalent (0-40in)	10–30%
Electrical conductivity (0-40in)	0–8 mmhos/cm
Sodium adsorption ratio (0-40in)	0–10
Soil reaction (1:1 water) (0-40in)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	5–27%
Subsurface fragment volume >3" (Depth not specified)	0–5%

Ecological dynamics

This site developed under Colorado Plateau ecological conditions and the natural

influences of herbivory and climate. This site’s plant species composition is generally dominated by Torrey's jointfir. Blackbrush, Shadscale and Crispleaf buckwheat are commonly associated shrub species. Crispleaf buckwheat can occasionally dominate on steep north exposures. James galleta, Indian ricegrass and other perennial grass production is dependant on weather patterns (summer or winter precipitation) and on soil depth to a gypsic or other restrictive layer. The shallower the soil, the fewer herbaceous species. Blackbrush appears to act as a paleo-endenmic species in this MLRA and may not be able to reestablish itself following mortality.

There is no evidence to indicate that this site historically maintained a short burn frequency. Large gaps between plants (very discontinuous fuels)in relic areas indicate that this site may have historically very rarely burned. Until further research indicates that fire played a significient role in the ecosystem processes of this site, it will not include fire as a disturbance in the reference state. However, due to modern disturbances such as OHV use, the resilience of the historical vegetation may become at risk. These disturbances may result in an opportunity for invasive annuals to enter the system and possibly produce sufficient fuel loads for fire to become a risk. Cheatgrass, red brome, and Russian thistle are most likely to invade this site.

This ecological site has been grazed by domestic livestock since they were first introduced into the area around 1860. It is highly resistant to grazing due to the low palatability of Torrey's jointfir and lack of forage plants. The introduction of domestic livestock and the use of fencing and reliable water sources have therefore only minimally influenced the historic disturbance regime associated with this ecological site.

Improper livestock grazing including, season long grazing and\or heavy stocking rates, may cause this site to depart from the reference plant community. As ecological condition deteriorates, perennial grasses and palatable shrubs may decrease while Woolly locoweed, Desert trumpet, Rubber rabbitbrush, and Broom snakeweed may increase. Improper grazing may also increase the chance of invasion by invasive annuals. On the Colorado Plateau, however, these species are capable of establishing themselves in the abscence of grazing but they rarely increase to a point where they dominate the Torrey jointfir communities.

Management practices that maintain or improve the rangeland vegetation include prescribed grazing and the proper location of water developments. Severe drought may adversely affect the production of the herbaceous perennial vegetation.

Suitability for rangeland seeding is very poor. It is not practical to revegetate large areas of this ecological site because of the sites shallow soil depth, low annual precipitation, and very low available water capacity. Additionally, slpoes can range to 50% making them too steep for reseeding. To control erosion in areas where the need is critical, small areas can be mechanically treated and seeded.

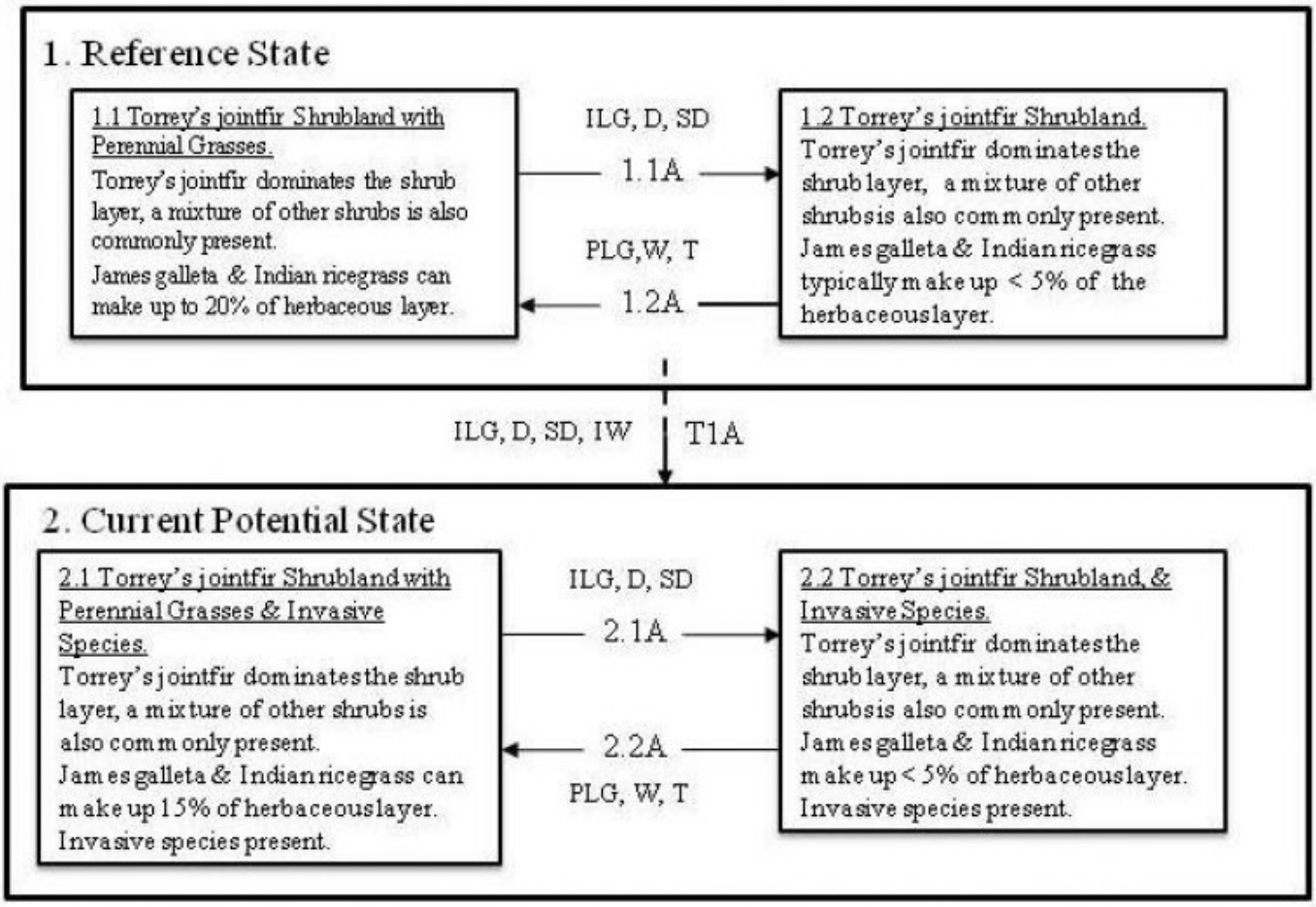
As vegetation communities respond to changes in management or natural influences that

move them to different ecological states, 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 State and Transition diagram shows some of the most commonly occurring plant communities found on this ecological site. These plant communities may not represent every possibility, but they are the most prevalent and repeatable. 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 40 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
R035XY142UT – Desert Very Shallow Gypsum (Torrey's Jointfir).



Legend:
D = Drought.
W = Wet weather periods.
T = Time
ILG = Improper Livestock Grazing
PLG = Proper Livestock Grazing
SD = Surface Disturbance.
IW = Invasive Weed Source.

State 1
Reference State

The reference state represents the historic plant communities and ecological dynamics of the Desert Very Shallow Gypsum, Torrey's jointfir ecological site. This state includes the biotic communities that become established on the site if all successional sequences are completed under current climatic conditions; natural disturbances are inherent in its

development. This state is dominated by Torrey’s jointfir, a mixture of other shrubs, and limited amounts of perennial grasses. The reference state is self sustaining and resistant to change due to high resistance to natural disturbances and high resilience following natural disturbances. Biological soil crusts are highly variable in their expression on this site. The reference state was determined by study of rangeland relic areas, areas protected from excessive disturbance and outside influences, such as grazing and recreation. Literature reviews, trends in plant community dynamics, and historical accounts are also considered. Reference State: Community phases resistant to natural disturbances. Indicators: A site dominated by Torrey’s jointfir where James galleta, Indian ricegrass and sand dropseed may also be present. Feedbacks: Natural fluctuations in climate that allows for a self sustaining Torrey’s joitfir and a native grass community understory. Any disturbance that may allow for the establishment of invasive species. At-risk Community Phase: All communities are at risk when perennial plants are stressed and nutrients are available for invasive plants to establish. Trigger: Introduction of invasive plants to fill available niches.

Community 1.1
Torrey's jointfir Shrubland with perennial grasses.

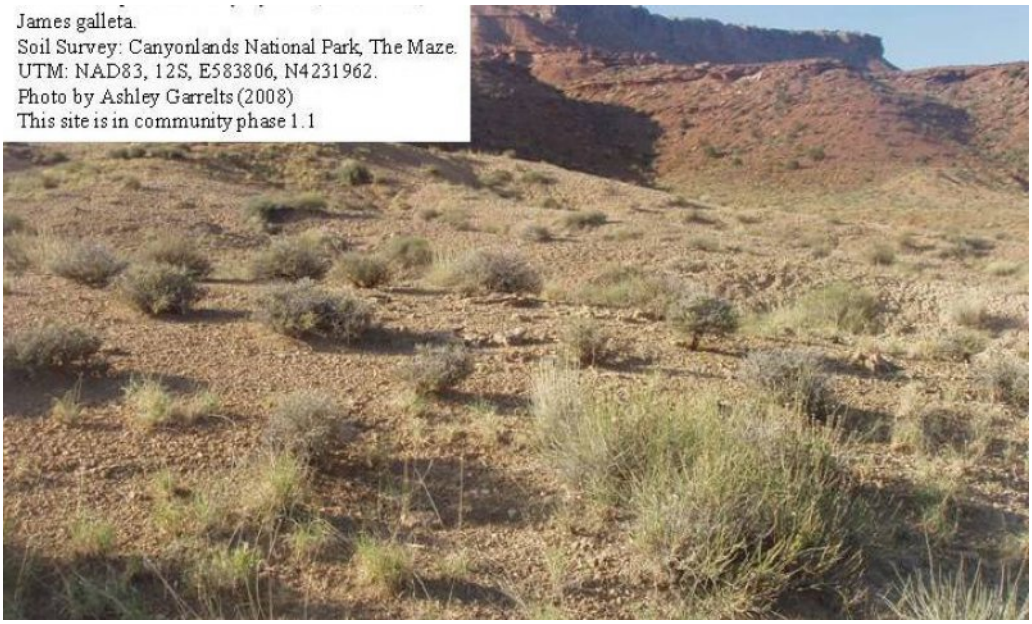


Figure 4. Torrey Jointfir Shrubland with Perennial Grasses.

The dominant aspect of the plant community is Torrey's jointfir, Blackbrush, and James galleta. Matted crinklemat is the dominant forb. The composition by air-dry weight is approximately 20% perennial grasses, 20% forbs, and 60% shrubs. Of note, Comb Wash wild buckwheat (*Eriogonum clavellatum*) is endemic to this site, possibly only found in San Juan County. In average years, plants begin growth around February 20 and end growth around October 30. The following tables provide an example of 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	40	90	140
Grass/Grasslike	20	30	50
Forb	5	15	20
Total	**65**	**135**	**210**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	20-60%
Grass/grasslike foliar cover	5-20%
Forb foliar cover	5-10%
Non-vascular plants	0%
Biological crusts	0-60%
Litter	0-5%
Surface fragments >0.25" and <=3"	5-30%
Surface fragments >3"	0%
Bedrock	5-20%
Water	0%
Bare ground	30-60%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	0-10%	0-8%	0-5%
>0.5 <= 1	–	0-20%	0-8%	0-4%
>1 <= 2	–	5-30%	0-5%	0-4%
>2 <= 4.5	–	0-10%	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Community 1.2
Torrey's jointfir Shrubland.

Figure 6. Torreys jointfir shrubland.

The dominant aspect of the plant community is Torrey's jointfir, blackbrush, with some James galleta. Matted crinklemat is the dominant forb. The composition by air-dry weight is approximately 5% perennial grasses, 10% forbs, and 85% shrubs. Of note, Comb Wash Wild Buckwheat (*Eriogonum clavellatum*) is endemic to this site, possible only found in San Juan County. In average years, plants begin growth around February 20 and end growth around October 30. The average annual production and species composition tables for this community phase are very similar to those tables developed for community phase 1.1 except that production of perennial grasses is lower (20% vs. 5%) and production of shrubs is higher (60% vs. 85%). The following tables provide an example of the typical vegetative floristics of a community phase 1.2 plant community.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	40	90	140
Grass/Grasslike	15	20	30
Forb	5	15	20
Total	**60**	**125**	**190**

Table 9. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	20-80%
Grass/grasslike foliar cover	5-10%

Forb foliar cover	5-10%
Non-vascular plants	0%
Biological crusts	0-60%
Litter	0-5%
Surface fragments >0.25" and <=3"	5-30%
Surface fragments >3"	0%
Bedrock	5-20%
Water	0%
Bare ground	30-60%

Table 10. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	0-10%	0-8%	0-5%
>0.5 <= 1	–	0-20%	0-8%	0-4%
>1 <= 2	–	5-30%	0-5%	0-4%
>2 <= 4.5	–	0-10%	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Pathway 1.1A
Community 1.1 to 1.2

Torrey's jointfir Shrubland with perennial grasses.

Torrey's jointfir Shrubland.

This pathway occurs when climatic events, such as drought disfavor the establishment and persistence of perennial grasses. Improper livestock grazing and/or surface disturbance may accelerate this transition.

Pathway 1.2A
Community 1.2 to 1.1

Torrey's jointfir Shrubland.

Torrey's jointfir Shrubland with perennial grasses.

This pathway occurs when weather events, such as years with normal to above average precipitation favor the establishment and persistence of perennial grasses. Carefully managed livestock grazing, where present can accelerate this transition.

State 2
Current Potential State

The plant communities found on this State are similar to those found State 1 except that invasive species have become established in the herbaceous layer. Species commonly invading this state include cheatgrass, red brome, Russian thistle and possibly halogeton. Indicators: A site dominated by Torrey's jointfir where James galleta, Indian ricegrass and sand dropseed may also be present. Invasive weeds are present also. Feedbacks: Natural fluctuations in climate that allow for the self sustainment of Torrey's joitfir and a native grass community. Any disturbance that may allow for an increase in those invasive species presently occupying the state. Trigger: Any activity that allows invasive weeds to become more prominent in the plant communities.

Community 2.1
Torrey's jointfir, shrubland with perennial grasses & invasive weeds.

Figure 8. Torrey jointfir Shrubland with grasses and weeds.

This plant community is similar to Reference State Community 1.1. except that invasive species are now present. The dominate aspect of this community is composed of Torrey's jointfir with a mixture of other shrubs including blackbrush, shadscale, and crispleaf buckwheat commonly occurring. Cheatgrass and/or red brome are common invasive species. Native perennial grasses are still present and may include but are not limited to, Indian ricegrass, James galleta, and several dropseed species. Other native and invasive forbs may also be present and cover is variable. The composition by air-dry weight is approximately 30% grasses, 15% forbs, and 55% shrubs. Of note, comb wash buckwheat is endemic to this site, and is possibly only found in San Juan County. Bare ground is 0-40% and biological crusts range from 5-60%. Surface rock fragments (0-60%) can be very prevalent and are characterized by gravels, cobbles, and/or channers. The following tables provide an example of the typical vegetative floristics of a community phase 2.1 plant community.

Table 11. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	40	70	110
Grass/Grasslike	20	30	50
Forb	10	15	25
Total	**70**	**115**	**185**

Table 12. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	5-40%
Grass/grasslike foliar cover	0-8%
Forb foliar cover	0-9%
Non-vascular plants	0%
Biological crusts	0-60%
Litter	0-6%
Surface fragments >0.25" and <=3"	5-28%
Surface fragments >3"	0%
Bedrock	5-20%
Water	0%
Bare ground	20-40%

Table 13. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	0-10%	0-8%	0-5%
>0.5 <= 1	–	0-20%	0-8%	0-4%
>1 <= 2	–	5-30%	0-5%	0-4%
>2 <= 4.5	–	0-10%	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Community 2.2
Torrey's jointfir, shrubland with invasive weeds.

Figure 10. Torreys jointfir with invasive species.

This plant community is similar to Reference State Community 1.2 except that invasive species are now present. The dominate aspect of this community is composed of Torrey's jointfir with a mixture of other shrubs including blackbrush, shadscale, and crispleaf buckwheat commonly occurring. Cheatgrass and/or red brome are common invasive species. Native perennial grasses are still present and may include, but are not limited to, Indian ricegrass, James galleta, and several dropseed species. Other native and invasive forbs may also be present and cover is variable. The composition by air-dry weight is approximately 20% grasses (mostly annuals), 10% forbs, and 60% shrubs. Of note, comb wash buckwheat is endemic to this site, and is possibly only found in San Juan County. Surface rock fragments (0-60%) can be very prevalent and are characterized by gravels, cobbles, and/or channers. The average annual production and species composition tables

for this community phase are very similar to those tables developed for community phase 2.1 except that production of grasses (mostly annual) is lower (20% vs. 30%) and production of shrubs is higher (60% vs. 55%). The following tables provide an example of the typical vegetative floristics of a community phase 2.2 plant community.

Table 14. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	40	70	110
Grass/Grasslike	20	30	50
Forb	10	15	25
Total	**70**	**115**	**185**

Table 15. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	5-40%
Grass/grasslike foliar cover	0-8%
Forb foliar cover	0-9%
Non-vascular plants	0%
Biological crusts	0-60%
Litter	0-6%
Surface fragments >0.25" and <=3"	5-28%
Surface fragments >3"	0%
Bedrock	5-20%
Water	0%
Bare ground	20-40%

Table 16. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	0-10%	0-8%	0-5%
>0.5 <= 1	–	0-20%	0-8%	0-4%
>1 <= 2	–	5-30%	0-5%	0-4%
>2 <= 4.5	–	0-10%	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Pathway 2.1A
Community 2.1 to 2.2

Torrey's jointfir, shrubland with perennial grasses & invasive weeds.

Torrey's jointfir, shrubland with invasive weeds.

This pathway occurs when weather events, such as drought disfavor the establishment and persistence of perennial grasses. Improper livestock grazing and/or surface disturbance may accelerate this transition. Annuals such as cheatgrass may be able to take advantage of these conditions during short term wet spells.

Pathway 2.2A
Community 2.2 to 2.1

Torrey's jointfir, shrubland with invasive weeds.

Torrey's jointfir, shrubland with perennial grasses & invasive weeds.

This pathway occurs when weather events, such as years with normal to above average precipitation favor the establishment and persistence of perennial grasses. Carefully managed livestock grazing, where present can accelerate this transition. Annual species

such as cheatgrass may increase during this period.

Transition T1A
State 1 to 2

--Transition from Reference State (State 1) to Current Potential State (State 2)— This transition is from the native perennial warm and cool season grass understory in the reference state to a state that contains invasive species. Events include season long continuous grazing of perennial grasses, prolonged drought, and surface disturbances, etc. However invasive species such as cheatgrass have been known to invade intact perennial plant communities with little to no disturbances. Once invasive plants are found in the plant community 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**			60–120	
	Torrey's jointfir	EPTO	*Ephedra torreyana*	50–90	–
	blackbrush	CORA	*Coleogyne ramosissima*	20–40	–
3				11–45	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	0–45	–
	crispleaf buckwheat	ERCOA	*Eriogonum corymbosum var. aureum*	2–25	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–10	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	3–10	–
	spiny hopsage	GRSP	*Grayia spinosa*	0–3	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–3	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–3	–
	basin saltbush	ATTR3	*Atriplex tridentata*	0–3	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–3	–
	Comb Wash buckwheat	ERCL2	*Eriogonum clavellatum*	1–3	–
	narrowleaf yucca	YUAN2	*Yucca angustissima*	0–2	–
Grass/Grasslike					
0	**Dominant Grasses**			10–35	

	James' galleta	PLJA	*Pleuraphis jamesii*	10–35	–
1	**Sub-Dominant Grasses**			5–20	
	Grass, annual	2GA	*Grass, annual*	0–5	–
	Grass, perennial	2GP	*Grass, perennial*	0–5	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–5	–
	spike dropseed	SPCO4	*Sporobolus contractus*	0–5	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–5	–
	needle and thread	HECO26	*Hesperostipa comata*	0–3	–
	sandhill muhly	MUPU2	*Muhlenbergia pungens*	0–3	–
	alkali sacaton	SPAI	*Sporobolus airoides*	0–3	–
Forb					
2	**Forbs**			5–20	
	Comb Wash buckwheat	ERCL2	*Eriogonum clavellatum*	0–12	–
	cushion buckwheat	EROV	*Eriogonum ovalifolium*	0–8	–
	nakedstem sunray	ENNU	*Enceliopsis nudicaulis*	0–8	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–5	–
	desert princesplume	STPI	*Stanleya pinnata*	0–5	–
	matted crinklemat	TILA6	*Tiquilia latior*	0–5	–
	woodyaster	XYLOR	*Xylorhiza*	0–5	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–5	–
	Forb, annual	2FA	*Forb, annual*	0–5	–
	Forb, perennial	2FP	*Forb, perennial*	0–5	–
	Crescent milkvetch	ASAM5	*Astragalus amphioxys*	0–3	–
	woolly locoweed	ASMO7	*Astragalus mollissimus*	0–3	–
	stemless four-nerve daisy	TEACA2	*Tetraneuris acaulis var. acaulis*	0–3	–
	redroot buckwheat	ERRA3	*Eriogonum racemosum*	0–3	–
	prairie sunflower	HEPE	*Helianthus petiolaris*	0–3	–
	Jones' pepperweed	LEMOJ	*Lepidium montanum var. jonesii*	0–3	–
	rusty lupine	LUPUP	*Lupinus pusillus ssp.*	0–3	–

			pusillus		
	blazingstar	MENTZ	*Mentzelia*	0–1	–
	tufted evening primrose	OECA10	*Oenothera caespitosa*	0–1	–

Table 18. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
0	**Dominant Shrubs**			80–140	
	Torrey's jointfir	EPTO	*Ephedra torreyana*	50–90	–
	blackbrush	CORA	*Coleogyne ramosissima*	30–60	–
3				10–45	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	0–45	–
	crispleaf buckwheat	ERCOA	*Eriogonum corymbosum var. aureum*	2–25	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–10	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	3–10	–
	spiny hopsage	GRSP	*Grayia spinosa*	0–3	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–3	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–3	–
	basin saltbush	ATTR3	*Atriplex tridentata*	0–3	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–3	–
	Comb Wash buckwheat	ERCL2	*Eriogonum clavellatum*	1–3	–
	narrowleaf yucca	YUAN2	*Yucca angustissima*	0–2	–
Grass/Grasslike					
0	**Dominant Grasses**			0–20	
	James' galleta	PLJA	*Pleuraphis jamesii*	0–20	–
1	**Sub-Dominant Grasses**			5–20	
	Grass, annual	2GA	*Grass, annual*	0–5	–
	Grass, perennial	2GP	*Grass, perennial*	0–5	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–5	–
	spike dropseed	SPCO4	*Sporobolus contractus*	0–5	–

	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–5	–
	needle and thread	HECO26	*Hesperostipa comata*	0–3	–
	sandhill muhly	MUPU2	*Muhlenbergia pungens*	0–3	–
	alkali sacaton	SPAI	*Sporobolus airoides*	0–3	–
Forb					
2	**Forbs**			5–20	
	Comb Wash buckwheat	ERCL2	*Eriogonum clavellatum*	0–12	–
	cushion buckwheat	EROV	*Eriogonum ovalifolium*	0–8	–
	nakedstem sunray	ENNU	*Enceliopsis nudicaulis*	0–8	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–5	–
	desert princesplume	STPI	*Stanleya pinnata*	0–5	–
	matted crinklemat	TILA6	*Tiquilia latior*	0–5	–
	woodyaster	XYLOR	*Xylorhiza*	0–5	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–5	–
	Forb, annual	2FA	*Forb, annual*	0–5	–
	Forb, perennial	2FP	*Forb, perennial*	0–5	–
	Crescent milkvetch	ASAM5	*Astragalus amphioxys*	0–3	–
	woolly locoweed	ASMO7	*Astragalus mollissimus*	0–3	–
	stemless four-nerve daisy	TEACA2	*Tetraneuris acaulis var. acaulis*	0–3	–
	redroot buckwheat	ERRA3	*Eriogonum racemosum*	0–3	–
	prairie sunflower	HEPE	*Helianthus petiolaris*	0–3	–
	Jones' pepperweed	LEMOJ	*Lepidium montanum var. jonesii*	0–3	–
	rusty lupine	LUPUP	*Lupinus pusillus ssp. pusillus*	0–3	–
	blazingstar	MENTZ	*Mentzelia*	0–1	–
	tufted evening primrose	OECA10	*Oenothera caespitosa*	0–1	–

Table 19. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					

Shrub/Vine					
0	**Dominant Shrub**			20–30	
	Torrey's jointfir	EPTO	*Ephedra torreyana*	20–30	–
3	**Sub-dominant Shruba**			11–45	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	0–45	–
	crispleaf buckwheat	ERCO14	*Eriogonum corymbosum*	2–27	–
	blackbrush	CORA	*Coleogyne ramosissima*	0–20	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–10	–
	spiny hopsage	GRSP	*Grayia spinosa*	0–3	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–3	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–3	–
	Comb Wash buckwheat	ERCL2	*Eriogonum clavellatum*	0–3	–
	basin saltbush	ATTR3	*Atriplex tridentata*	0–3	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–3	–
	narrowleaf yucca	YUAN2	*Yucca angustissima*	0–2	–
Grass/Grasslike					
0	**Dominant Grass**			10–35	
	James' galleta	PLJA	*Pleuraphis jamesii*	5–25	–
	cheatgrass	BRTE	*Bromus tectorum*	5–15	–
1	**Sub-dominant Grass**			11–25	
	spike dropseed	SPCO4	*Sporobolus contractus*	0–5	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–5	–
	Grass, annual	2GA	*Grass, annual*	0–5	–
	Grass, perennial	2GP	*Grass, perennial*	0–5	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–5	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–3	–
	sandhill muhly	MUPU2	*Muhlenbergia pungens*	0–3	–
	alkali sacaton	SPAI	*Sporobolus airoides*	0–3	–
Forb					
2	**Forbs**			8–21	
	Comb Wash buckwheat	ERCL2	*Eriogonum clavellatum*	0–12	–

	cushion buckwheat	EROV	*Eriogonum ovalifolium*	0–8	–
	nakedstem sunray	ENNU	*Enceliopsis nudicaulis*	0–8	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–5	–
	Forb, annual	2FA	*Forb, annual*	0–5	–
	Forb, perennial	2FP	*Forb, perennial*	0–5	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–5	–
	desert princesplume	STPI	*Stanleya pinnata*	0–5	–
	matted crinklemat	TILA6	*Tiquilia latior*	0–5	–
	woodyaster	XYLOR	*Xylorhiza*	0–5	–
	stemless four-nerve daisy	TEAC	*Tetraneuris acaulis*	0–3	–
	Crescent milkvetch	ASAM5	*Astragalus amphioxys*	0–3	–
	prairie sunflower	HEPE	*Helianthus petiolaris*	0–3	–
	Jones' pepperweed	LEMOJ	*Lepidium montanum var. jonesii*	0–3	–
	blazingstar	MENTZ	*Mentzelia*	0–1	–
	tufted evening primrose	OECA10	*Oenothera caespitosa*	0–1	–

Table 20. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
0	**Dominant Shrub**			20–30	
	Torrey's jointfir	EPTO	*Ephedra torreyana*	20–30	–
3	**Sub-dominant Shruba**			11–45	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	0–45	–
	crispleaf buckwheat	ERCO14	*Eriogonum corymbosum*	2–27	–
	blackbrush	CORA	*Coleogyne ramosissima*	0–20	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–10	–
	spiny hopsage	GRSP	*Grayia spinosa*	0–3	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–3	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–3	–

	Comb Wash buckwheat	ERCL2	*Eriogonum clavellatum*	0–3	–
	basin saltbush	ATTR3	*Atriplex tridentata*	0–3	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–3	–
	narrowleaf yucca	YUAN2	*Yucca angustissima*	0–2	–
Grass/Grasslike					
0	**Dominant Grass**			10–35	
	cheatgrass	BRTE	*Bromus tectorum*	5–15	–
	James' galleta	PLJA	*Pleuraphis jamesii*	0–15	–
1	**Sub-dominant Grass**			11–25	
	Grass, annual	2GA	*Grass, annual*	0–5	–
	Grass, perennial	2GP	*Grass, perennial*	0–5	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–5	–
	spike dropseed	SPCO4	*Sporobolus contractus*	0–5	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–5	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–3	–
	sandhill muhly	MUPU2	*Muhlenbergia pungens*	0–3	–
	alkali sacaton	SPAI	*Sporobolus airoides*	0–3	–
Forb					
2	**Forbs**			8–21	
	Comb Wash buckwheat	ERCL2	*Eriogonum clavellatum*	0–12	–
	cushion buckwheat	EROV	*Eriogonum ovalifolium*	0–8	–
	nakedstem sunray	ENNU	*Enceliopsis nudicaulis*	0–8	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–5	–
	Forb, annual	2FA	*Forb, annual*	0–5	–
	Forb, perennial	2FP	*Forb, perennial*	0–5	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–5	–
	desert princesplume	STPI	*Stanleya pinnata*	0–5	–
	matted crinklemat	TILA6	*Tiquilia latior*	0–5	–
	woodyaster	XYLOR	*Xylorhiza*	0–5	–

	stemless four-nerve daisy	TEAC	*Tetraneuris acaulis*	0–3	–
	Crescent milkvetch	ASAM5	*Astragalus amphioxys*	0–3	–
	prairie sunflower	HEPE	*Helianthus petiolaris*	0–3	–
	Jones' pepperweed	LEMOJ	*Lepidium montanum var. jonesii*	0–3	–
	blazingstar	MENTZ	*Mentzelia*	0–1	–
	tufted evening primrose	OECA10	*Oenothera caespitosa*	0–1	–

Animal community

--Wildlife Interpretation--
Small herds of mule deer and pronghorn antelope can be seen grazing/browsing on these sites especially when near water sources and in the winter. Desert bighorn sheep may utilize this site when occurring on steeper slopes. 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. Lizards are the most visible and can be observed during the day. Species may include the northern whiptail, desert spiny, and the colorful western collard lizard. (NPS.gov, 2008)

--Grazing Interpretations--
This site provides very limited grazing for livestock. Torrey's jointfir provides fair forage for cattle and sheep on winter range. When present, grasses, primarily Indian ricegrass and James galleta, provide good forage for livestock, however, these species are often not abundant enough to support many livestock. Forage composition and annual production depend largely on yearly precipitation amounts and thus provide challenges for those making livestock grazing management decisions. Regardless of class of livestock, this sites carrying capacity is always low. A lack of available drinking water, can also influence its suitability for livestock grazing. Care should be taken to maintain the native perennial grasses and shrubs present on this site because they are hard to restore one gone.

This site may serve a duel purpose by also being important habitat for wildlife species such as pronghorn antelope, mule deer, and desert bighorn sheep, and can be important for wintering areas for bighorn sheep. In many places, however, wildlife populations are small and thus have little grazing/beowsing impact on the site.

Grazing management should be based on a science based management plan that includes an on site resource inventories.

Hydrological functions

The soil is in hydrologic group D. The hydrologic curve numbers are 80 to 89 depending

on the watershed condition. These soils are saturated quickly due to high infiltration rates and shallow depth; once soils are saturated, run off potential is high. 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. Heavy grazing can alter the hydrology by decreasing plant cover and increasing bare ground. Fire, when present, can also affect hydrology, but its affects are 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

Resources that have special aesthetic and landscape values are wildflowers. Some recreation uses of this site include hiking, hunting, and horseback riding.

Wood products

None

Other products

None

Other information

--Poisonous/Toxic Plant Communities--
Toxic plants associated with this site include broom snakeweed. 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 will generally only graze broom snakeweed when other forage is unavailable, typically in winter when toxicity levels are at their lowest.

Other potentially toxic plants associated with this site can include some buckwheat species, which may accumulate selenium, but only when growing on selenium enriched soils. These plants, when consumed will cause alkali disease or chronic selenosis, which affects all classes of livestock (excluding goats). Typically, animals consuming 5-50 ppm selenium will develop chronic selenosis and animals consuming greater than 50 ppm selenium will develop acute selenosis. Clinical signs include lameness, soughing of the hoof, hair loss, blindness, and aimless wondering. Horses tend to develop what is called a “bob” tail or “roached” main due to breakage of the long hairs.

Although not found on this site yet, Russian thistle is a toxic plant of concern in arid environments that could become established on this site. It can cause 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 a period with cool/cloudy days, and 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 (Knight and Walter, 2001).

--Invasive Plant Communities--
When ecological conditions deteriorate and perennial vegetation decreases due to disturbance (i.e., fire, over grazing, drought, off road vehicle overuse, erosion, etc.) annual forbs and grasses may invade this site. Of particular concern in semi-arid environments are 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 Torrey jointfir’s slow growth rate it does not compete well with invading plants after a disturbance and thus restoration efforts could be hindered.

--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. Many semi-desert plant communities in the Colorado Plateau may have evolved without a significant influence of fire. However, a year with exceptionally heavy winter rains can generate sufficient fuels for fire by producing heavy stands of annual forbs and grasses. When fires do occur, the effect on plant communities may be extreme due to the sites harsh environment and slow rate of recovery.

Fires on Torrey jointfir ecological sites are relatively uncommon due to sparse vegetation and insufficient fuels. Its fire regime depends on the adjacent plant communities and has a wide range of return intervals. This plant generally sprouts from the roots or woody crown after fire, but it also has the capability of reestablishing through seed. While it establishes quickly after fire, its slow growth rate inhibits vigorous competition with invading annuals which could change the fire regime due to an increase in fine fuels.

Inventory data references

The data collected in 2005-2008 were in conjunction with the soil survey update for Arches and Canyonlands National Park. The vegetation data was collected in associated with a

soil pit and geo-referenced. All the data is stored as hard copy files and in electronic format in the NRCS Utah State Office.

Type locality

Location 1: Wayne County, UT	
Township/Range/Section	T27 S R5 E S3
Location 2: Wayne County, UT	
UTM zone	N
UTM northing	4231962
UTM easting	583806
General legal description	Canyonlands National Park

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)	Shane A. Green (NRCS), Robert D. Stager (BLM), Dana Truman (NRCS), Paul Curtis (BLM) and Randy Beckstrand (BLM)
Contact for lead author	shane.green@ut.usda.gov
Date	09/11/2008
Approved by	Shane A. Green
Approval date	
Composition (Indicators 10 and 12) based on	Foliar Cover

Indicators

1. **Number and extent of rills:** A. On more gentle slopes (< 10 %): Very few typically occur on the site. B. On steeper slopes (> 10 %): Rills are common and occur throughout the site. Rills commonly extend down entire slope.

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2. **Presence of water flow patterns:** Frequent and occur throughout the area. They are expected to be slightly sinuous (wind around well formed crust and perennial plant bases), > 15 feet long, <1 foot wide, and not widely spaced (6-12 feet) and connected into drainage networks. Evidence of flow will increase with slope.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals form at the base of some plants that occur on the edge of rills and water flow patterns. On steeper slopes

(>10%), gullies may remove soil from the base of shrubs exposing roots that resemble pedestals. Teracettes are not present.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Up to 80%. Soil surface may have 0 to 35 percent rock fragments. Ground cover is based on first raindrop impact, and bare ground is the opposite of ground cover. Some soils associated with this site have more biological soil crusts and less bare ground. 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:** Common. This site appears as a gullied landscape. On slopes and areas below adjacent exposed bedrock, gullies may be more numerous. Length often extends the entire slope until it reaches an area where water and sediment accumulate. Gullies are typically active, but the shoulders are muted (truncated) and have perennial vegetation establishing on them. Gully bottoms are typically active and flow during most rainfall events.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None. While there may be some evidence of wind generated soil movement, wind caused blowouts would not be expected. Some depositional areas may exist.

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7. **Amount of litter movement (describe size and distance expected to travel):** On gentle slopes (< 10 %) most litter accumulates at base of plants moved by wind or water. Some down slope redistribution caused by water. Some litter removal may occur in flow patterns or rills with deposition occurring at points of obstruction, especially following major storm events. Litter movement will increase with slopes > 10%.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** This site should have a soil stability rating of 5 under vegetation or biological soil crusts and a 2 to 3 in the interspaces using the soil stability kit test. Surface texture is fine sandy loam to gravelly 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):** Soil surface is typically 3 inches deep. Structure is typically weak fine granular. Color is typically light reddish brown (2.5YR6/4). 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:** Distribution of vascular plants is naturally sparse at this site. Plants are expected to intercept raindrops reducing splash erosion and biological crust is a factor reducing raindrop splash erosion. All plants are usually distributed to slow runoff a little to allow time for some infiltration. With the physiographic location of the site being on remnant hillsides, rolling hills, pediment surfaces, alluvial fans, dissected benches and upland valley plains infiltration is somewhat reduced by slope and less plant cover. Natural erosion would be expected and especially in severe thunder storms or heavy spring runoff. When perennial grasses and shrubs decrease, reducing ground cover and increasing bare ground, runoff is expected to increase and any associated infiltration reduced.

---

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. The associated structure is weak fine granular in the shallow A horizon with weak subangular blocky structure to gypsiferous shale in the C horizons. 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: Biological soil crusts > sprouting shrubs (Torrey jointfir)

    Sub-dominant: warm season perennial grass (Galleta) > = cool season perennial bunch grasses (Indian ricegrass) > = perennial and native annual forbs (matted crinklemat (Tiquilia latior) > = sprouting shrubs (rabbitbrush)

Other: 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.)

Additional: Temporal variability factors include erosion events, drought and insects or other pathogens. Spatial variability includes adjacency to other sites that produce runoff, and topography.
Following a recent disturbance such as drought or insects that removes the woody vegetation, forbs and perennial grasses (herbaceous species) may dominate the community. These conditions would reflect a community phase within the reference state.

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** During years with above average precipitation, there should be very little recent plant mortality and decadence in either the shrubs or grasses. During severe (multi year) drought, up to 20% of the Torrey mormontea stems will die. Some mortality of perennial grass and other shrubs may also occur during severe droughts. There may be partial mortality of individual grasses and shrubs during less severe drought

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14. **Average percent litter cover (%) and depth (in):** Litter cover (including under plants) nearly all of which should be fine litter. Depth should be 1 leaf thickness.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 50-100 #/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:** The only species expected to invade this site are those that can tolerate high gypsum and arid conditions, none known.

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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. The highly gypsic and arid nature of this site would be expected to inhibit most successful reproduction.
