USDA Natural Resources
Conservation Service

Ecological site R035XY220UT
Semidesert Shallow Loam (Torrey's Jointfir)

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.

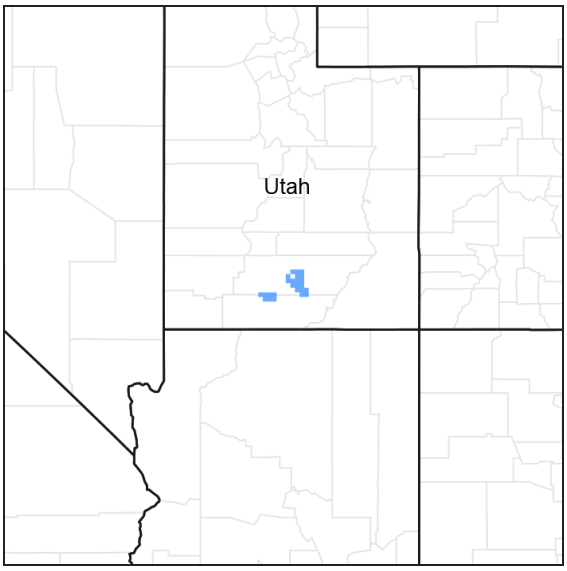


Figure 1. Mapped extent

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 site occurs on shallow, gypsum-affected soils in the semidesert zone of MLRA D35 (Colorado and Green River Plateaus), however, the gypsum levels on this site are relatively low compared to other gypsum sites in the MLRA. It recieves 8 to 10 inches of annual precipitation, most notably as convective thunderstorms from July through October. It most commonly occurs on gently sloping (2-30% slopes) hills and structural benches at elevations ranging from 5500-6800 feet. The reference plant community is sparsley vegetated and dominated by Torrey's jointfir, Bigelow sagebrush, shadscale, James' galleta, and Indian ricegrass. The reference plant community is highly resistant to change due to its inability to carry fire, along with a harsh soil environment that resists invasion and dominance by other species. However, Russian thistle can establish on the site.

Similar sites

R035XY264UT	**Semidesert Gypsum (Torrey's Jointfir)** This site has deep soils and more than double the annual production, though composition is comparable.
R035XY142UT	**Desert Very Shallow Gypsum (Torrey's Jointfir)** This site has very shallow soils and recieves 6-9 inches of annual precipitation. It also has much greater gypsum amounts and Bigelow sagebrush is not a dominant shrub.

R035XY106UT	**Desert Gypsum Loam (Torrey's Jointfir)** This site has moderately deep to deep soils and recieves 6-9 inches of annual precipitation. The plant community is very similar, but with less Bigelow Sagebrush.
R035XY237UT	**Semidesert Shallow Gypsum (Mormontea)** This site is also shallow and gypsum affected, but it has much higher gypsum amounts. Bigelow sagebrush is not a dominant shrub on this site.
R035XY126UT	**Desert Shallow Gypsum (Torrey's Jointfir)** This site is also shallow, but it recieves 6-9 inches of precipitation and it typically has greater amounts of gypsum. Bigelow sagebrush is not a dominant plant on this site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Ephedra torreyana* (2) *Artemisia bigelovii*
Herbaceous	(1) *Pleuraphis jamesii* (2) *Achnatherum hymenoides*

Physiographic features

This site occurs on hills and structural benches. Runoff is high to very high. Slopes typically range from 2-30%. Elevations are generally 5500-6800 ft.

Table 2. Representative physiographic features

Landforms	(1) Structural bench (2) Hill
Elevation	1,676–2,073 m
Slope	2–30%

Climatic features

The climate is characterized by hot summers and cool winters. Average annual precipitation ranges from 8-10 inches. April, May and June are the driest months during the growing season, and about half of the annual precipitation falls from July to October. Much of the summer precipitation occurs as convection thunderstorms. Large fluctuations in daily temperatures are common, as well as high variability in precipitation from month to month and from year to year.

Modeled climate data (PRISM) was used to describe this section, since no weather stations are near this ecological site.

Table 3. Representative climatic features

Frost-free period (average)	200 days
Freeze-free period (average)	225 days
Precipitation total (average)	254 mm

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 of this site are shallow sandy loams that are gypsum affected. They most commonly formed in residuum and/or alluvium derived from sedimentary rock. Gypsum is present in the soil but is relatively low compared with other gypsum ecological sites. These soils are well-drained and have moderate permeability. Water holding capacity ranges from 0.7 to 2.7 inches of water throughout the profile and is positively correlated to soil depth. The soil moisture regime is ustic aridic and the soil temperature regime is mesic.

This site has been used in the following soil surveys and has been correlated to the following components:
UT685 – Capital Reef National Park – Daklos;
UT686 – Escalante Grand Staircase National Monument – Wayneco;

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone and sandstone (2) Residuum–sandstone and shale
Surface texture	(1) Channery fine sandy loam (2) Sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	13–51 cm
Surface fragment cover <=3"	0–15%
Surface fragment cover >3"	0–30%
Available water capacity (0-101.6cm)	1.78–6.86 cm
Calcium carbonate equivalent (0-101.6cm)	7–15%
Electrical conductivity (0-101.6cm)	0–5 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	1–5
Soil reaction (1:1 water) (0-101.6cm)	7.9–9
Subsurface fragment volume <=3" (Depth not specified)	0–20%
Subsurface fragment volume >3" (Depth not specified)	0–30%

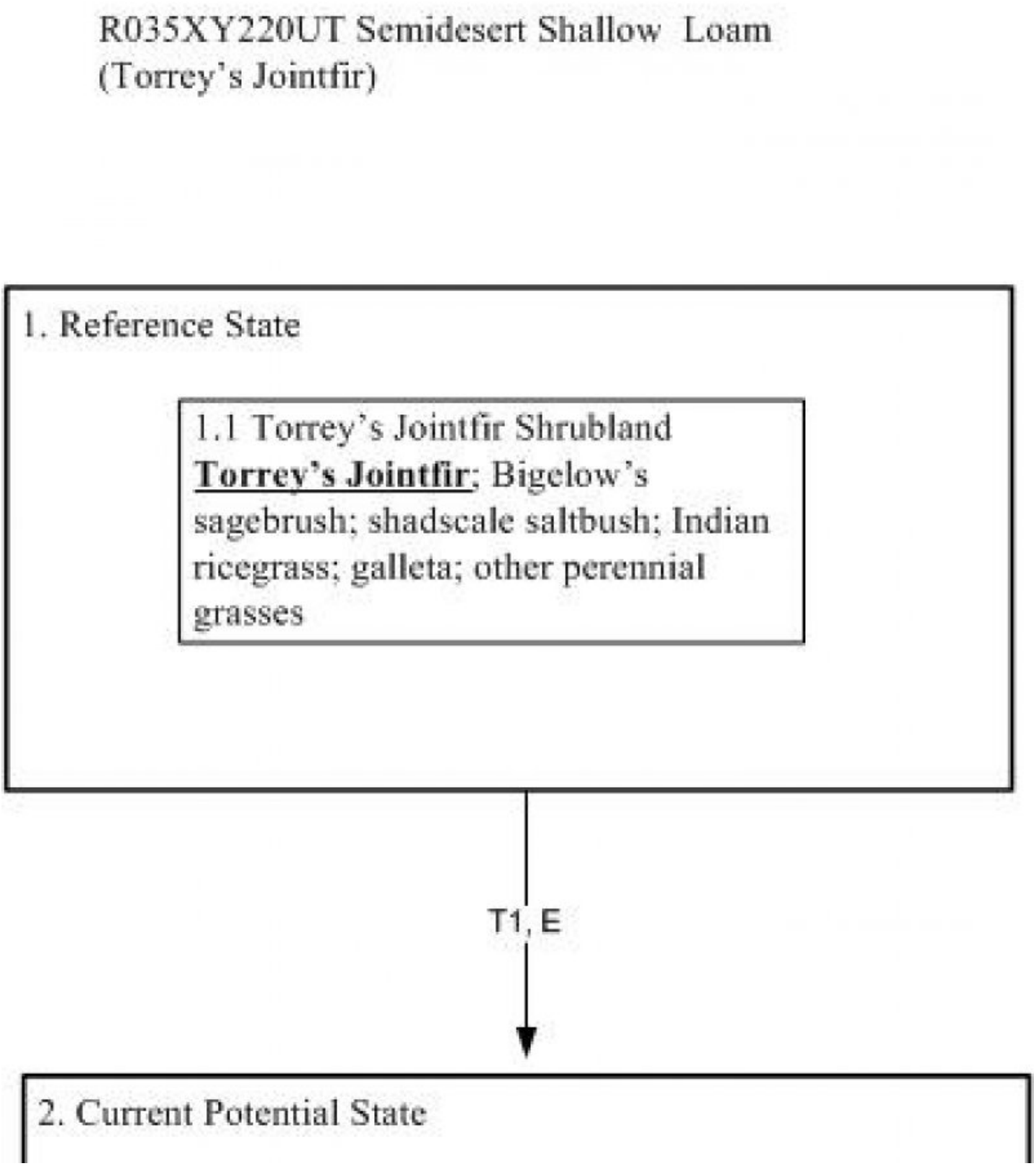
Ecological dynamics

This ecological site has been grazed by domestic livestock since they were first introduced into the area (~1860). The introduction of domestic livestock and the use of fencing and reliable water sources have influenced the disturbance regime historically associated with this ecological site. This ecological site served as wintering pastures for sheep and cattle producers. Improperly managed livestock grazing (continuous season long grazing, heavy stocking rates, etc.) may cause this site to depart from the reference plant community. Native perennial grasses decrease while invasive forbs, annual grasses, rabbitbrush and broom snakeweed increase. Timing of grazing also affects the ecological dynamics—continuous spring grazing results in a decline of cool season grasses, while heavy summer/early fall grazing results in a decline of warm season grasses.

The suitability for rangeland seeding is very poor to poor. The major limiting factors are the very shallow soil, low available water capacity, and low precipitation.

As vegetation communities respond to changes in management or natural influences, return to previous states may not be possible. 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 model diagram does not necessarily depict all the transitions and states that are possible, but it does show some of the most commonly occurring plant communities. These plant communities may not represent every possibility, but they are the most prevalent and repeatable. As more data is 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



2.1 Torrey's Jointfir Shrubland
Torrey's Jointfir; prickly Russian thistle; Bigelow's sagebrush; shadscale saltbush; Indian ricegrass; galleta; other perennial grasses

State 1
Reference State

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. The reference state represents the historic plant communities and ecological dynamics of the semidesert shallow loam, Torrey's jointfir site. This state includes the biotic communities that become established on the ecological 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 and a mixture of warm cool season 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. Reference State: Community phases resistant to natural disturbances. Indicators: A site dominated by Torrey's jointfir where galleta, Indian ricegrass and needleandthread may or may not be present. Feedbacks: 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
Reference State

Semidesert Shallow Loam (Torrey's jointfir) community 1.1—Reference Plant Communtiy. Cover is 2% grass,

Figure 4. Phase 1.1

This plant community phase is dominated by Torrey's jointfir, shadscale, bigelow's sagebrush, and perennial grasses. Grasses may include but are not limited to, Indian ricegrass, galleta, and needleandthread. Other perennial grasses may or may not be present. Other perennial shrubs, and forbs may be present and cover is variable. Bare ground is 8-20% and surface rock fragments (40-60%) can be very prevalent. The air-dry composition weight is 40% perennial grasses, 15% forbs, 40% shrubs and 5% trees.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	45	78	112
Shrub/Vine	45	90	112
Forb	–	17	34
Tree	6	6	6
Total	**96**	**191**	**264**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	6-10%
Grass/grasslike foliar cover	0-8%
Forb foliar cover	0-4%
Non-vascular plants	0%
Biological crusts	0%
Litter	4-6%
Surface fragments >0.25" and <=3"	0-19%
Surface fragments >3"	3-30%
Bedrock	5-20%
Water	0%
Bare ground	8-20%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	0-10%	0-4%	0-2%
>0.15 <= 0.3	–	0-20%	0-4%	0-2%
>0.3 <= 0.6	–	2-6%	0-2%	0-2%
>0.6 <= 1.4	–	4-8%	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

State 2
Current Potential State

This state is similar to state one, however there are now invasive species established in the understory—prickly Russian thistle being the most common. Indicators: A site dominated by Torrey’s jointfir where galleta, Indian ricegrass and needleandthread may or may not be present.

Community 2.1
Perennial Shrubland

This plant community is similar to the reference state however, invasive plants are present. This plant community phase is dominated by Torrey's jointfir, shadscale, bigelow's sagebrush, prickly Russian thistle, and perennial grasses. Grasses may include but are not limited to, Indian ricegrass, galleta, and needleandthread. Other perennial grasses may or may not be present. Other perennial shrubs, and forbs may be present and cover is variable. Bare ground is 8-20% and surface rock fragments (40-60%) can be very prevalent.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	45	78	112
Shrub/Vine	45	90	112
Forb	–	17	34
Tree	6	6	6
Total	**96**	**191**	**264**

Table 9. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	6-10%
Grass/grasslike foliar cover	0-8%
Forb foliar cover	0-4%
Non-vascular plants	0%
Biological crusts	0%
Litter	4-6%
Surface fragments >0.25" and <=3"	0-19%
Surface fragments >3"	3-30%
Bedrock	5-20%
Water	0%
Bare ground	8-20%

Table 10. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	0-10%	0-4%	0-2%
>0.15 <= 0.3	–	0-20%	0-4%	0-2%
>0.3 <= 0.6	–	2-6%	0-2%	0-2%
>0.6 <= 1.4	–	4-8%	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Transition T1, E
State 1 to 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. Once invasive plants are found in the plant community a threshold has been crossed.

Additional community tables

Table 11. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
0	**Dominant Shrubs**			45–146	
	Torrey's jointfir	EPTO	*Ephedra torreyana*	11–122	2–6
	Bigelow sage	ARBI3	*Artemisia bigelovii*	11–40	2–6
	shadscale saltbush	ATCO	*Atriplex confertifolia*	0–22	0–2
3	**Sub-dominant Shrub**			0–45	
	buckwheat	ERIOG	*Eriogonum*	0–11	0–2
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–11	0–2
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–6	0–2
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–6	0–2
	mormon tea	EPVI	*Ephedra viridis*	0–6	0–2
	mountain ball cactus	PESIS	*Pediocactus simpsonii var. simpsonii*	0–2	0–2
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–1	0–1
Grass/Grasslike					
0	**Dominant Grasses**			45–224	
	James' galleta	PLJA	*Pleuraphis jamesii*	0–45	0–5
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–39	0–5
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–22	0–5
	purple threeawn	ARPU9	*Aristida purpurea*	0–20	0–5
	little Parish's needlegrass	ACPAD	*Achnatherum parishii var. depauperatum*	0–11	0–5
1	**Sub-dominant Grass**			0–12	
	blue grama	BOGR2	*Bouteloua gracilis*	0–12	0–2
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–12	0–2
Forb					
0	**Dominant Forbs**			0–22	
	Brenda's yellow cryptantha	CRFL5	*Cryptantha flava*	0–6	0–2
	rock goldenrod	PEPU7	*Petradoria pumila*	0–6	0–2
2	**Sub-Dominant Forbs**			0–34	
	Forb, annual	2FA	*Forb, annual*	0–20	–
	Forb, perennial	2FP	*Forb, perennial*	0–20	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	0–11	0–2
	greenstem paperflower	PSSP	*Psilostrophe sparsiflora*	0–6	0–2
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–6	0–2
	freckled milkvetch	ASLE8	*Astragalus lentiginosus*	0–6	0–2
	gooseberryleaf globemallow	SPGR2	*Sphaeralcea grossulariifolia*	0–2	0–2

	heartleaf twistflower	STCO6	*Streptanthus cordatus*	0–2	0–2
	Arizona four-nerve daisy	TEACA	*Tetraneuris acaulis var. arizonica*	0–2	0–2
Tree					
4	**Trees**			0–6	
	Utah juniper	JUOS	*Juniperus osteosperma*	0–6	0–3

Table 12. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
0	**Dominant Shrubs**			45–146	
	Torrey's jointfir	EPTO	*Ephedra torreyana*	11–122	2–6
	Bigelow sage	ARBI3	*Artemisia bigelovii*	11–40	2–6
	shadscale saltbush	ATCO	*Atriplex confertifolia*	0–22	0–2
3	**Sub-dominant Shrub**			0–45	
	buckwheat	ERIOG	*Eriogonum*	0–11	0–2
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–11	0–2
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–6	0–2
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–6	0–2
	mormon tea	EPVI	*Ephedra viridis*	0–6	0–2
	mountain ball cactus	PESIS	*Pediocactus simpsonii var. simpsonii*	0–2	0–2
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–1	0–1
Grass/Grasslike					
0	**Dominant Grasses**			45–224	
	James' galleta	PLJA	*Pleuraphis jamesii*	0–45	0–5
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–39	0–5
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–22	0–5
	purple threeawn	ARPU9	*Aristida purpurea*	0–20	0–5
	little Parish's needlegrass	ACPAD	*Achnatherum parishii var. depauperatum*	0–11	0–5
1	**Sub-dominant Grass**			0–12	
	blue grama	BOGR2	*Bouteloua gracilis*	0–12	0–2
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–12	0–2
Forb					
0	**Dominant Forbs**			0–22	
	prickly Russian thistle	SATR12	*Salsola tragus*	1–11	0–2
	Brenda's yellow cryptantha	CRFL5	*Cryptantha flava*	0–6	0–2
	rock goldenrod	PEPU7	*Petradoria pumila*	0–6	0–2
2	**Sub-Dominant Forbs**			0–34	
	Forb, annual	2FA	*Forb, annual*	0–20	–
	Forb, perennial	2FP	*Forb, perennial*	0–20	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	0–11	0–2
	greenstem paperflower	PSSP	*Psilostrophe sparsiflora*	0–6	0–2
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–6	0–2

	white sagebrush	ARLU	*Artemisia ludoviciana*	0–6	0–2
	freckled milkvetch	ASLE8	*Astragalus lentiginosus*	0–6	0–2
	gooseberryleaf globemallow	SPGR2	*Sphaeralcea grossulariifolia*	0–2	0–2
	heartleaf twistflower	STCO6	*Streptanthus cordatus*	0–2	0–2
	Arizona four-nerve daisy	TEACA	*Tetraneuris acaulis var. arizonica*	0–2	0–2
Tree					
4	**Trees**			0–6	
	Utah juniper	JUOS	*Juniperus osteosperma*	0–6	0–3

Animal community

Wildlife Interpretation
Water scarcity and lack of cover limit the species richness and abundance of large mammals on this site; however small herds of mule deer and pronghorn antelope may graze/browse on these sites, especially when near water sources and in the winter. 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 poor grazing conditions for livestock due to the lack of perennial grasses. However, due to preferable weather conditions, this site may be best utilized as winter range. This site often lacks natural perennial water sources, which can influence the suitability for livestock grazing. The plant community is primarily shrubs, with the majority of canopy cover being attributed to Torrey's jointfir. Torrey's jointfir can serve as forage for livestock on winter range. When present, grasses, primarily galleta and Indian ricegrass, provide good year round grazing forage for horses, cattle, and sheep; however many times these species are not abundant enough to support livestock. Before making specific grazing management recommendations, an onsite evaluation should be made.

--References--

Relative Forage Preference of Plants for Grazing Use by Season: Plants commonly found in Major Land Resource Area D35 --The Colorado Plateau. 2007

Stubbendieck, J., S. L. Hatch, and C. H. Butterfield. 1997. North American range plants. Lincoln, NE: University of Nebraska Press. 501p.

USDA, Forest Service. 2007. Fire effects information: plant species life form. Available at http://www.fs.fed.us/database/feis/plants/index.html. Accessed 7 August 2007.

Hydrological functions

Runoff and Soil Loss
The following runoff and soil loss data was generated using the Rangeland Hydrology and Erosion Model Web Tool. See citation below.
Hydrology and erosion are approximately the same for both state 1 and state 2 (refer to STM). Slopes range from 2-30 percent on this site. Slope does not affect the runoff on this site, but does have an impact on soil loss. Average runoff is typically about 1 inch per year, but may be as high as 2. inches in a single 100-year storm event. However, soil loss ranges from 0.16 (about 2% slope) to 0.4 (about 30% slope) tons per acre on an average year, and from 0.5 (about 2% slope) to 1.5 (about 30% slope) tons per acre during a 100-year storm event. Long-term soil loss is not a concern on this site, but rather the rare storm events (i.e. 25, 50 or 100 year storms) result in significant soil loss that are more likely to impact the soil resource. Average rainfall ranges from 8-12 inches per year, but a single 100-year storm event can generate 3.7 inches of precipitation in a 24-hour period.
Individual shrubs are uniformly distributed, resulting in high tortuosity which slows down overland flow and promotes on-site infiltration. The grasses and forbs in the shrub interspaces have a minimal impact on water flow patterns due to low production. Heavy grazing does not significantly alter the hydrology since this site is not typically affected by

livestock. Interspaces are typically protected by rock fragments and litter.

Soil Group Curve Number
The soils associated with this ecological site are generally in Hydrologic Soil Group D due to the shallow depth (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.

--References--
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NRCS Grazing Lands Technology Institute. 2003. National Range and Pasture Handbook. Fort Worth, TX, USA: US Department of Agriculture, Natural Resources Conservation Service, 190-VI-NRPH.
Southwest Watershed Research Center. 2008. Rangeland Hydrology and Erosion Model Web Tool. Tuscon, Arizona, USA: US Department of Agriculture, Agricultural Research Service. Available at http://apps.tucson.ars.ag.gov/rhem/. Accessed on Dec, 2010.

Recreational uses

Recreational uses are hiking, hunting, and aesthetics.

Wood products

There are no wood products from this site.

Other information

--Poisonous and 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.

Potentially toxic plants associated with this site 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.

Russian thistle is a toxic plant of concern in arid environments that may established on this site in the future. Russian thistle is an invasive toxic plant, causing nitrate and to a lesser extent oxalate poisoning, which affects all classes of livestock. The buildup of nitrates in these plants is highly dependent upon environmental factors, such as after a rain storm during a drought, cool/cloudy days, and soils high in nitrogen and low in sulfur and phosphorus, all which cause increased nitrate accumulation. 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--
Generally as ecological conditions deteriorate and perennial vegetation decreases due to disturbance (fire, over grazing, drought, off road vehicle overuse, erosion, etc.) annual forbs and grasses will invade the site. Of particular concern in semi-arid environments are the non-native annual invaders including cheatgrass, Russian thistle, kochia,

halogeton, and annual mustards. The presence of these species will depend on soil properties and moisture availability; however, these invaders are highly adaptive and can flourish in many locations. Once established, complete removal is difficult but suppression may be possible. Due to 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 the present fuel load and plant moisture content—sites with small fuel loads will burn more slowly and less intensely than sites with large fuel loads. Many desert communities in the Colorado Plateau may have evolved without the influence of fire. However a year of exceptionally heavy winter rains can generate fuels by producing heavy stands of annual forbs and grasses. When fires do occur, the effect on the plant community may be extreme due to the 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 root crown after fire, but 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.

--References--

Knight, A. P. and R. G. Walter. 2001. A guide to plant poisoning of animals in North America. Jackson, WY: Teton NewMedia. 367p.

USDA, Forest Service. 2007. Fire effects information: plant species life form. Available at http://www.fs.fed.us/database/feis/plants/index.html. Accessed 7 August 2007.

Type locality

Location 1: Wayne County, UT	
UTM zone	N
UTM northing	4235005
UTM easting	0485512
General legal description	Capitol Reef National Park. Data was collected in conjuction with the Capitol Reef Soil Survey update 2010.

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.

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Date	09/12/2008
Approved by	Shane A. Green
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** A. On more gentle slopes (< 15 %): Very few. Rills may be 10 or more feet in length. Rills are most likely to form below adjacent exposed bedrock or water flow patterns where sufficient water accumulates to cause erosion. B. On steep slopes (> 15 %): Few rills are present. Where they occur, rills may extend down entire slope.

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2. **Presence of water flow patterns:** Some sinuous flow patterns wind around perennial plants and surface rock. Evidence of flow patterns is expected to increase somewhat with slopes greater than 15%. Water flow patterns are long (15-20 feet), narrow (<1 foot wide), and spaced widely (10-20 yards) on gentle slopes (<15%) and more closely (<10 yards) on steeper slopes (>15%).

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3. **Number and height of erosional pedestals or terracettes:** Rare, small pedestals may form at the base of plants that occur on the edge of water flow patterns, but should not show any exposed roots. Terracettes are rare, forming behind debris dams of small to medium sized litter (up to 2 inches in diameter) in water flow patterns. These debris dams may accumulate smaller litter (leaves, grass and forb stems) and sediment.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 30 – 40%. (Soil surface is typically covered by 30 to 60 percent surface fragments). Ground cover is based on the first raindrop impact, and bare ground is the inverse of ground cover. Ground cover + bare ground = 100%. Any well developed biological crusts present should not be recorded as bare ground. Poorly developed biological soil crusts that are interpreted as functioning as bare ground (therefore they would be susceptible to raindrop splash erosion) should be recorded as bare ground.

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5. **Number of gullies and erosion associated with gullies:** None to rare on gentle slopes (< 15%). On steep slopes and areas below adjacent exposed bedrock, gullies may occur. Length often extends from exposed bedrock until gully reaches a stream or an area where water and sediment accumulate. Gullies may remove soil from base of shrubs and/or trees exposing roots. Gullies may show slightly more indication of erosion as slope increases, or as the site occurs

adjacent to steep sites/watershed with concentrated flow patterns.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None. The channery soil surface armors and reduces the potential for wind erosion.

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7. **Amount of litter movement (describe size and distance expected to travel):** Most litter accumulates at the base of plants. Woody litter is usually not moved unless present in water flow patterns, rills, or gullies.

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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 an soil stability rating of 4 or 5 under plant canopies and a rating of 2 to 4 in the interspaces using the soil stability test kit. The average rating should be a 4. Surface texture is very channery clay loam. Vegetation cover, litter accumulation, surface rock and biological soil crusts reduce erosion.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface horizon is typically 5 inches deep. Structure is typically moderate fine granular. Color is typically light brownish gray to (2.5Y6/2). 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 and/or any well developed biological soil crusts (where present) will break raindrop impact and splash erosion. Spatial distribution of vascular plants provide detention storage and surface roughness that slows runoff allowing time for infiltration. Interspaces between plants may serve as water flow patterns during episodic runoff events, with natural erosion expected during large storms. When perennial grasses decrease, reducing ground cover and increasing bare ground, runoff is expected to increase and any associated infiltration reduced.

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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. Bedrock is found within 20 inches of soil surface. This should not be considered as compaction.

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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: Sprouting shrubs (Torrey, Green, and Cutler Mormontea) > warm season perennial grasses (Galleta) > cool season perennial grasses (Indian ricegrass, Needle and thread)

    Sub-dominant: Forbs (Rock goldenrod, Yellow cryptantha) > non sprouting shrubs (Cliffrose, Snakeweed) > trees (Utah juniper) > Biological soil crusts

    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. Crested wheatgrass, Smooth brome, Intermediate wheatgrass, Siberian wheatgrass and/or forage kochia etc.) Biological soil crust is variable in it’s expression where present on this site and is measured as a component of ground cover. Forbs can be expected to vary widely in their expression in the

plant community based upon departures from average growing conditions.

Additional: Factors contributing to temporal variability include insects and other pathogens, drought, extreme precipitation events, etc. Factors contributing to spatial variability include slope, amount of rock fragments, aspect, etc. Following a recent disturbance such as fire, drought or insects that may remove the woody vegetation, forbs and perennial grasses (herbaceous species) may become more dominate in the community. These conditions may reflect a functional community phase within the reference state.

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** During years with average to above-average precipitation, there should be very little recent mortality or decadence apparent in trees, shrubs, or grasses. During severe (multi-year) drought up to 20% of the junipers may die, either from drought or pathogens such as mistletoe. There may be partial mortality of individual bunchgrasses and other shrubs during drought. Some bunchgrass and shrub mortality may occur during severe droughts, particularly on the shallower and coarser soils associated with this site. Because woody stems may persist for many years, juniper (especially older trees) will normally have dead stems within the plant canopy.

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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 in the interspaces and up to ¼" under canopies. Litter cover may increase to 7-15% on some years due to increased production of plants.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 85-220 #/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:** Cheatgrass, Russian thistle, Utah Juniper and other introduced annual forbs.

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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.
