Ecological site R035XY106UT
Desert Gypsum Loam (Torrey's Jointfir)

Accessed: 04/23/2024

General information

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

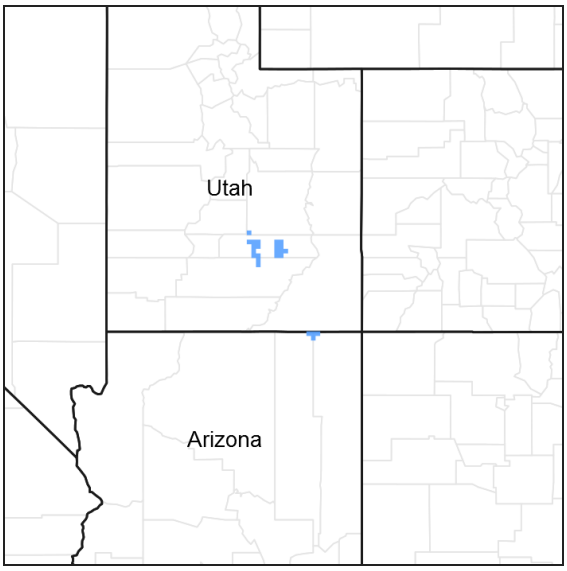


Figure 1. Mapped extent

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

MLRA notes

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

This site occurs on moderately deep, gypsum-affected soils in the desert zone of MLRA D35 (Colorado and Green River Plateaus). It recieves 6 to 9 inches of annual precipitation, most notably as convective thunderstorms from July through October. It most commonly occurs on gently sloping (2-30%) hills, pediments, alluvial fans, and structural benches at elevations between 4900-6000 feet. The reference plant community is sparsley vegetated and dominated by Torrey's jointfir, shadscale, corymbose buckwheat, James' galleta, and Indian ricegrass. The reference plant community is highly resistant to change due to its inability to carry fire, along with a soil environment that precludes invasion and dominance by other species.

Similar sites

R035XY126UT	**Desert Shallow Gypsum (Torrey's Jointfir)** This site has shallow soils that do not support perennial grasses under drought conditions due to very low water-holding capacity. Overall production is also lower, though species composition is similar.
R035XY142UT	**Desert Very Shallow Gypsum (Torrey's Jointfir)** This site has very shallow soils and is very highly gypsum affected. Overall production is very low and mostly occurs in in patches of slightly deep, less gypsum-affected pockets of soil. It cannot support perennial grasses during drought.

R035XY237UT	**Semidesert Shallow Gypsum (Mormontea)** This site has shallow soils and recieves greater than 9 inches of annual precipitation. It tends to be very high in gypsum, but with the increased moisture it recieves, it supports a very similar reference plant community in terms of composition and production.
R035XY264UT	**Semidesert Gypsum (Torrey's Jointfir)** This site has similar soil depth and gypsum percent, but it recieves greater than 9 inches of annual precipitation. As a result, the community composition is similar, but the production is about double.

Table 1. Dominant plant species

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

Physiographic features

This site occurs on hills, pediments, alluvial fans, and structural benches at elevations between 4900-6000 feet. Slopes range from 2-30 percent.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Pediment (3) Structural bench
Flooding frequency	None
Ponding frequency	None
Elevation	5,000–6,800 ft
Slope	2–30%
Aspect	Aspect is not a significant factor

Climatic features

This site is hot in the summer and cool in the winter. Average annual precipitation is 6 to 9 inches, with about half of the precipitation occuring as convection thunderstorms from July through October. June is typically the driest month during the growing season. Precipitation is extremely variable from month to month and from year to year. Large fluctuations in daily temperatures are also common.
Modeled climate data (PRISM) was used in addition to the Bluff Weather Station data for this site.

Table 3. Representative climatic features

Frost-free period (average)	182 days
Freeze-free period (average)	206 days
Precipitation total (average)	9 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

Soils are moderately deep to deep and are gypsum affected. Soil textures range from very fine sandy loams to loamy fine sands with moderately rapid permeability. These soils formed in residuum or slope aluvium derived from sandstone material high in gypsum. Rock fragments are not usually present on the soil surface or throughout the profile. The soil moisture regime is typic aridic and the soil temperature regime is mesic. Water-holding capacity ranges from 2 to 3 inches of water in the upper 40 inches of soil.

This site has been used in the following soil surveys and has been correlated to the following components:
UT631 – Henry Mountains Area – Robroost;
UT685 – Capital Reef National Park – Ivanpatch;

Table 4. Representative soil features

Parent material	(1) Residuum–sandstone and shale
Surface texture	(1) Sandy loam (2) Fine sandy loam (3) Loamy fine sand
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid
Soil depth	20–60 in
Surface fragment cover <=3"	0–25%
Surface fragment cover >3"	0–20%
Available water capacity (0-40in)	2–3 in
Calcium carbonate equivalent (0-40in)	5–20%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	7.4–7.8
Subsurface fragment volume <=3" (Depth not specified)	0–3%
Subsurface fragment volume >3" (Depth not specified)	0–3%

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, shadscale, crispleaf buckwheat, James' galleta, and Indian ricegrass. Crispleaf buckwheat can occasionally dominate on steep north exposures. James galleta, Indian ricegrass and other perennial grass production is somewhat dependant on weather patterns (summer or winter precipitation).

There is no evidence that this site historically burned on a regular basis due to very large and persistent gaps between plants. However, modern disturbances such as recreation and livestock grazing, may result in an opportunity for invasive annuals to enter the system. To this point non-native invasive species have not been documented on this site.

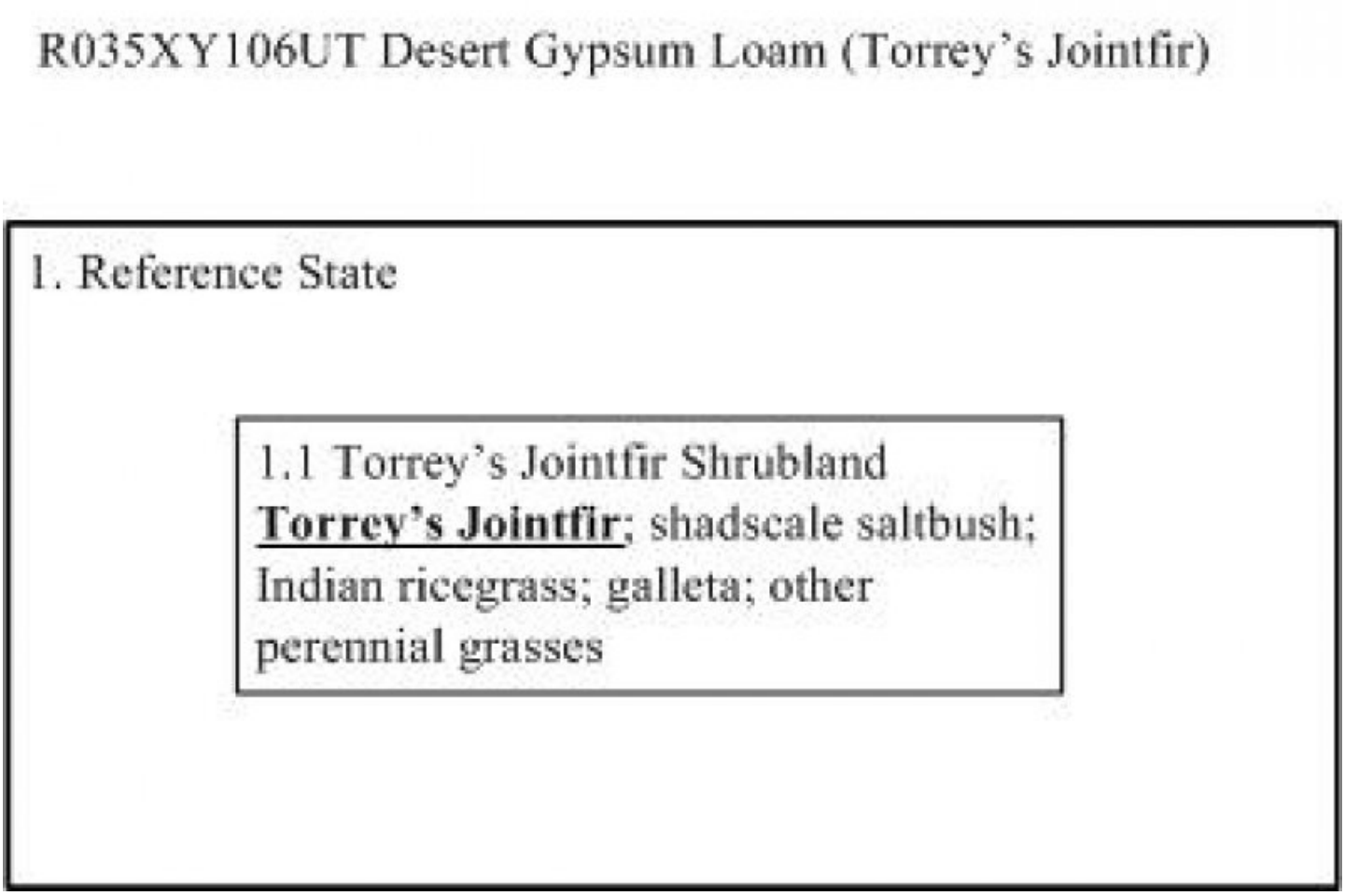
This ecological site has been grazed by domestic livestock since they were first introduced into the area around 1860. It is highly resistant to grazing due to the low palatability of Torrey's jointfir and lack of forage plants. The introduction of domestic livestock and the use of fencing and reliable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

influenced the historic disturbance regime associated with this ecological site.

Suitability for rangeland seeding is very poorbecause of low annual precipitation, and very low available water capacity.

The following State and Transition diagram shows the reference plant community. No other plant communities have been documented on this site to date. As more data are collected, new plant communities or states 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 1
Reference State

The reference state is highly resistant to change due to the harsh soil environment of this site. Few species can readily establish and dominate on a gypsum affected soil with only 6-9 inches of annual precipitaion. However, given the moderate to deep soils, deep-rooted perennial grass species are resilient during and after drought, and are expected to persist in the community under droughty conditions. The fuel loads are too sparse to carry a fire, and insect or disease impacts have not been documented to have a major impact on the plant community of the site. The resulting condition is a reference state that perpetuates itself on the site indefinately under natural historical conditions. To this point, no non-native invasive species have been documented on this site, however, it is expected that cheatgrass, Russian thistle, and/or annual mustards may be able to establish as a result of disturbance.

Community 1.1
Torrey's Jointfir Shrubland

taxadjunct soil component. NAD83 0487313 E. 4238223 N. Photo by Jake Owens, June 30, 2010.

Figure 4. Phase 1.1

Figure 5. 1

This plant community phase is dominated by Torrey's jointfir, shadscale, and perennial grasses. Grasses may include but are not limited to, Indian ricegrass, galleta, and sand dropseed. Galleta is typically the dominant perennial grass species in this plant community phase. Other perennial grasses may or may not be present. Other perennial shrubs, and forbs may be present and cover is variable. Bare ground is 0-8% and biological crusts are 0-50%. Surface rock fragments (0-60%) can be very prevalent and are characterized by gravels.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	15	70	115
Shrub/Vine	35	70	115
Forb	0	10	20
Total	**50**	**150**	**250**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	5-15%
Grass/grasslike foliar cover	5-15%
Forb foliar cover	2-5%
Non-vascular plants	0%
Biological crusts	0-50%
Litter	2-6%

Surface fragments >0.25" and <=3"	2-40%
Surface fragments >3"	0-40%
Bedrock	0%
Water	0%
Bare ground	15-65%

Table 7. Canopy structure (% cover)

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

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
0	**Dominant Shrub**			35–115	
	Torrey's jointfir	EPTO	*Ephedra torreyana*	15–60	1–6
	shadscale saltbush	ATCO	*Atriplex confertifolia*	0–45	0–4
	crispleaf buckwheat	ERCO14	*Eriogonum corymbosum*	0–30	0–3
3	**Subdominant Shrubs**			5–35	
	Gardner's saltbush	ATGA	*Atriplex gardneri*	0–20	0–2
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	0–20	0–2
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–20	0–2
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–15	–
	slender buckwheat	ERMI4	*Eriogonum microthecum*	0–9	0–1
	Bigelow sage	ARBI3	*Artemisia bigelovii*	0–5	0–1
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–5	0–1
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–3	0–1
	narrowleaf yucca	YUANA2	*Yucca angustissima var. angustissima*	0–2	0–2
	Fremont's mahonia	MAFR3	*Mahonia fremontii*	0–2	0–1
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–2	0–1
	Stansbury cliffrose	PUST	*Purshia stansburiana*	0–2	0–1
	shortspine horsebrush	TESP2	*Tetradymia spinosa*	0–2	0–1
Grass/Grasslike					
0	**Dominant Grasses**			15–115	

0	**Dominant Grasses**			15–45	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–70	0–4
	James' galleta	PLJA	*Pleuraphis jamesii*	15–60	1–4
1	**Sub-Dominant Grasses**			0–50	
	Grass, perennial	2GP	*Grass, perennial*	0–20	0–2
	Grass, annual	2GA	*Grass, annual*	0–15	0–1
	sandhill muhly	MUPU2	*Muhlenbergia pungens*	0–10	0–1
	alkali sacaton	SPAI	*Sporobolus airoides*	0–10	0–1
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–10	0–1
	purple threeawn	ARPU9	*Aristida purpurea*	0–5	0–1
Forb					
2	**Sub-Dominant Forbs**			0–20	
	rusty lupine	LUPU	*Lupinus pusillus*	0–10	0–1
	Forb, annual	2FA	*Forb, annual*	0–10	–
	Forb, perennial	2FP	*Forb, perennial*	0–10	–
	Brenda's yellow cryptantha	CRFL5	*Cryptantha flava*	0–9	0–1
	stemless four-nerve daisy	TEACA2	*Tetraneuris acaulis var. acaulis*	0–9	0–1
	mountain pepperweed	LEMO2	*Lepidium montanum*	0–5	0–1
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–4	0–1
	Bicknell's milkvetch	ASCO16	*Astragalus consobrinus*	0–3	0–1
	Navajo tea	THSU	*Thelesperma subnudum*	0–2	0–1
	matted crinklemat	TILA6	*Tiquilia latior*	0–2	0–1
	woodyaster	XYLOR	*Xylorhiza*	0–2	0–1
	largeflower skeletonplant	LYGR	*Lygodesmia grandiflora*	0–2	0–1
	badlands mule-ears	SCSCC	*Scabrethia scabra ssp. canescens*	0–2	0–1
	Greenland mountain ash	SOGR2	*Sorbus groenlandica*	0–2	0–1
	nakedstem sunray	ENNU	*Enceliopsis nudicaulis*	0–2	0–1
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–2	0–1
	western blanketflower	GASP	*Gaillardia spathulata*	0–2	0–1
	snowball sand verbena	ABFR2	*Abronia fragrans*	0–2	0–1

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 and natural perennial water sources. However, due to preferable weather conditions, this site may be best utilized as winter range. 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 sand dropseed, 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 not influence by slope (2-8% slope). Both runoff and infiltration are variable based on surface rock fragments. When surface rock fragments are low (<15%) runoff is 0.8 inches/year and soil loss is 0.25 tons/ac/year but can range as high as 0.5tons/ac/year during a 100yr storm event. When surface rock fragments are high (40%), runoff is 0.4 inches/year and soil loss is 0.08 ton/ac/year but can range as high as 0.23 ton/ac/year 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 5-9 inches per year, but a single 100-year storm event can generate 2 inches of precipitation in a 24-hour period.
Individual shrubs plants are uniformly distributed but sparse, resulting in tortuosity which can slow down overland flow and promote 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 influenced by livestock. Interspaces are typically protected by biological soil crusts, rock fragments, or a weak physical soil crust. Soil physical crusts and weak biological crusts (light cyanobacteria) are the most susceptible to water erosion.
The soils associated with this ecological site are generally in Hydrologic Soil Group B (NRCS National Engineering Handbook). The hydrologic curve numbers are 61 to 79 depending on the condition of the watershed. 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 can also affect hydrology, but it is variable. Fire intensity, fuel type, soil, climate, and topography can each have different influences. Fires can increase areas of bare ground and hydrophobic layers that reduce infiltration and increase runoff. (National Range and Pasture Handbook, 2003)

--References--
National Engineering Handbook. US Department of Agriculture, Natural Resources Conservation Service. Available: http://www.info.usda.gov/CED/Default.cfm#National%20Engineering%20Handbook. Accessed February 25, 2008.
NRCS Grazing Lands Technology Institute. 2003. National Range and Pasture Handbook. Fort Worth, TX, USA: US Department of Agriculture, Natural Resources Conservation Service, 190-VI-NRPH.
Southwest Watershed Research Center. 2008. Rangeland Hydrology and Erosion Model Web Tool. Tuscon, Arizona, USA: US Department of Agriculture, Agricultural Research Service. Available at http://apps.tucson.ars.ag.gov/rhem/. Accessed on Dec, 2010.

Recreational uses

Recreation activities are hiking and hunting. Natural beauty lies in the topography, soils, and plants of the site. Trafficability over unsurfaced roads is poor because of the low strength of gypsum-affected soils

Wood products

None

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.

Although not found on this site yet, 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. The fire regime depends on the adjacent plant communities and has a wide range of return intervals. Torrey’s jointfir 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.

Other references

Modal Soil: Robroost FSL — coarse-loamy, mixed, mesic Cambic Gypsiorthids

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

National Engineering Handbook. US Department of Agriculture, Natural Resources Conservation Service. Available: http://www.info.usda.gov/CED/Default.cfm#National%20Engineering%20Handbook. Accessed February 25, 2008.

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.

NPS.gov. 2008. Canyonlands National Park. Nature and Science. Available: http://www.nps.gov/cany/naturescience/. Accessed on January 4, 2008.

Contributors

George Cook
Jamin Johanson
Susanne Mayne

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	09/10/2008
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 occur throughout the site. Rills commonly extend down entire slope.

---

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.

---

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. Terracettes are not present.

---

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 60 - 70%. Soil surface usually has no surface rock, but a few soils may have up to 35 percent mainly gravel with up to 15 percent cobbles of gypsiferous sandstone. Ground cover is based on first raindrop impact, and bare ground is the opposite 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.

---

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 typically appear 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.

---

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.

---

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%.

---

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 4 to 5 under plant canopies and biological soil crusts and a rating of 3 in the interspaces using the soil stability kit test. The average should be a 4. 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 horizon is typically 2 to 5 inches deep. Structure is typically weak to moderate thin platy. Color is typically light reddish brown (5YR6/3-4). 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.

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Distribution of vascular plants are expected to intercept raindrops reducing splash erosion but not eliminating it. Plants are usually distributed in sufficient density to slow runoff allowing time for some infiltration. With the geomorphic location of the site being on gently sloping fans, benches, alluvial fans, upland valley plains and hillsides infiltration is somewhat reduced by slope and less plant cover. Natural erosion would be expected 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 to moderate thin platy in the shallow A horizon with weak medium and fine subangular blocky structure and veins and streaks of gypsum in the B and C horizons. These should not be considered to be compaction layers.

---

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 mormontea)

    Sub-dominant: perennial bunch grasses (Indian ricegrass, Galleta) > = perennial and native annual forbs (Locoweed and others) > non-sprouting shrubs (Shadscale).

    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.). Forbs can be expected to vary widely in their expression in the plant community based upon departures from average growing conditions.

    Additional: Temporal variability is caused by droughts, insects and other pathogens, large precipitation events, etc. and spatial variability is caused by adjacency to other sites that produce runoff, and topography.

---

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.

---

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 1/16” under canopies.

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 65-106 #/acre on an average year

---

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 and ragweed are most likely to invade this site.

---

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