USDA Natural Resources Conservation Service

Ecological site R035XY227UT
Semidesert Shallow Sand (Utah Juniper-Pinyon)

Accessed: 06/30/2024

General information

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

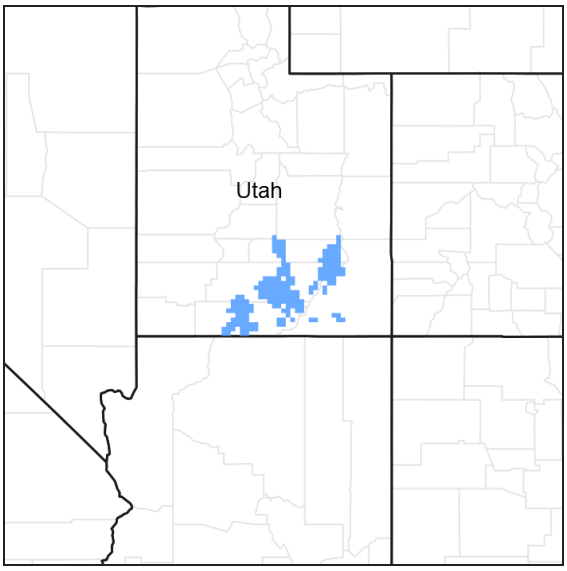


Figure 1. Mapped extent

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

MLRA notes

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

Site Concept: This site occurs in the semidesert zone of the Colorado and Green River Plateaus region (MLRA35) in Southern Utah. It is found on sheets atop structural benches, ridges, mesas, and hillslopes at elevations between 5200 and 6500 feet. Annual precipitation ranges from 8 to 11 inches, with much of the summer moisture occuring as convective thunderstorms from July to October. Soils are shallow sands or sandy loams over sandstone bedrock that formed in residuum and/or eolian sands. The soil temperature and moisture regimes are mesic and ustic aridic respectively. Utah juniper is the dominant plant, and two-needle pinyon can also be abundant. This site is does not burn regularly and is highly resistant to plant community change.

Classification relationships

Modal Soil: Mellenthin — loamy-skeletal, mixed, mesic, Lithic Ustollic Calciorthids

Associated sites

R035XY212UT	**Semidesert Sand (Fourwing Saltbush)**
R035XY215UT	**Semidesert Sandy Loam (4-Wing Saltbush)**

R035XY221UT	**Semidesert Shallow Loam (Utah Juniper-Pinyon)**
R035XY224UT	**Semidesert Shallow Sand (Blackbrush)**

Similar sites

R035XY221UT	**Semidesert Shallow Loam (Utah Juniper-Pinyon)**
R028AY223UT	**Semidesert Sand (Utah Juniper)**

Table 1. Dominant plant species

Tree	(1) *Juniperus osteosperma* (2) *Pinus edulis*
Shrub	(1) *Artemisia bigelovii*
Herbaceous	Not specified

Physiographic features

This site occurs on sand sheets atop structural benches, ridges, mesas, and hillslopes. Runoff is high to very high(due to the shallow depth). Slopes typically range from 2-40%. Elevations are generally 5200-6500 ft, but can be as high as 7500 ft.

Table 2. Representative physiographic features

Landforms	(1) Sand sheet (2) Ridge (3) Structural bench
Flooding frequency	None
Ponding frequency	None
Elevation	5,200–6,500 ft
Slope	2–40%
Aspect	N, SW

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 are 62 degrees Fahrenheit and mean annual low temperatures are 42 degrees Fahrenheit. Approximately 70-75% of precipitation occurs as rain from March through October. On the average, February, May, and June are the driest months and July through October are the wettest months. Precipitation is extremely variable from month to month and from year to year but averages between 8 and 11 inches per year. Much of the summer precipitation occurs as convection thunderstorms.

Table 3. Representative climatic features

Frost-free period (average)	179 days
Freeze-free period (average)	216 days
Precipitation total (average)	11 in

Influencing water features

Due to its landscape position, this site is not typically influenced by streams or wetlands.

Soil features

The characteristic soils of this site are shallow sands or sandy loams over sandstone bedrock. They formed in residuum and/or eolian deposits derived from sandstone. Textures are usually sandy with few rock fragments throughout, but can be gravelly sandy loams. Water holding capacity ranges from 0.6 to 1.4 inches of water in the entire profile. 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:

UT631 – Henry Mountains Area, Parts of Garfield, Wayne, and Kane Counties – Arches; Mellenthin
UT636—Panguitch Area, Parts of Garfield, Iron, Kane, and Washington Counties—Arches; Mident; Navigon
UT685 – Capital Reef National Park – Arches, Mident, Santrick;
UT686 – Escalante Grande Staircase National Monument – Arches; Mident; Navigon

Table 4. Representative soil features

Parent material	(1) Residuum–sandstone
Surface texture	(1) Fine sand (2) Gravelly fine sandy loam (3) Loamy fine sand
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	4–20 in
Surface fragment cover <=3"	0–19%
Surface fragment cover >3"	0–5%
Available water capacity (0-40in)	0.6–1.4 in
Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–15%
Subsurface fragment volume >3" (Depth not specified)	0–24%

Ecological dynamics

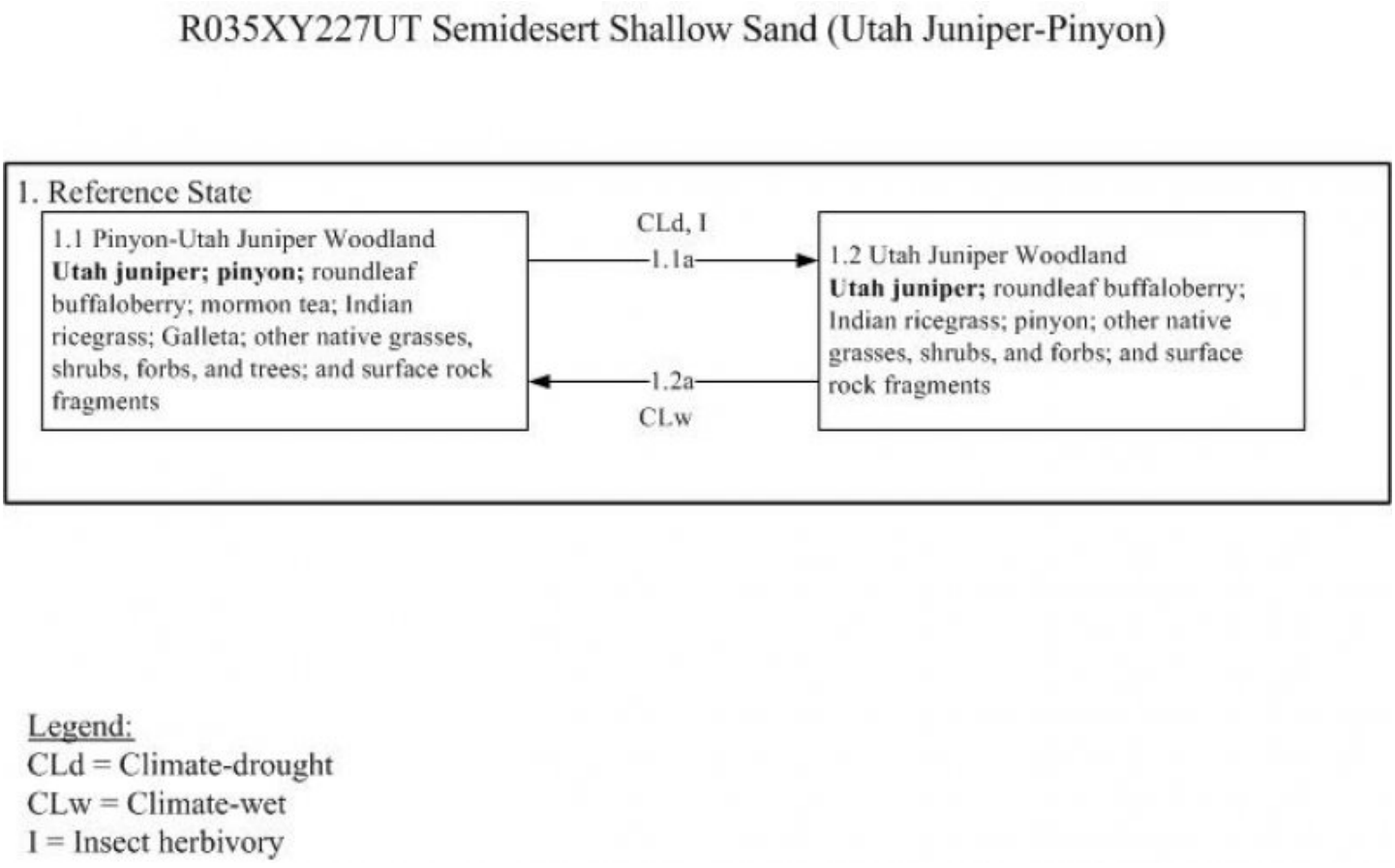
This site developed under the Colorado Plateau climatic conditions and the natural influences of herbivory, and climate; however due to the remote location, broken topography, and lack of perennial water sources this area rarely served as habitat for large herds of native herbivores. This site’s plant species composition is generally dominated by Utah juniper and twoneedle pinyon. There is no evidence to indicate that this site historically maintained a short burn frequency. Until further research indicates that fire played a role in the ecosystem processes of this site, the state and transition model will not include fire as a disturbance in the reference state. However, due to modern disturbances such as brush treatments, invasive species, and OHV use, the resilience of the plant communities may be at risk. Disturbances that reduce the presence of perennial grasses result in an opportunity for invasive annuals to enter into the system and may produce a fuel load for fire to become an ecological driver.

Drought and insects appear to be the main driving factors in many of the Pinyon/Juniper communities of Utah.

Betancourt et al. (1993), noted that Pinyon and Juniper woodlands in the southwest appear to be more susceptible to large die offs during droughts, than in other locations. As severe droughts persist, the Pinyon trees, being more susceptible to drought and insects, seem to die out, while the Utah juniper trees survive.

As vegetative communities respond to changes in management or natural occurrences, thresholds can be crossed, which usually means that a return to the previous state may not be possible without major energy inputs. The amount of energy input needed to affect vegetative shifts depends on the present biotic and abiotic features and the desired results. The following diagram does not necessarily depict all the transition and states that this site may exhibit, but it does show some of the most common plant communities that can occur on the site and the transition pathways among the communities. These plant communities may not represent every possibility, but they are the most prevalent and repeatable. No data has been recorded to indicate a state containing invasive species exists. As more data is collected, some of these plant communities will be revised or removed, and new ones may be added. None of these plant communities should necessarily be thought of as the “desired plant community. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

State and transition model



State 1
Reference State

This state includes the biotic communities that become established on the ecological site if all successional sequences are completed under the natural disturbance regimes. The reference state is generally dominated by Utah juniper, and twoneedle pinyon, however depending on disturbance history, native grasses, forbs, or other shrubs may occupy significant composition in the plant community. The primary disturbance mechanism is climate fluctuation. During long periods of drought, this site may lose the two-needle pinyon (phase 1.1). The reference state is self sustaining and resistant to change due to high resistance to natural disturbances and high resilience following natural disturbances. When natural disturbances occur, the rate of recovery is variable. Typically, in the reference state this site will fluctuate between community phases 1.1 and 1.2. Reference State: Plant communities influenced by insect herbivory, and climate fluctuations. Indicators: A community dominated by Utah juniper, where twoneedle pinyon shrubs, and native perennial grasses and forbs may or may not be present. Feedbacks: Natural

fluctuations in climate that allow for a self sustaining juniper-pinyon and native grass community. At-risk Community Phase: All communities are at risk when native plants are stressed and nutrients become available for invasive plants to establish. Such an occurrence has not been documented on this site, however, this possibility should be taken into consideration.

Community 1.1
Utah Juniper and Pinyon Woodland

Figure 4. Utah Juniper and Pinyon Woodland

This community phase is characterized by a Utah juniper and pinyon upper canopy. In the lower canopy, commonly seen grasses include Indian ricegrass, galleta, and blue grama. Other perennial grasses, shrubs, and forbs may or may not be present and cover is variable. Air dry composition of this site is approximately 10 percent forbs, 10 percent grasses, 10 percent shrubs and 70 percent trees. Bare ground is variable (10-32%) depending on biological crust cover, which is also variable (0-20%) and surface rock fragments (34-60%).

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	200	350	620
Shrub/Vine	40	50	80
Grass/Grasslike	30	50	70
Forb	30	40	50
Total	**300**	**490**	**820**

Table 6. Ground cover

Tree foliar cover	8-24%
Shrub/vine/liana foliar cover	0-5%
Grass/grasslike foliar cover	0-5%
Forb foliar cover	0-4%
Non-vascular plants	0%
Biological crusts	0-20%
Litter	5-12%
Surface fragments >0.25" and <=3"	0-19%
Surface fragments >3"	0-5%
Bedrock	4-20%
Water	0%
Bare ground	10-32%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	0-2%	0-5%	0-4%
>0.5 <= 1	–	0-3%	0-5%	0-4%
>1 <= 2	–	2-5%	0-5%	0-4%
>2 <= 4.5	–	0-3%	–	–
>4.5 <= 13	0-8%	–	–	–
>13 <= 40	8-24%	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Community 1.2
Utah Juniper Woodland

This community phase is generally represented by a Utah juniper and two-needle pinyon overstore with only a minor component of Pinyon, if any. In the lower canopy, commonly seen grasses include Indian ricegrass, galleta, and blue grama. Other perennial grasses, shrubs, and forbs may or may not be present and cover is variable. Air dry composition of this site is approximately 10 percent forbs, 10 percent grasses, 10 percent shrubs and 70 percent trees. Bare ground is variable (10-32%) depending on biological crust cover, which is also variable (0-20%) and surface rock fragments (34-60%).

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	200	350	620
Shrub/Vine	40	50	80
Grass/Grasslike	30	50	70
Forb	30	40	50
Total	**300**	**490**	**820**

Table 9. Ground cover

Tree foliar cover	8-24%
Shrub/vine/liana foliar cover	0-5%
Grass/grasslike foliar cover	0-5%
Forb foliar cover	0-4%
Non-vascular plants	0%
Biological crusts	0-20%
Litter	5-12%
Surface fragments >0.25" and <=3"	0-19%
Surface fragments >3"	0-5%
Bedrock	4-20%
Water	0%
Bare ground	10-32%

Table 10. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	0-2%	0-5%	0-4%
>0.5 <= 1	–	0-3%	0-5%	0-4%
>1 <= 2	–	2-5%	0-5%	0-4%
>2 <= 4.5	–	0-3%	–	–
>4.5 <= 13	0-8%	–	–	–
>13 <= 40	8-24%	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Pathway 1.1a
Community 1.1 to 1.2

-Community Pathway- 1.1a (I, CLD,) Insect herbivory coupled with long-term drought. During periods of long-term drought, Pinyon trees are susceptible to insect infestations. Insect herbivory decreases the amount on Pinyon in the community.

Pathway 1.2a
Community 1.2 to 1.1

1.2a (CLW) = If a moist climate persists, twoneedle pinyons may reestablish.

Additional community tables

Table 11. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Tree					
0	**Dominant Trees**			140–620	
	twoneedle pinyon	PIED	*Pinus edulis*	80–340	4–14
	Utah juniper	JUOS	*Juniperus osteosperma*	60–280	5–10
Shrub/Vine					
0	**Shrubs**			20–80	
	Bigelow sage	ARBI3	*Artemisia bigelovii*	20–50	–
	Torrey's jointfir	EPTO	*Ephedra torreyana*	10–25	–
	roundleaf buffaloberry	SHRO	*Shepherdia rotundifolia*	10–25	–
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	4–13	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	4–13	–
	Mexican cliffrose	PUME	*Purshia mexicana*	4–13	–
Grass/Grasslike					
0	**Dominant Grasses**			10–75	
	James' galleta	PLJA	*Pleuraphis jamesii*	10–70	0–5
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–60	0–5
	Stansbury cliffrose	PUST	*Purshia stansburiana*	0–40	0–6

	blue grama	BOGR2	*Bouteloua gracilis*	0–40	0–2
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	10–38	–
	littleleaf mountain mahogany	CEIN7	*Cercocarpus intricatus*	0–30	0–6
	Bigelow sage	ARBI3	*Artemisia bigelovii*	0–25	0–5
	mormon tea	EPVI	*Ephedra viridis*	0–25	0–5
	Torrey's jointfir	EPTO	*Ephedra torreyana*	0–20	0–5
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–15	0–5
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–15	0–2
	sandhill muhly	MUPU2	*Muhlenbergia pungens*	0–15	0–2
	shadscale saltbush	ATCO	*Atriplex confertifolia*	0–10	0–5
	Utah serviceberry	AMUT	*Amelanchier utahensis*	0–10	0–5
	roundleaf buffaloberry	SHRO	*Shepherdia rotundifolia*	0–10	0–5
	spiny hopsage	GRSP	*Grayia spinosa*	0–8	0–4
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–8	0–2
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–5	0–2
	Fremont's mahonia	MAFR3	*Mahonia fremontii*	0–5	0–2
	blackbrush	CORA	*Coleogyne ramosissima*	0–5	0–2
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–5	0–2
	spineless horsebrush	TECA2	*Tetradymia canescens*	0–5	0–2
	narrowleaf yucca	YUAN2	*Yucca angustissima*	0–5	0–2
	skunkbush sumac	RHTR	*Rhus trilobata*	0–5	0–2
	Thompson's dalea	PSTH	*Psorothamnus thompsoniae*	0–5	0–2
	singleleaf ash	FRAN2	*Fraxinus anomala*	0–5	0–2
	needle and thread	HECO26	*Hesperostipa comata*	0–5	0–2
1	**Sub-Dominant Grasses**			26–61	
	Grass, perennial	2GP	*Grass, perennial*	0–20	–
	desert needlegrass	ACSP12	*Achnatherum speciosum*	0–5	0–2
	sand bluestem	ANHA	*Andropogon hallii*	0–5	0–2
	purple threeawn	ARPU9	*Aristida purpurea*	0–5	0–2
	saline wildrye	LESAS	*Leymus salinus ssp. salinus*	2–5	0–2
	muttongrass	POFE	*Poa fendleriana*	0–5	0–2
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–5	0–2
Forb					
2	**Forbs**			5–75	
	cryptantha	CRYPT	*Cryptantha*	0–30	0–5
	Forb, annual	2FA	*Forb, annual*	0–25	–
	Forb, perennial	2FP	*Forb, perennial*	0–25	–
	rock goldenrod	PEPU7	*Petradoria pumila*	0–20	0–2
	Navajo fleabane	ERCOC3	*Erigeron concinnus var. concinnus*	0–10	0–5
	beautiful rockcress	ARPU2	*Arabis pulchra*	0–10	0–2
	phlox	PHLOX	*Phlox*	0–8	0–2
	Utah penstemon	PEUT	*Penstemon utahensis*	0–5	0–2
	skyblue phacelia	PHCO	*Phacelia coerulea*	0–5	0–2

	heartleaf twistflower	STCO6	*Streptanthus cordatus*	0–5	0–2
	stemless four-nerve daisy	TEACA2	*Tetraneuris acaulis var. acaulis*	0–5	0–2
	woolly locoweed	ASMO7	*Astragalus mollissimus*	0–5	0–2
	aster	ASTER	*Aster*	0–5	0–2
	Fendler's sandmat	CHFE3	*Chamaesyce fendleri*	0–5	0–2
	spotted sandmat	CHMA15	*Chamaesyce maculata*	0–5	0–2
	bull thistle	CIVU	*Cirsium vulgare*	0–5	0–2
	twisted cleomella	CLPL2	*Cleomella plocasperma*	0–5	0–2
	Brenda's yellow cryptantha	CRFL5	*Cryptantha flava*	0–5	0–2
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–5	0–2
	fineleaf hymenopappus	HYFI	*Hymenopappus filifolius*	0–5	0–2
	mountain pepperweed	LEMO2	*Lepidium montanum*	0–5	0–2
	rayless tansyaster	MAGR2	*Machaeranthera grindelioides*	0–5	0–2
	Colorado four o'clock	MIMU	*Mirabilis multiflora*	0–5	0–2
	nakedstem sunray	ENNU	*Enceliopsis nudicaulis*	0–5	0–2
	pretty buckwheat	ERBI	*Eriogonum bicolor*	0–5	0–2
	scarlet globemallow	SPCOC	*Sphaeralcea coccinea ssp. coccinea*	0–5	0
	crispleaf buckwheat	ERCO14	*Eriogonum corymbosum*	0–3	0–2

Table 12. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Tree					
0	**Dominant Trees**			140–620	
	Utah juniper	JUOS	*Juniperus osteosperma*	60–280	5–10
	twoneedle pinyon	PIED	*Pinus edulis*	0–30	0–5
Shrub/Vine					
0	**Shrubs**			20–80	
	Bigelow sage	ARBI3	*Artemisia bigelovii*	20–50	–
	Torrey's jointfir	EPTO	*Ephedra torreyana*	10–25	–
	roundleaf buffaloberry	SHRO	*Shepherdia rotundifolia*	10–25	–
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	4–13	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	4–13	–
	Mexican cliffrose	PUME	*Purshia mexicana*	4–13	–
Grass/Grasslike					
0	**Dominant Grasses**			10–75	
	James' galleta	PLJA	*Pleuraphis jamesii*	10–70	0–5
	Stansbury cliffrose	PUST	*Purshia stansburiana*	0–40	0–6
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	10–38	–
	littleleaf mountain mahogany	CEIN7	*Cercocarpus intricatus*	0–30	0–6
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–30	0–5
	Bigelow sage	ARBI3	*Artemisia bigelovii*	0–25	0–5

	mormon tea	EPVI	*Ephedra viridis*	0–25	0–5
	Torrey's jointfir	EPTO	*Ephedra torreyana*	0–20	0–5
	blue grama	BOGR2	*Bouteloua gracilis*	0–20	0–2
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–15	0–5
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–15	0–2
	sandhill muhly	MUPU2	*Muhlenbergia pungens*	0–15	0–2
	shadscale saltbush	ATCO	*Atriplex confertifolia*	0–10	0–5
	Utah serviceberry	AMUT	*Amelanchier utahensis*	0–10	0–5
	roundleaf buffaloberry	SHRO	*Shepherdia rotundifolia*	0–10	0–5
	spiny hopsage	GRSP	*Grayia spinosa*	0–8	0–4
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–8	0–2
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–5	0–2
	Fremont's mahonia	MAFR3	*Mahonia fremontii*	0–5	0–2
	blackbrush	CORA	*Coleogyne ramosissima*	0–5	0–2
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–5	0–2
	spineless horsebrush	TECA2	*Tetradymia canescens*	0–5	0–2
	narrowleaf yucca	YUAN2	*Yucca angustissima*	0–5	0–2
	skunkbush sumac	RHTR	*Rhus trilobata*	0–5	0–2
	Thompson's dalea	PSTH	*Psorothamnus thompsoniae*	0–5	0–2
	singleleaf ash	FRAN2	*Fraxinus anomala*	0–5	0–2
	needle and thread	HECO26	*Hesperostipa comata*	0–5	0–2
1	**Sub-Dominant Grasses**			26–61	
	Grass, perennial	2GP	*Grass, perennial*	0–20	–
	desert needlegrass	ACSP12	*Achnatherum speciosum*	0–5	0–2
	sand bluestem	ANHA	*Andropogon hallii*	0–5	0–2
	purple threeawn	ARPU9	*Aristida purpurea*	0–5	0–2
	saline wildrye	LESAS	*Leymus salinus ssp. salinus*	2–5	0–2
	muttongrass	POFE	*Poa fendleriana*	0–5	0–2
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–5	0–2
Forb					
2	**Forbs**			5–75	
	cryptantha	CRYPT	*Cryptantha*	0–30	0–5
	Forb, annual	2FA	*Forb, annual*	0–25	–
	Forb, perennial	2FP	*Forb, perennial*	0–25	–
	rock goldenrod	PEPU7	*Petradoria pumila*	0–20	0–2
	Navajo fleabane	ERCOC3	*Erigeron concinnus var. concinnus*	0–10	0–5
	beautiful rockcress	ARPU2	*Arabis pulchra*	0–10	0–2
	phlox	PHLOX	*Phlox*	0–8	0–2
	Utah penstemon	PEUT	*Penstemon utahensis*	0–5	0–2
	skyblue phacelia	PHCO	*Phacelia coerulea*	0–5	0–2
	heartleaf twistflower	STCO6	*Streptanthus cordatus*	0–5	0–2
	stemless four-nerve daisy	TEACA2	*Tetraneuris acaulis var. acaulis*	0–5	0–2
	woolly locoweed	ASMO7	*Astragalus mollissimus*	0–5	0–2

	aster	ASTER	*Aster*	0–5	0–2
	Fendler's sandmat	CHFE3	*Chamaesyce fendleri*	0–5	0–2
	spotted sandmat	CHMA15	*Chamaesyce maculata*	0–5	0–2
	bull thistle	CIVU	*Cirsium vulgare*	0–5	0–2
	twisted cleomella	CLPL2	*Cleomella plocasperma*	0–5	0–2
	Brenda's yellow cryptantha	CRFL5	*Cryptantha flava*	0–5	0–2
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–5	0–2
	fineleaf hymenopappus	HYFI	*Hymenopappus filifolius*	0–5	0–2
	mountain pepperweed	LEMO2	*Lepidium montanum*	0–5	0–2
	rayless tansyaster	MAGR2	*Machaeranthera grindelioides*	0–5	0–2
	Colorado four o'clock	MIMU	*Mirabilis multiflora*	0–5	0–2
	nakedstem sunray	ENNU	*Enceliopsis nudicaulis*	0–5	0–2
	pretty buckwheat	ERBI	*Eriogonum bicolor*	0–5	0–2
	scarlet globemallow	SPCOC	*Sphaeralcea coccinea ssp. coccinea*	0–5	0
	crispleaf buckwheat	ERCO14	*Eriogonum corymbosum*	0–3	0–2

Animal community

--Wildlife Interpretation--
The scarcity of water on this site limits the species richness and the abundance of large mammals. This site provides thermal cover and limited forage opportunities for mule deer. Birds, Bats, lizards, snakes and rodents are more common. Birds from several families from hawks to sparrows are typical. Golden eagles and red-tailed hawks are common as well as the great horned-owl. Species typical of pinyon juniper areas including black-chinned and rufous hummingbirds, and several fly catchers, wood peckers, and corvids will use this site for nesting and foraging. Several species of rodents forage and occupy this site including desert cottontail, black tailed jack rabbit, Colorado chipmunk, white–tailed Antelope squirrel, Apache pocket mouse, several species of Peromyscus. Coyotes and kit foxes will also forage in the area. Dens are probably located in other ecological sites due to the shallow soils and/or the presence rocks or rock out crops. Bats (Myotis, Pipisturellus, and others) can be observed in this ecological site, but are likely limited to areas near water or canyons.

--Grazing Interpretations—
This site provides fair grazing conditions for wildlife. However, this site often lacks natural perennial water sources, which can influence the suitability for wildlife grazing. Mule deer, desert bighorn sheep, pronghorn antelope, and elk may utilize this site, though in many places the populations will be small and have little grazing impact.

The plant community is primarily Utah Juniper and pinyon; sub dominants include Utah serviceberry, singleleaf ash, mormon tea, and buffaloberry. These shrubs provide good winter browse for cattle, sheep, goats, pronghorn antelope, elk, mule deer, and bighorn sheep. Grasses include Indian ricegrass and galleta, and when present these grasses provide good grazing conditions for all classes of livestock and wildlife. Utah juniper and pinyon pine provide good cover for livestock and wildlife; mule deer, pronghorn antelope, and goats may also graze these trees. Forb composition and annual production depends primarily on precipitation amounts and thus is challenging to use in livestock grazing management decisions. However, forb composition should be monitored for species diversity, as well as poisonous or injurious plant communities which may be detrimental to livestock if grazed. Before making specific grazing management recommendations, an onsite evaluation must 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.
Soil textures are typically fine sandy loams and slope ranges 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 0.75 inches per year, but may be as high as 1.4 inches in a single 100-year storm event. However, soil loss ranges from 0.19(about 2% slope) to 0.5 (about 30% slope) tons per acre on an average year, and from 0.4 (about 2% slope) to 1 (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 9-12 inches per year, but a single 100-year storm event can generate 2 inches of precipitation in a 24-hour period.

Individual tree and shrub plants are uniformly distributed but spaces far apart, resulting in some 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 often 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.

Soil Group
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--
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 include hiking and hunting.

Wood products

The site index is 35. Wood production is about four cords per acre per year.

Other information

--Poisonous and Toxic Plant Communities--
Toxic plants associated with this site include woolly locoweed and broom snakeweed. Woolly locoweed is toxic to all classes of livestock and wildlife. Locoweed is palatable and has similar nutrient value to alfalfa, which may cause

animals to consume it even when other forage is available. Locoweed contains swainsonine (indolizdine alkaloid) and is poisonous at all stages of growth. Poisoning will become evident after 2-3 weeks of continuous grazing and is associated with 4 major symptoms: 1) neurological damage, 2) emaciation, 3) reproductive failure and abortion, and 4) congestive heart failure linked with “high mountain disease”. 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 generally will only graze broom snakeweed when other forage is unavailable, typically in winter when toxicity levels are at their lowest (Knight and Walter, 2001). Havard oak is thought to contain tannins that can be detrimental to cattle, sheep, and occasionally horses if grazed as more than 50% of the diet. Oak is highly toxic during the budding stage, leafing stage, and when acorns are available. Symptoms include lack of appetite, weakness, excessive thirst, edema, reluctance to follow the herd, and emaciation

--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 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. On well developed Utah juniper and pinyon pine communities soils are complete occupied by lateral roots, which inhibit an herbaceous understory as well as annual invasions. However once these sites are disturbed and pinyon-juniper communities begin to decline invasion is possible.

--Fire Ecology--
The ability for an ecological site to carry fire depends primarily on the present fuel load and plant moisture content—sites with small fuel loads will burn more slowly and less intensely than sites with large fuel loads. Many semi-desert 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.

There is no evidence that this site historically maintained a short burn frequency. Only a few species in the association show fire scars and can be aged. This ecological site is comprised of scatterd junipers and pinyons with bare interspaces to patchy occurrence of grasses, which is unlikely to carry a fire unless under high winds, high temperature, and low humidity. Currently, burning is not a recommended brush management tool. If annual grasses or forbs dominate the area after disturbance, re-vegetating efforts could be hampered due to several factors including an increase in fire frequency.

--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	418529
UTM easting	0493683
General legal description	Capitol Reef National Park

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)	Robert Stager (BLM), Randy Beckstrand (BLM), V. Keith Wadman (NRCS Ret.), Dana Truman (NRCS), Paul Curtis (BLM), Shane A. Green (NRCS).
Contact for lead author	shane.green@ut.usda.gov
Date	10/23/2008
Approved by	Shane A. Green
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills increase immediately following large storm events but should not persist more than one or two winters due to frost-heave recovery. There should be very few on slopes < 6%. On slopes >6%, rills may be 5-10 feet in length. Rills are most likely to form below adjacent exposed bedrock or water flow patterns where sufficient water accumulates to cause erosion.

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2. **Presence of water flow patterns:** Waterflow patterns are often associated with micro topography on the site (small hummocks, etc.), these waterflow patterns should be narrow (<1-1½') but can be very long. These waterflow patterns should be widely spaced (15-20 yrds) on low slopes (< 6%), increasing in frequency (every 10-15yrds) with slope. Otherwise, there should be none to few and short (3-6') water flow patterns on low slopes (< 6%), increasing in frequency and length (up to 5-10') with slope. Waterflow patterns should dissipate where the slope flattens.

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3. **Number and height of erosional pedestals or terracettes:** Shrubs that occur on the edge of water flow patterns and rills on steeper slopes (>6%) may be pedestalled, but there should be no exposed roots.
Terracettes are few, occurring where woody litter obstructs water flow patterns.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 20-25%. Most bare ground is associated with water flow patterns, rills, and gullies. Any areas with well developed biological soil crusts should not be counted as bare ground. Poorly developed biological soil crusts that are interpreted as functioning as bare ground (therefore they would be susceptible to raindrop splash erosion) should be recorded as bare ground. This site has variable rock cover ranging from 0 to 70%, but most are under 25%. This can affect the amount of bare ground to expect. Use the description in the published soil survey to determine the amount of rock cover to expect on a specific site. Ground cover is based on first raindrop impact, and bare ground is the opposite of ground cover. Ground cover + Bare ground = 100%.

5. **Number of gullies and erosion associated with gullies:** No active gullies. Some stable gullies may be present in landscape settings where increased runoff may accumulate (such as areas below exposed bedrock). Such gully development is expected to be limited to slopes exceeding 15% and adjacent to sites where runoff accumulation occurs. Any gullies present should show little sign of accelerated erosion and should be stabilized with perennial vegetation. Natural features of the rolling micro topography should not be interpreted as gullies.

6. **Extent of wind scoured, blowouts and/or depositional areas:** There should be very little evidence of active wind scoured, blowout or depositional areas. Wind caused deposition at the base of shrubs and trees is stabilized by litter.

7. **Amount of litter movement (describe size and distance expected to travel):** There may be movement of fine litter on low slopes (< 6%) of up 2-4'. On steeper slopes, fine litter may be redistributed by wind or water flow patterns following large storm events, depositing where the slope flattens or behind obstructions. Woody litter (if present) should not move from beneath the plant.

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 the plant canopies, and a rating of 3 in the interspaces. The average should be a 4. Surface texture is fine sand. Vegetation cover, litter 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 4 inches deep. Structure is typically weak. Color is typically light reddish brown (5YR6/4). The A horizon does not differ between interspaces and underneath plant canopies. 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 and/or biological soil crusts (where present) intercept raindrops preventing, but not eliminating, reduction of infiltration due to physical crusting. Plants and/or biological soil crusts usually have sufficient cover to slow runoff allowing time for infiltration. Shrubs and bunchgrasses and associated plant litter provide barriers to flow.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None, although bedrock is found within 20 inches of soil surface. In addition, there may be layers of calcium carbonate or other naturally occurring hard layers found in the soil subsurface. 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: sprouting shrub (Bigelow sagebrush > Torrey mormontea = Roundleaf buffaloberry) > trees (Utah juniper, Two needle pinyon) > cool-season bunchgrasses (e.g. Indian ricegrass, Needle and thread) > warm-season bunchgrasses (e.g. Galleta)

Sub-dominant: forbs (e.g. Wrights birdbeak, Horned spurge) > > biological soil crusts

Other: Perennial and annual forbs can be expected to vary widely in their expression in the plant community based upon departures from average growing conditions. Functional/structural groups may appropriately contain non-native species if their ecological function is the same as the native species in the reference state.

Additional: Factors contributing to temporal variability include wildlife (deer) use; drought and insects and other pathogens such as mistletoe on the Junipers.
Factors contributing to spatial variability include texture, depth and coarse fragment (rock/gravel) content, slope and aspect.

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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 either the shrubs or grasses. Some mortality of bunchgrass and other shrubs may also occur during severe droughts, particularly on the shallower and coarser soils associated with this site. There may be partial mortality of individual bunchgrasses and other shrubs during less severe drought. 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 shrub canopies, and up to ¾" under tree canopies. Litter cover may increase up to 10% immediately following leaf drop. Litter redistribution following natural extreme runoff events can reduce litter cover by concentrating it in low-lying areas. Litter cover may increase to 7-10% followings seasons with above average production due to a high production of annuals.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 300-800 #/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:** None currently known; however cheatgrass, Russian thistle, and other introduced annual forbs have future potential. This reference should be revised if any of these species become invasive in this ecological site.

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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.
