Trend Study 16A-7-07

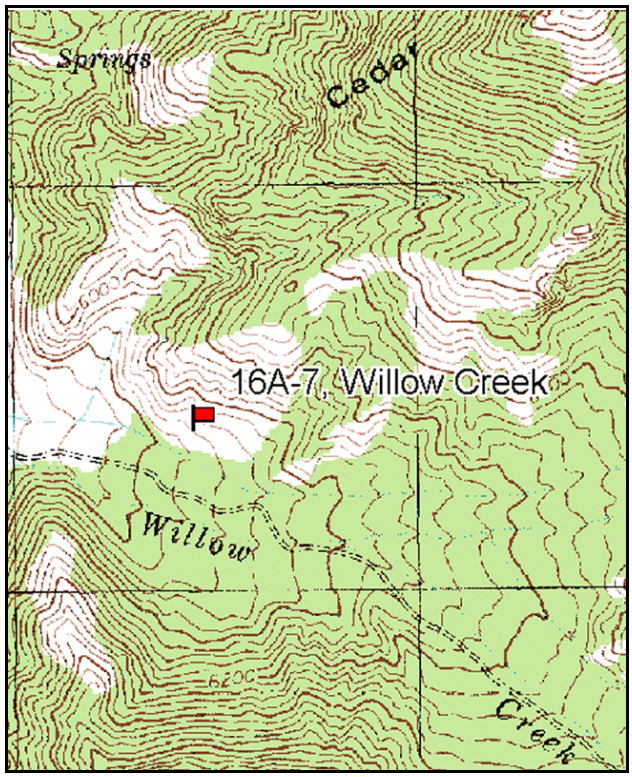
Study site name: Willow Creek . Vegetation type: Stansbury Cliffrose .

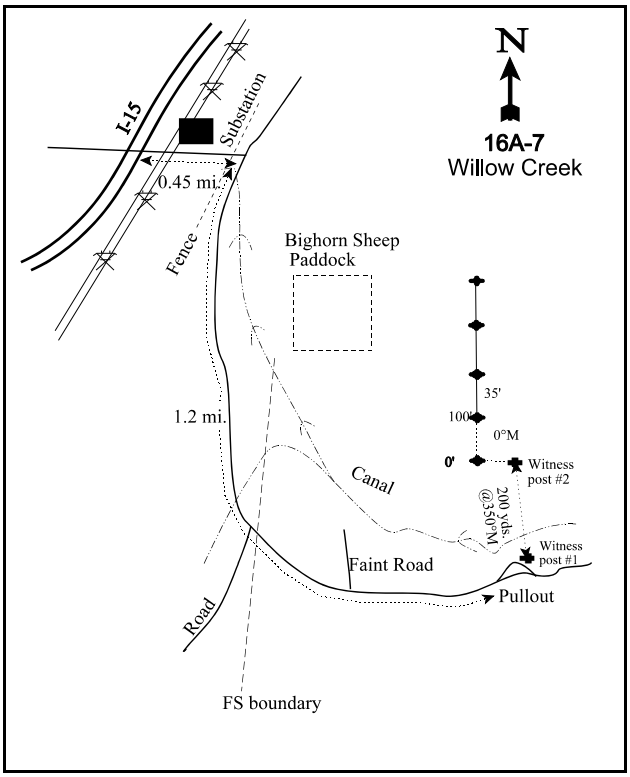
Compass bearing: frequency baseline 0 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Beginning at the east side of the underpass where Cemetery Road passes over I-15 southeast of Mona, proceed east for 0.45 miles to an intersection. Take the right fork and proceed 1.2 miles to the witness post staying on the main road. From this point, walk 200 yards at 350 degrees magnetic to the witness post (you will need to cross the irrigation canal). The 0-foot baseline stake is 3 paces west of the witness post. It is a green fencepost with a red browse tag, number 3958, attached. The baseline runs at an azimuth of 0 degrees magnetic.





Map Name: Mona

Diagrammatic Sketch

Township 12S , Range 1E , Section 3

GPS: NAD 83, UTM 12S 430382 E 4405594 N

DISCUSSION

Willow Creek - Trend Study No. 16A-7

Study Information

This study is located at the mouth of Willow Creek Canyon, within the Uinta National Forest [elevation: 5,900 feet (1,798 m), slope: 42%, aspect: southwest]. Unfenced, private land lies immediately to the west. The study samples a Stansbury cliffrose (*Cowania mexicana* ssp. *stansburiana*) community that is considered critical deer and elk winter range. A fire burned approximately 0.5 miles (0.8 km) to the south in 2001. In 1997, quadrat frequency of elk pellet groups was moderately high at 32%, and deer pellet frequency was lower at 11%. Deer use was estimated at 88 days use/acre (217 ddu/ha) in 2002 and 122 days use/acre (301 ddu/ha) in 2007. Elk use was estimated at 36 days use/acre (89 edu/ha) in 2002 and 13 days use/acre (33 edu/ha) in 2007. Most of the deer pellet groups appeared to be from winter use, while most of the elk use was late winter to early spring.

Soil

The soil is classified as the Yeates Hollow series (USDA-NRCS 2007). The soils in this series are deep and well-drained to moderately well-drained. They formed in alluvium, colluvium, and residuum from conglomerate, sandstone, and quartzite. The soil texture is a sandy loam with a neutral pH (7.0). Organic matter is limited at only 1.8%. Soil phosphorus is also moderately low at 6.4 ppm. When the study was established, the soil surface appeared highly eroded, with 21% bare ground and 12% pavement cover. By 2007, relative vegetative cover was 36%, with 10% bare ground and 15% pavement relative cover. Pedestalling was common, but erosion appeared localized. The erosion condition was classified as slight in 2002 and 2007.

Browse

Stansbury cliffrose is the preferred browse species, and has provided 85% to 92% of the total browse cover since the baseline was lengthened in 1997. Density steadily increased from 580 plants/acre (1,433 plants/ha) in 1997 to 1,040 plants/acre (2,570 plants/ha) in 2007. The population was largely mature until 2007, when 46% of the plants were classified as decadent. Recruitment has been low throughout the study. Vigor has been good on most individuals, with 16% and 10% of the population showing poor vigor in 2002 and 2007, respectively. Use was moderate-heavy in 1983 and 1989, and over 90% of the plants have displayed heavy use since 1997. Annual leader growth averaged 1.1 inches (2.8 cm) in 2002 and 2007. Other browse species, such as mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), bitterbrush (*Purshia tridentata*), fourwing saltbush (*Atriplex canescens*), and white rubber rabbitbrush (*Chrysothamnus nauseosus* ssp. *albicaulis*), are found in low densities and have displayed moderate-heavy use.

Herbaceous Understory

The herbaceous understory is dominated by cheatgrass (*Bromus tectorum*), which comprised 46% to 62% of the total herbaceous cover between 1997 and 2007. It provided 17% cover in 1997, 15% in 2002, and 16% in 2007. Perennial grasses have increased from 6% cover in 1997 to 7% in 2002 and 12% in 2007. The most abundant perennial grass is bluebunch wheatgrass (*Agropyron spicatum*), which composed 25% of the total grass cover in 2002 and 26% in 2007. Bulbous bluegrass (*Poa bulbosa*), a low-value perennial, is also fairly abundant. It has increased in average cover from 1% to 4% since 1997.

The forb composition is poor and is dominated by annuals. The most abundant forb species are pale alyssum (*Alyssum alyssoides*) and storksbill (*Erodium cicutarium*), which has been shown to outcompete and prevent the establishment of native species (Kimball and Schiffman 2003). Scarlet globemallow (*Sphaeralcea coccinea*) and heath aster (*Leucelene ericoides*) are the most abundant perennial species, but occur infrequently.

1989 TREND ASSESSMENT

The trend for browse is stable. Cliffrose density increased slightly from 965 plants/acre (2,384 plants/ha) to 1,033 plants/acre (2,552 plants/ha). Decadence increased from 7% of the population to 39%. Young plants composed 10% of the population, which increased from 3%. All of the plants were vigorous and use was moderate-heavy. The trend for grass is stable. The sum of nested frequency for perennial grasses changed little. Bulbous bluegrass and Sandberg bluegrass (*Poa secunda*) were sampled for the first time, but in low frequencies. The trend for forbs is stable. The sum of nested frequency for perennial forbs changed little. Forbs were sampled infrequently and provided little forage.

browse - stable (0) grass - stable (0) forb - stable (0)

1997 TREND ASSESSMENT

The trend for browse is slightly down. Cliffrose density decreased 44%, however, this change partly reflects the increase in sampling area. Decadence decreased from 39% in 1989 to 3% in 1997, and no young plants were sampled. Vigor remained excellent, and 93% of the plants displayed heavy use. The trend for grass is down. The sum of nested frequency for perennial grasses, excluding bulbous bluegrass, decreased 22%. Bluebunch wheatgrass decreased significantly in nested frequency. The trend for forbs is stable. The sum of nested frequency for perennial forbs changed little. The Desirable Components Index (DCI) was rated as very poor-poor due to high annual grass cover, low perennial understory cover, and low recruitment of preferred browse.

winter range condition (DCI) - very poor-poor (37) Mid-level potential scale
browse - slightly down (-1) grass - down (-2) forb - stable (0)

2002 TREND ASSESSMENT

The trend for browse is slightly up. Cliffrose density increased from 580 plants/acre (1,433 plants/ha) to 880 plants/acre (2,174 plants/ha). Decadence increased from 3% to 23%, and plants displaying poor vigor increased from 0% to 16% of the population. Use remained heavy. Sagebrush, bitterbrush, and fourwing saltbush were sampled in low densities and also showed some heavy use. The trend for grass is slightly down. The sum of nested frequency for perennial grasses decreased 13%. Cheatgrass remained the dominant grass species and bulbous bluegrass increased significantly in nested frequency. The trend for forbs is stable. The sum of nested frequency for perennial forbs changed little. Although pale alyssum decreased significantly in nested frequency, it remained the most abundant forb. Storksbill increased significantly in nested frequency. The DCI continued to be rated as very poor-poor.

winter range condition (DCI) - very poor-poor (35) Mid-level potential scale
browse - slightly up (+1) grass - slightly down (-1) forb - stable (0)

2007 TREND ASSESSMENT

The trend for browse is stable. Cliffrose density increased 18%, while cover decreased from 15% to 11%. Decadence doubled to 46% of the population. Recruitment remained low, with only 6% of the population consisting of young plants. Plants displaying poor vigor decreased slightly from 16% to 10% of the population. Use remained heavy. The sagebrush density remained stable, and half of sampled plants displayed heavy use. The trend for grass is stable. The sum of nested frequency for perennial grasses increased 9%. However, cheatgrass cover increased from 14% to 16%. Bulbous bluegrass cover increased almost three-fold since 2002. The trend for forbs is stable. The sum of nested frequency for perennial forbs did not change, while storksbill increased significantly in nested frequency. The DCI rating declined to very poor due to a decrease in cover and increase in decadence of preferred browse.

winter range condition (DCI) - very poor (26) Mid-level potential scale
browse - stable (0) grass - stable (0) forb - stable (0)

HERBACEOUS TRENDS --
Management unit 16A, Study no: 7

Type	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
G	Agropyron spicatum	$_{b}$198	$_{b}$191	$_{a}$132	$_{a}$121	$_{a}$135	4.17	5.55	7.18
G	Bromus japonicus (a)	-	-	-	19	-	-	.39	-
G	Bromus tectorum (a)	-	-	$_{b}$354	$_{ab}$336	$_{a}$335	17.42	14.48	15.65
G	Festuca myuros (a)	-	-	$_{a}$6	-	$_{a}$4	.03	-	.00
G	Poa bulbosa	-	$_{a}$10	$_{a}$32	$_{b}$58	$_{b}$85	1.23	1.50	4.28
G	Poa secunda	-	$_{a}$12	$_{a}$27	$_{a}$17	$_{a}$16	.13	.11	.26
Total for Annual Grasses		0	0	360	355	339	17.45	14.87	15.66
Total for Perennial Grasses		198	213	191	196	236	5.53	7.17	11.73
Total for Grasses		198	213	551	551	575	22.99	22.04	27.39
F	Agoseris glauca	-	-	-	1	-	-	.00	-
F	Alyssum alyssoides (a)	-	-	$_{b}$291	$_{a}$212	$_{a}$217	3.07	.82	2.46
F	Artemisia ludoviciana	$_{a}$5	$_{a}$6	$_{a}$6	$_{a}$3	-	.06	.03	-
F	Astragalus cibarius	-	-	-	-	3	-	-	.03
F	Asclepias sp.	-	-	-	5	-	-	.18	-
F	Astragalus utahensis	$_{a}$2	$_{a}$5	$_{a}$11	$_{a}$-	$_{a}$2	.24	.00	.03
F	Camelina microcarpa (a)	-	-	3	-	-	.00	-	-
F	Calochortus nuttallii	1	-	-	-	-	-	-	-
F	Cerastium sp.	-	3	-	-	-	-	-	-
F	Cirsium vulgare	$_{a}$1	$_{a}$6	-	-	-	-	-	-
F	Cryptantha sp.	$_{a}$4	$_{a}$2	-	-	-	-	-	-
F	Descurainia pinnata (a)	-	-	$_{a}$8	$_{a}$2	$_{a}$8	.03	.01	.05
F	Draba sp. (a)	-	-	-	-	4	-	-	.01
F	Eriogonum brevicaule	$_{a}$3	$_{a}$4	$_{a}$7	-	-	.06	-	-
F	Erodium cicutarium (a)	-	-	$_{a}$35	$_{b}$93	$_{c}$141	.18	1.67	2.69
F	Erigeron pumilus	$_{a}$34	$_{a}$47	-	-	-	-	-	-
F	Eriogonum umbellatum	-	-	-	-	1	-	-	.03
F	Galium aparine (a)	-	-	$_{a}$8	-	$_{a}$1	.01	-	.00
F	Haplopappus acaulis	-	-	-	-	-	-	-	.03
F	Hackelia patens	-	-	6	-	-	.02	-	-
F	Holosteum umbellatum (a)	-	-	-	$_{a}$3	$_{a}$5	-	.00	.01
F	Lappula occidentalis (a)	-	-	-	$_{a}$1	$_{b}$17	-	.00	.05
F	Lactuca serriola	-	-	$_{a}$1	$_{a}$2	$_{a}$8	.00	.00	.02
F	Leucelene ericoides	-	-	$_{a}$14	$_{a}$18	$_{a}$18	.26	.19	.39
F	Lygodesmia grandiflora	$_{a}$9	-	-	-	$_{a}$5	-	-	.06
F	Oenothera sp.	-	-	1	-	-	.03	-	-

Type	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
F	Penstemon sp.	-	-	-	1	-	-	.03	-
F	Phlox longifolia	-	$_{a}$4	$_{a}$3	$_{a}$3	$_{a}$1	.01	.15	.03
F	Sphaeralcea coccinea	$_{a}$8	$_{a}$14	$_{ab}$26	$_{b}$31	$_{ab}$22	.98	.59	.42
F	Taraxacum officinale	-	-	3	-	-	.00	-	-
F	Tragopogon dubius	-	-	-	-	3	-	-	.00
Total for Annual Forbs		0	0	345	311	393	3.30	2.51	5.28
Total for Perennial Forbs		67	91	78	64	63	1.68	1.19	1.06
Total for Forbs		67	91	423	375	456	4.98	3.70	6.34

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 16A, Study no: 7

Type	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	Artemisia tridentata vaseyana	2	2	2	.53	.91	.38
B	Atriplex canescens	0	1	0	-	-	-
B	Chrysothamnus nauseosus albicaulis	13	3	3	1.04	.53	.30
B	Cowania mexicana stansburiana	21	33	26	14.32	14.97	10.62
B	Gutierrezia sarothrae	27	16	17	.39	1.25	.24
B	Purshia tridentata	0	1	0	-	-	-
Total for Browse		63	56	48	16.29	17.66	11.55

CANOPY COVER, LINE INTERCEPT --
Management unit 16A, Study no: 7

Species	Percent Cover	
	'02	'07
Artemisia tridentata vaseyana	-	.86
Chrysothamnus nauseosus	-	.18
Chrysothamnus nauseosus albicaulis	-	1.25
Cowania mexicana stansburiana	.33	23.03
Gutierrezia sarothrae	-	.08

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 16A, Study no: 7

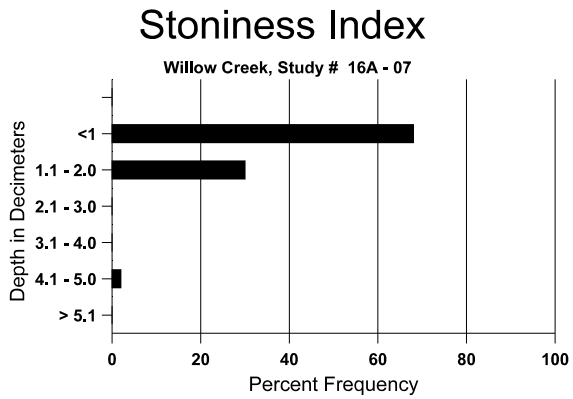
Species	Average leader growth (in)	
	'02	'07
Cowania mexicana stansburiana	1.1	1.1

BASIC COVER --
Management unit 16A, Study no: 7

Cover Type	Average Cover %				
	'83	'89	'97	'02	'07
Vegetation	1.25	8.75	40.62	40.11	41.18
Rock	4.00	8.00	7.40	7.74	9.30
Pavement	11.50	29.75	15.57	16.68	17.24
Litter	62.25	44.75	40.29	36.85	35.05
Cryptogams	0	0	.14	0	.07
Bare Ground	21.00	8.75	12.06	18.06	11.79

SOIL ANALYSIS DATA --
Herd Unit 16A, Study no: 07, Willow Creek

Effective rooting depth (in)	Temp °F (depth)	pH	Sandy loam			%0M	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
17.4	54.8 (14.6)	7.0	58.4	25.1	16.6	1.8	6.4	38.4	.6



PELLET GROUP DATA --
Management unit 16A, Study no: 7

Type	Quadrat Frequency		
	'97	'02	'07
Rabbit	-	-	2
Elk	32	19	6
Deer	11	30	35

Days use per acre (ha)	
'02	'07
-	-
36 (89)	13 (33)
88 (217)	122 (301)

BROWSE CHARACTERISTICS --
Management unit 16A, Study no: 7

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
83	**0**	-	-	-	-	-	0	0	0	-	0	-/-
89	**0**	-	-	-	-	-	0	0	0	-	0	-/-
97	**40**	-	-	40	-	480	50	0	0	-	0	28/50
02	**40**	-	-	20	20	40	0	50	50	-	0	32/54
07	**40**	-	-	20	20	20	0	50	50	-	50	25/43
Atriplex canescens												
83	**33**	-	-	-	33	-	0	0	100	-	100	-/-
89	**33**	-	-	33	-	-	0	0	0	-	0	43/39
97	**0**	-	-	-	-	-	0	0	0	-	0	59/46
02	**20**	-	-	20	-	-	0	100	0	-	0	48/69
07	**0**	-	-	-	-	-	0	0	0	-	0	78/65
Brickellia sp.												
83	**0**	-	-	-	-	-	0	0	-	-	0	-/-
89	**666**	-	100	566	-	-	0	0	-	-	0	6/5
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
02	**0**	-	-	-	-	-	0	0	-	-	0	-/-
07	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Chrysothamnus nauseosus albicaulis												
83	**66**	-	-	66	-	-	0	0	0	-	0	31/51
89	**66**	-	-	33	33	-	0	0	50	-	0	41/31
97	**320**	-	40	280	-	20	31	44	0	-	0	29/51
02	**60**	-	-	-	60	-	67	0	100	33	33	24/38
07	**60**	-	-	20	40	80	0	0	67	-	0	31/45
Chrysothamnus viscidiflorus viscidiflorus												
83	**33**	-	-	33	-	-	0	0	-	-	0	14/17
89	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
02	**0**	-	-	-	-	-	0	0	-	-	0	-/-
07	**0**	-	-	-	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Cowania mexicana stansburiana												
83	**965**	-	33	866	66	-	21	38	7	-	3	52/53
89	**1033**	-	100	533	400	-	39	32	39	-	0	81/84
97	**580**	20	-	560	20	100	7	93	3	-	0	56/66
02	**880**	-	20	660	200	100	0	95	23	16	16	64/67
07	**1040**	-	60	500	480	60	4	94	46	2	10	68/70
Gutierrezia sarothrae												
83	**266**	-	-	266	-	-	0	0	0	-	0	13/14
89	**566**	-	-	533	33	-	0	0	6	6	12	8/10
97	**1780**	20	880	880	20	20	0	0	1	-	0	11/11
02	**520**	-	20	260	240	320	0	0	46	38	38	7/10
07	**680**	-	260	420	-	-	0	0	0	-	0	11/17
Purshia tridentata												
83	**0**	-	-	-	-	-	0	0	-	-	0	-/-
89	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	-	0	78/194
02	**20**	-	20	-	-	-	0	0	-	-	0	-/-
07	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Quercus gambelii												
83	**0**	-	-	-	-	-	0	0	-	-	0	-/-
89	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	-	0	29/45
02	**0**	-	-	-	-	-	0	0	-	-	0	72/57
07	**0**	-	-	-	-	-	0	0	-	-	0	76/53
Rhus trilobata												
83	**166**	-	100	66	-	-	0	0	0	-	0	24/24
89	**133**	-	-	33	100	-	0	0	75	-	75	28/30
97	**0**	-	-	-	-	-	0	0	0	-	0	-/-
02	**0**	-	-	-	-	-	0	0	0	-	0	53/114
07	**0**	-	-	-	-	-	0	0	0	-	0	-/-