

Trend Study 16A-8-07

Study site name: Gardner Canyon .

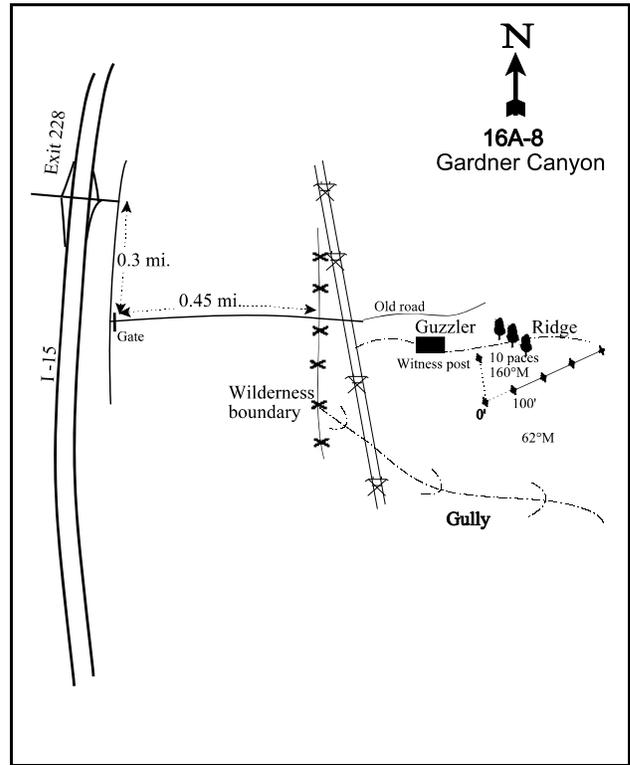
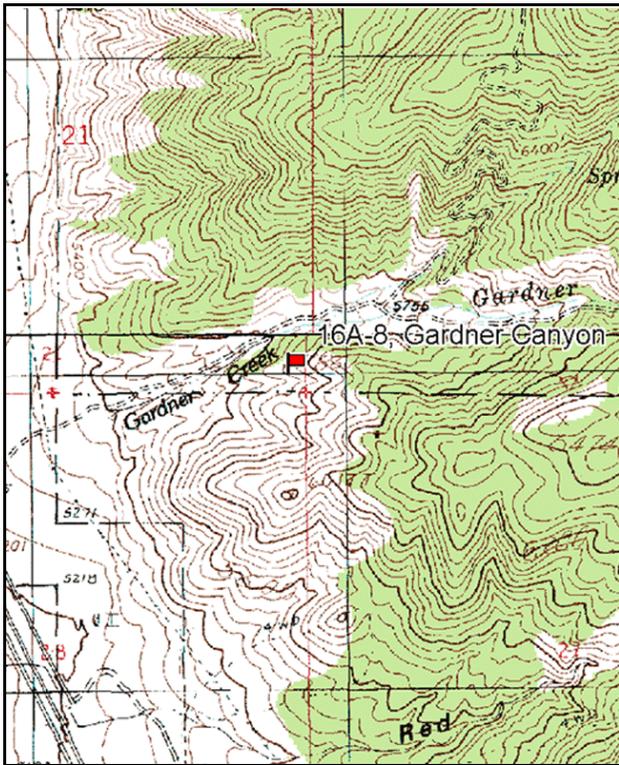
Vegetation type: Stansbury Cliffrose .

Compass bearing: frequency baseline 62 degrees magnetic.

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

LOCATION DESCRIPTION

From exit #228 off of I-15, turn south on the frontage road and drive 0.3 miles to an intersection with a gate. Turn left at the intersection and drive 0.45 miles to the wilderness boundary fence. Walk up the old road under some powerlines. To the south, and perpendicular to the road, is a steep slope with a Gambel oak and cliffrose community. Walk up the slope to a guzzler on the ridgetop. The witness post lies 75 yards up the ridge from the guzzler. From the witness post, the 0-foot stake is 10 paces at an azimuth of 160 degrees magnetic. The study is marked by green steel "T" fenceposts 12 to 13 inches in height. The 0-foot stake has a red browse tag, number 3964, attached.



Map Name: Nephi

Diagrammatic Sketch

Township 12S, Range 1E, Section 28

GPS: NAD 83, UTM 12S 429752 E 4400202 N

DISCUSSION

Gardner Canyon - Trend Study No. 16A-8

Study Information

This study is located on critical winter range between I-15 and Mt. Nebo. It lies on UDWR land, near the guzzler in Gardner Canyon [elevation: 5,700 feet (1,737 m), slope: 45%, aspect: west]. To the northeast of the study is U.S. Forest Service wilderness area. These foothills are heavily used by deer and elk, and carcasses were found in the area during the 1989 and 2007 readings. Deer and elk pellet groups were moderately abundant in 1997 with quadrat frequencies of 21% and 20%, respectively. Pellet group transect data estimated 70 deer days use/acre (172 ddu/ha) in 2002 and 101 deer days use/acre (250 ddu/ha) in 2007. Elk use was estimated at 24 elk days use/acre (60 edu/ha) in 2002 and 19 elk days use/acre (48 edu/ha) in 2007.

Soil

The soil is classified within the Lundy series (USDA-NRCS 2007). The soils in this series are shallow and well-drained. They formed in residuum and colluvium from limestone and shale. There is an abundance of large and small rocks on the surface. The soil texture is a loam with a neutral pH (7.0). Organic matter is limited at only 1.6%, and phosphorus is also low at 4.4 ppm. Values less than 6 ppm may be limiting to plant growth and development (Tiedemann and Lopez 2004). The majority of the soil is covered by vegetation and litter, however, relative bare ground cover has been moderate at 16% in 1997, 23% in 2002, and 15% in 2007. Some erosion is occurring due to the steep slope. The erosion condition was classified as slight in 2002 and 2007 due to pedestalling, flow patterns, gullies, and apparent soil movement.

Browse

The preferred browse species are Stansbury cliffrose (*Cowania mexicana* ssp. *stansburiana*) and true mountain mahogany (*Cercocarpus montanus*). A few moderately-heavily hedged mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) plants were sampled from 1983 to 1997, but by 2002, these plants had died.

Cliffrose has provided 36% to 54% of the total browse cover since 1997. After the baseline was lengthened in 1997, its density has steadily declined from 600 plants/acre (1,482 plants/ha) to 440 plants/acre (1,087 plants/ha). The population has been mostly mature, with relatively high decadence and low reproduction and recruitment. Plants displaying poor vigor increased from less than 10% of the population in 1997 and 2002 to 23% in 2007. The average height of mature plants is approximately 4 feet (1.2 m), making most plants available for wildlife use. Use has been mostly heavy since the study began in 1983. Annual leader growth averaged 1.5 inches (3.8 cm) in 2002 and 1.6 inches (4.1 cm) in 2007.

Mountain mahogany has provided 27% to 41% of the total browse cover since 1997. Its density is lower than that of cliffrose, having fluctuated between 200 plants/acre (494 plants/ha) and 300 plants/acre (741 plants/ha) in the past 10 years. Most plants have been mature. Decadence was low in 1997, but increased to 33% in 2002, and remained stable in 2007. No seedlings have been sampled since 1983, and young plants were sampled in low densities only in 1989 and 1997. The population was vigorous throughout the study until 2007, when 20% of the plants displayed poor vigor. The average height of mature plants in 2007 was 5.5 feet (1.7 m). Use of the available portions of the plants has been moderate-heavy. Annual leader growth averaged 1.6 inches (4.1 cm) in 2002 and 2.1 inches (5.3 cm) in 2007.

Herbaceous Understory

The understory composition is dominated by annuals, biennials, and low-value perennials. Total grass cover was 19% in 1997, 18% in 2002, and 21% in 2007. Cheatgrass (*Bromus tectorum*) is the dominant grass species, and has provided 9%-12% cover since 1997. The most abundant perennial grass is bluebunch wheatgrass (*Agropyron spicatum*), which provided 43% of the total grass cover in 2002 and 41% in 2007.

Forbs provided 5%-7% cover from 1997 to 2007. Pale alyssum (*Alyssum alyssoides*) and storksbill (*Erodium cicutarium*) together have provided 57%-86% of the total forb cover since 1997. Storksbill is an introduced species that outcompetes and prevents the establishment of native species (Buchanan et al. 1978). Scarlet globemallow (*Sphaeralcea coccinea*) is the most abundant perennial forb, and has provided less than 2% cover since 1997.

1989 TREND ASSESSMENT

The trend for browse is stable. Cliffrose density remained at 966 plants/acre (2,386 plants/ha), but decadence increased from 21% of the population to 52%. Recruitment also increased, with 24% of the population composed of young plants. Twenty-four percent of the sampled plants displayed poor vigor. The density of mahogany increased from 333 plants/acre (823 plants/ha) to 466 plants/acre (1,151 plants/ha). Recruitment increased to 21% of the population consisting of young plants, and no decadent plants were sampled. All of the sampled plants were vigorous. Sagebrush was sampled at a density of 66 plants/acre (163 plants/ha), and all of the plants were decadent and showed poor vigor. Cliffrose, mahogany, and sagebrush were all moderately-heavily hedged. The trend for grass is stable. The only perennial grass sampled in 1989 was bluebunch wheatgrass, which remained stable in nested frequency. The trend for forbs is stable. The sum of nested frequency for perennial forbs changed little, but the number of forb species sampled decreased from 10 to only five.

browse - stable (0)

grass - stable (0)

forb - stable (0)

1997 TREND ASSESSMENT

The trend for browse is stable. Preferred browse density decreased, but this change was partly attributed to the increase in sampling area. Cliffrose decadence decreased from 52% of the population to 23%. Recruitment also decreased, but was still good, with 10% of the population consisting of young plants. The majority of the mahogany population was mature, with 8% consisting of young plants and 8% decadence. The cliffrose and mahogany populations were vigorous, and use was mostly heavy. Forty decadent sagebrush plants/acre (99 plants/ha) were sampled, and were classified as dying. The trend for grass is stable. The sum of nested frequency for perennial grass changed very little, and was composed primarily of bluebunch wheatgrass. The trend for forbs is slightly down. The sum of nested frequency for perennial forbs decreased 16%. The Desirable Components Index (DCI) was rated as very poor-poor due to low preferred browse cover and an understory dominated by annual species.

winter range condition (DCI) - very poor-poor (35) Mid-level potential scale

browse - stable (0)

grass - stable (0)

forb - slightly down (-1)

2002 TREND ASSESSMENT

The trend for browse is stable. Cliffrose density decreased from 600 plants/acre (1,482 plants/ha) to 500 plants/acre (1,235 plants/ha), while young recruitment decreased from 10% to 4% of the population. Decadence remained relatively stable at 20% of the population. Vigor was good and use was mostly heavy. Mahogany density increased from 240 plants/acre (593 plants/ha) to 300 plants/acre (741 plants/ha), but decadence also increased from 8% to 33% of the population. No young mahogany plants were sampled. Only 7% of the sampled plants displayed poor vigor, and use was moderate-heavy. No living sagebrush plants were sampled. The trend for grass is slightly down. The sum of nested frequency for perennial grasses decreased 15%, and bluebunch wheatgrass decreased significantly in nested frequency. However, cheatgrass nested frequency also decreased significantly. The trend for forbs is slightly down. The sum of nested frequency for perennial forbs decreased 15%, while the frequency of annual species increased 10%. The DCI rating remained very poor-poor.

winter range condition (DCI) - very poor-poor (36) Mid-level potential scale

browse - stable (0)

grass - slightly down (-1)

forb - slightly down (-1)

2007 TREND ASSESSMENT

The trend for browse is slightly down. Cliffrose and mahogany densities decreased by 12% and 33%, respectively. Cliffrose decadence increased from 20% to 32%. There was no young recruitment in the cliffrose and mahogany populations, although one young sagebrush plant was sampled. Plants showing poor vigor increased to approximately 20% of the preferred browse, and use was mostly heavy. The trend for grass is stable. The sum of nested frequency for perennial grasses changed little. The total grass cover increased slightly from 18% to 21%, however, most of this increase was attributed to an increase in cheatgrass. The trend for forbs is slightly up. The sum of nested frequency for perennial forbs increased 36%. The majority of this increase was attributed to a significant increase in the nested frequency of scarlet globemallow. However, forb composition remained poor. The DCI rating declined to very poor due to high decadence and low recruitment of preferred browse.

winter range condition (DC Index) - very poor (31) Mid-level potential scale

browse - slightly down (-1)

grass - stable (0)

forb - slightly up (+1)

HERBACEOUS TRENDS --

Management unit 16A, Study no: 8

Type	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
G	Agropyron spicatum	ab ²³⁴	b ²³¹	b ²²⁷	a ¹⁸⁷	a ¹⁷⁶	7.66	7.83	8.78
G	Bromus japonicus (a)	-	-	-	-	3	-	-	.00
G	Bromus tectorum (a)	-	-	b ³⁴⁴	a ²⁹⁶	a ³²⁰	11.33	9.32	11.89
G	Festuca myuros (a)	-	-	a ³	a ⁶	a ⁹	.00	.18	.07
G	Poa bulbosa	-	-	a ¹	ab ⁵	13	.00	.64	.48
G	Poa pratensis	2	-	-	-	-	-	-	-
G	Poa secunda	a ¹	-	-	a ⁶	a ⁻	-	.04	.00
Total for Annual Grasses		0	0	347	302	332	11.34	9.50	11.97
Total for Perennial Grasses		237	231	228	198	189	7.67	8.51	9.27
Total for Grasses		237	231	575	500	521	19.01	18.02	21.24
F	Alyssum alyssoides (a)	-	-	b ³⁵⁰	a ³⁰³	a ³¹²	5.48	1.82	3.84
F	Asclepias sp.	-	-	-	-	-	-	.03	-
F	Astragalus sp.	-	2	-	-	-	-	-	-
F	Calochortus nuttallii	a ³	-	a ⁶	-	a ³	.01	-	.00
F	Cirsium undulatum	a ¹	-	-	-	a ²	-	-	.01
F	Comandra pallida	3	-	-	-	-	-	-	-
F	Descurainia pinnata (a)	-	-	6	-	-	.01	-	-
F	Draba sp. (a)	-	-	-	-	1	-	-	.00
F	Eriogonum brevicaulis	3	-	-	-	-	-	-	-
F	Erodium cicutarium (a)	-	-	a ¹²	b ⁸⁶	b ¹¹⁶	.05	1.31	1.59
F	Erigeron pumilus	a ¹⁴	a ²¹	-	-	-	-	-	-
F	Galium aparine (a)	-	-	2	-	-	.03	-	-
F	Hackelia patens	-	-	4	-	-	.00	-	-

Type	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
F	<i>Helianthus annuus</i> (a)	-	-	-	3	-	-	.01	-
F	<i>Hedysarum boreale</i>	17	-	-	-	-	-	-	-
F	<i>Holosteum umbellatum</i> (a)	-	-	-	-	6	-	-	.01
F	<i>Lappula occidentalis</i> (a)	-	-	-	_a 16	_b 42	-	.18	.45
F	<i>Leucelene ericoides</i>	-	-	_a 15	_a 8	_a 17	.27	.21	.10
F	<i>Lygodesmia grandiflora</i>	_a 12	_a 3	_a 5	_a 16	_a 10	.03	.14	.06
F	<i>Phlox longifolia</i>	-	-	-	-	1	-	-	.00
F	<i>Sphaeralcea coccinea</i>	_{ab} 90	_b 117	_{ab} 80	_a 80	_b 108	.50	1.77	1.29
F	<i>Streptanthus cordatus</i>	_a 8	_a 3	_a 7	-	-	.04	-	-
F	<i>Tragopogon dubius</i>	_a 4	-	_a 4	-	-	.01	-	-
F	<i>Trifolium</i> sp.	-	-	1	-	-	.00	-	-
Total for Annual Forbs		0	0	370	408	477	5.57	3.32	5.92
Total for Perennial Forbs		155	146	122	104	141	0.88	2.16	1.49
Total for Forbs		155	146	492	512	618	6.46	5.48	7.41

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

BROWSE TRENDS --

Management unit 16A, Study no: 8

Type	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	<i>Artemisia tridentata</i> vaseyana	1	0	0	-	-	.00
B	<i>Cercocarpus montanus</i>	11	13	9	2.78	3.31	4.39
B	<i>Chrysothamnus nauseosus</i> albicaulis	1	1	0	.38	.30	.15
B	<i>Chrysothamnus viscidiflorus</i> stenophyllus	15	13	15	.21	.46	.81
B	<i>Cowania mexicana</i> stansburiana	22	21	22	4.65	5.33	3.94
B	<i>Gutierrezia sarothrae</i>	26	45	34	.50	2.07	1.33
B	<i>Rhus trilobata</i>	0	0	0	-	.76	.18
Total for Browse		76	93	80	8.54	12.25	10.82

CANOPY COVER, LINE INTERCEPT --
Management unit 16A, Study no: 8

Species	Percent Cover	
	'02	'07
<i>Cercocarpus montanus</i>	-	7.38
<i>Chrysothamnus viscidiflorus stenophyllus</i>	-	.85
<i>Cowania mexicana stansburiana</i>	-	5.41
<i>Gutierrezia sarothrae</i>	-	1.73

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 16A, Study no: 8

Species	Average leader growth (in)	
	'02	'07
<i>Cercocarpus montanus</i>	1.6	2.1
<i>Cowania mexicana stansburiana</i>	1.5	1.6

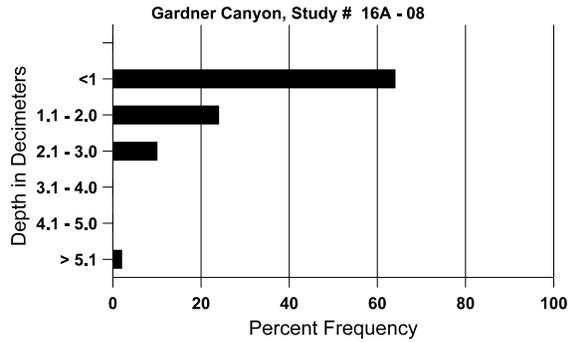
BASIC COVER --
Management unit 16A, Study no: 8

Cover Type	Average Cover %				
	'83	'89	'97	'02	'07
Vegetation	0	10.25	33.54	33.40	38.12
Rock	17.00	20.00	18.29	18.00	18.54
Pavement	2.00	12.75	7.86	5.28	4.10
Litter	50.50	31.00	30.88	30.60	38.04
Cryptogams	.25	0	.99	.75	.74
Bare Ground	30.25	26.00	17.82	26.45	17.23

SOIL ANALYSIS DATA --
Herd Unit 16A, Study no: 08, Gardner Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	Loam			%OM	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
10.1	55.4 (13.8)	7.0	38.7	40.7	20.6	1.6	4.4	57.6	.5

Stoniness Index



PELLET GROUP DATA --

Management unit 16A, Study no: 8

Type	Quadrat Frequency		
	'97	'02	'07
Rabbit	5	2	11
Elk	20	20	15
Deer	21	26	51

Days use per acre (ha)	
'02	'07
-	-
24 (60)	19 (48)
70 (172)	101 (250)

BROWSE CHARACTERISTICS --

Management unit 16A, Study no: 8

		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)
Amelanchier alnifolia												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	21/37
07	0	-	-	-	-	-	0	0	-	-	0	-/-
Artemisia tridentata vaseyana												
83	66	-	-	66	-	-	50	50	0	-	0	25/19
89	66	-	-	-	66	-	50	50	100	50	50	-/-
97	40	-	-	-	40	60	100	0	100	100	100	21/35
02	0	-	-	-	-	60	0	0	0	-	0	22/37
07	0	20	-	-	-	-	0	0	0	-	0	23/27

		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)
Cercocarpus montanus												
83	333	-	-	333	-	-	70	30	0	-	0	52/55
89	466	-	100	366	-	-	36	64	0	-	0	62/51
97	240	-	20	200	20	-	25	75	8	-	0	63/79
02	300	-	-	200	100	-	27	67	33	7	7	67/75
07	200	-	-	140	60	-	10	70	30	10	20	66/80
Chrysothamnus nauseosus albicaulis												
83	0	-	-	-	-	-	0	0	0	-	0	-/-
89	0	-	-	-	-	-	0	0	0	-	0	-/-
97	20	-	-	20	-	-	100	0	0	-	0	28/71
02	20	-	-	-	20	-	0	0	100	-	0	25/51
07	0	-	-	-	-	-	0	0	0	-	0	21/47
Chrysothamnus viscidiflorus stenophyllus												
83	633	-	33	600	-	-	0	0	0	-	0	10/13
89	798	-	266	466	66	-	29	0	8	4	8	10/14
97	440	-	-	400	40	20	0	0	9	5	5	13/25
02	360	-	-	280	80	40	6	0	22	-	0	14/25
07	420	-	-	420	-	-	29	0	0	-	0	15/29
Cowania mexicana stansburiana												
83	966	-	-	766	200	-	38	62	21	-	0	32/30
89	966	-	233	233	500	-	31	69	52	24	24	25/29
97	600	-	60	400	140	180	3	80	23	7	7	46/48
02	500	-	20	380	100	120	0	80	20	8	8	38/43
07	440	-	-	300	140	160	0	95	32	23	23	49/49
Eriogonum heracleoides												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	15/30
Gutierrezia sarothrae												
83	1933	-	-	1933	-	-	0	0	0	-	0	11/9
89	832	-	33	266	533	-	0	0	64	28	32	9/8
97	1280	60	580	660	40	40	0	0	3	2	2	7/10
02	2280	-	20	1920	340	300	0	0	15	5	5	7/12
07	2060	160	1080	900	80	-	0	.97	4	3	3	8/12

		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)
Quercus gambelii												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	78/81
02	0	-	-	-	-	-	0	0	-	-	0	36/26
07	0	-	-	-	-	-	0	0	-	-	0	57/42
Rhus trilobata												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	57/188
07	0	-	-	-	-	-	0	0	-	-	0	68/125