

Trend Study 17-62-07

Study site name: Grove Creek .

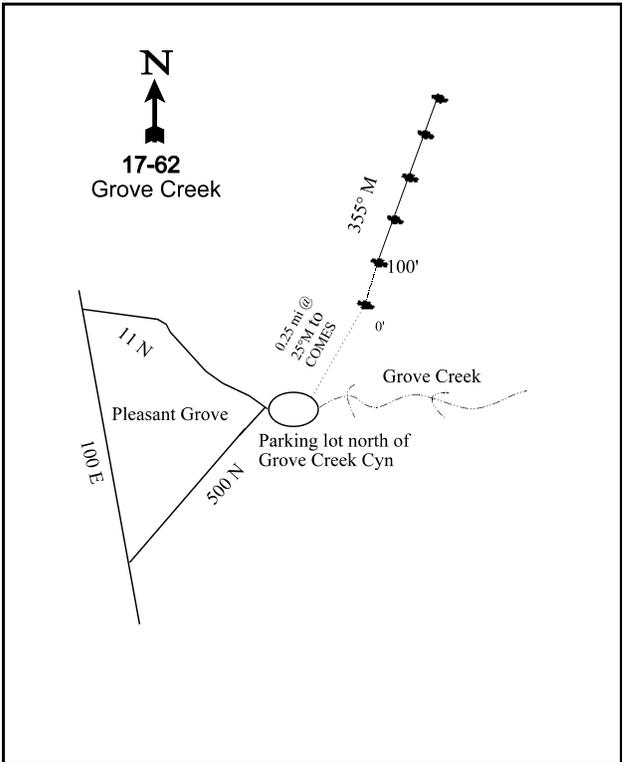
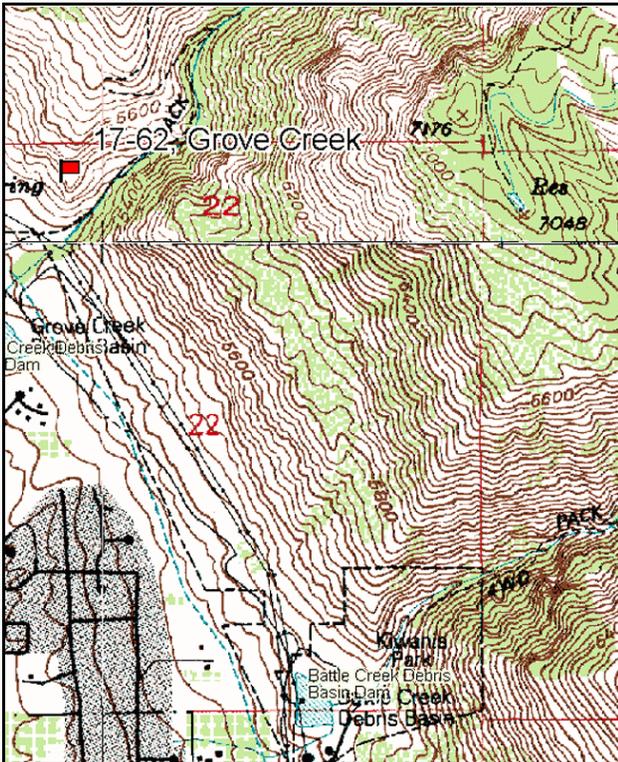
Vegetation type: Stansbury Cliffrose .

Compass bearing: frequency baseline 355 degrees magnetic.

Frequency belt placement: line 1 (11 ft), line 2 (34 ft), line 3 (59 ft), line 4 (71 ft), line 5 (95 ft). Rebar: belt 2 on 3ft., belt 3 on 2ft., and belt 4 on 4ft.

LOCATION DESCRIPTION

From the junction of Highway's 89 (State St.) and 146 in Pleasant Grove, continue on Highway 146 until 500 North, just before the school. Continue on this road until it comes to the parking lot at the mouth of Grove Creek Canyon. From the parking lot, follow the ridge for 0.25 miles at 25 degrees magnetic to the 0-foot stake in the cliffrose.



Map Name: Lehi

Diagrammatic Sketch

Township 4S, Range 2E, Section 29

GPS: NAD 83, UTM 12T 439692 E 4469781 N

## DISCUSSION

### Grove Creek - Trend Study No. 17-62

#### Study Information

This study was established in 2002 to monitor deer and bighorn sheep winter range above Pleasant Grove [elevation: 5,340 feet (1,628 m), slope: 40%, aspect: southwest]. Bighorn sheep were transplanted into the area in the late 1990s. The nearest perennial source of water is Grove Creek, which is 400 feet (122 m) to the south. This study has become increasingly important winter range as a result of the expansion of residential development. The only remaining available winter range is found on the steeper slopes on Forest Service land. Deer and bighorn sheep use has been heavy, but elk use has been light. From the pellet group transect data, deer use was estimated at 72 days use/acre (177 ddu/ha) in 2002 and 90 days use/acre (223 ddu/ha) in 2007. Elk use was estimated at 5 days use/acre (12 edu/ha) in 2002 and 1 day use/acre (3 edu/ha) in 2007. Bighorn sheep use was estimated 38 days use/acre (94 sdu/ha) in 2002 and 32 days use/acre (79 sdu/ha) in 2007. It has been difficult to differentiate between the pellet groups of bighorn sheep and those of mule deer.

#### Soil

The soil is shallow, rocky, and has a clay loam texture. The soil reaction is neutral (pH of 7.3). The parent material is limestone, which is exposed as bedrock and large rock outcrops on the site. Relative rock cover was 8% in 2002 and 6% in 2007. Relative vegetation cover has been stable at approximately 30%, but relative litter cover increased from 27% in 2002 to 44% in 2007. The relative bare ground cover decreased from 20% in 2002 to 9% in 2007. The hillslope is terraced and has numerous game trails and flow paths. Despite these features and the steep slope, the soil erosion condition was classified as slight in 2002 and 2007.

#### Browse

The dominant browse species are Stansbury cliffrose (*Cowania mexicana* ssp. *stansburiana*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). The canopy cover of cliffrose increased from 3% in 2002 to 5% in 2007. The density has ranged from 120 plants/acre (297 plants/ha) in 2002 to 80 plants/acre (198 plants/ha) in 2007. The cliffrose population consists mostly of large, mature plants. No seedling cliffrose have been sampled, and the young age class decreased from 50% of the population in 2002 to 0% in 2007. There were no decadent plants in 2002, but they accounted for 25% of the population in 2007. Vigor was good in 2002, but in 2007 25% of the population had poor vigor and was classified as dying. The average annual leader growth was 3.3 inches (8.4 cm) in 2002 and 4.1 inches (10.4 cm) in 2007. Browse use on cliffrose was light-moderate in 2002, and shifted to moderate in 2007.

The canopy cover of sagebrush was 1% in 2002, and less than 1% in 2007. The density of sagebrush decreased from 380 plants/acre (941 plants/ha) in 2002 to 240 plants/acre (594 plants/ha) in 2007. No seedling or young sagebrush have been sampled. Decadence has been high, ranging from 53% of the population in 2002 to 42% in 2007. There were almost as many dead plants as living in 2002, and an equal number in 2007. Plants with poor vigor accounted for 37% of the population in 2002 and 42% in 2007. The average annual leader growth was 6.3 inches (16.0 cm) in 2002 and 2.0 inches (5.1 cm) in 2007. Browse use on sagebrush has been moderate-heavy.

#### Herbaceous Understory

The herbaceous understory has low diversity and is dominated by annual species. These annual species are likely to be limiting successful establishment of shrub seedlings. Annual grass cover was 19% in 2002 and 20% in 2007. Cheatgrass (*Bromus tectorum*) accounted for most of the annual grass cover, though Japanese brome (*Bromus japonicus*) is also present. Perennial grass cover was 4% in both 2002 and 2007. The dominant perennial grass is bluebunch wheatgrass (*Agropyron spicatum*). Bulbous bluegrass (*Poa bulbosa*) is present, but has only been sampled in few quadrats. This perennial species has a phenology that is similar to annual grasses (Stewart and Hull 1949) and may limit the establishment of other species.

Annual forbs cover was 4% in 2002 and 6% in 2007. The dominant forb is storksbill (*Erodium cicutarium*), which has also been shown to limit the establishment of other species (Kimball and Schiffman 2003). A second allelopathic annual, bur buttercup (*Ranunculus testiculatus*) is also present, but decreased in average cover from 1% in 2002 to nearly 0% in 2007. Perennial forb cover was 1% in 2002 and less than 1% in 2007. The dominant perennial forb is Bonneville pea (*Lathyrus brachycalyx*). Two noxious weed species were sampled in 2007, yellow starthistle (*Centaurea solstitialis*) and field bindweed (*Convolvulus arvensis*). Both species had a quadrat frequency of 3% or less.

2007 TREND ASSESSMENT

The browse trend is slightly down. The density of sagebrush decreased 37%. Sagebrush decadence decreased from 53% of the population to 42%, and the density of dead plants decreased 25%. Plants with poor vigor increased from 37% of the population to 42%. Heavily browsed plants increased from 37% of the population to 58%. Animal use on sagebrush was irregular; some plants were heavily hedged while others had not been browsed at all. Cliffrose density decreased 33%. No seedling plants were sampled, and few plants had produced flowers. Young plants decreased from 50% of the population to 0%. Decadence increased from 0% of the population to 25%, and all of the decadent plants were classified as dying. The grass trend is down. Excluding bulbous bluegrass, the sum of nested frequency of perennial grasses decreased 24%. There was a significant decrease in the nested frequency of Sandberg bluegrass (*Poa secunda*) and a significant increase in that of Japanese brome. Additionally, the nested frequency of cheatgrass increased significantly, and cheatgrass was sampled in 100% of the quadrats. The forb trend is down. Excluding noxious weeds, the sum of nested frequency of perennial forbs decreased 32%. However, perennial forbs had already been scarce. There was a significant decrease in the nested frequency of bur buttercup, and a significant increase in that of storksbill. However, the decrease in bur buttercup cover was smaller than the increase in storksbill cover. Additionally, two noxious weed species were sampled, yellow starthistle and field bindweed. The 2002 Desirable Components Index (DCI) score was very poor due to low browse cover, high annual grass cover, and low perennial grass and forb cover. In 2007, the DCI score remained very poor because browse cover was less than the threshold of 5%, and because of the two noxious weed species that were sampled.

2002 winter range condition (DCI) - very poor (22) Mid-level potential scale

2007 winter range condition (DCI) - very poor (-7) Mid-level potential scale

browse - slightly down (-1)      grass - down (-2)      forb - down (-2)

HERBACEOUS TRENDS --

Management unit 17 , Study no: 62

Type	Species	Nested Frequency		Average Cover %	
		'02	'07	'02	'07
G	Agropyron spicatum	<sub>a</sub> 114	<sub>a</sub> 106	3.82	4.14
G	Bromus japonicus (a)	<sub>b</sub> 60	<sub>a</sub> 9	.25	.02
G	Bromus tectorum (a)	<sub>a</sub> 396	<sub>b</sub> 432	19.07	20.13
G	Poa bulbosa	<sub>a</sub> 6	<sub>a</sub> 2	.09	.00
G	Poa fendleriana	1	-	.00	-
G	Poa secunda	<sub>b</sub> 37	<sub>a</sub> 10	.40	.07
Total for Annual Grasses		456	441	19.32	20.15
Total for Perennial Grasses		158	118	4.31	4.22
Total for Grasses		614	559	23.64	24.37

T y p e	Species	Nested Frequency		Average Cover %	
		'02	'07	'02	'07
F	<i>Alyssum alyssoides</i> (a)	<sub>a</sub> 135	<sub>b</sub> 174	.40	.58
F	<i>Ambrosia psilostachya</i>	<sub>a</sub> 6	<sub>a</sub> 5	.15	.03
F	<i>Antennaria rosea</i>	1	-	.03	-
F	<i>Artemisia ludoviciana</i>	<sub>a</sub> 5	<sub>a</sub> 2	.03	.00
F	<i>Astragalus utahensis</i>	-	-	.00	-
F	<i>Camelina microcarpa</i> (a)	3	-	.00	-
F	<i>Centaurea solstitialis</i>	-	7	-	.04
F	<i>Convolvulus arvensis</i>	-	2	-	.00
F	<i>Cryptantha</i> sp.	-	1	-	.03
F	<i>Erodium cicutarium</i> (a)	<sub>a</sub> 145	<sub>b</sub> 281	2.34	5.26
F	<i>Holosteum umbellatum</i> (a)	<sub>a</sub> 5	<sub>b</sub> 43	.01	.14
F	<i>Lathyrus brachycalyx</i>	<sub>a</sub> 28	<sub>a</sub> 19	.31	.25
F	<i>Lappula occidentalis</i> (a)	<sub>a</sub> 4	<sub>a</sub> 1	.18	.00
F	<i>Lactuca serriola</i>	-	3	-	.00
F	<i>Ranunculus testiculatus</i> (a)	<sub>b</sub> 154	<sub>a</sub> 16	.83	.03
F	<i>Sisymbrium altissimum</i> (a)	<sub>a</sub> 7	<sub>a</sub> 4	.09	.03
F	<i>Tragopogon dubius</i>	4	-	.00	-
Total for Annual Forbs		453	519	3.88	6.06
Total for Perennial Forbs		44	39	0.54	0.37
Total for Forbs		497	558	4.42	6.44

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

#### BROWSE TRENDS --

Management unit 17 , Study no: 62

T y p e	Species	Strip Frequency		Average Cover %	
		'02	'07	'02	'07
B	<i>Artemisia tridentata vaseyana</i>	19	12	1.65	.21
B	<i>Celtis reticulata</i>	0	1	-	-
B	<i>Chrysothamnus nauseosus albicaulis</i>	8	5	1.50	1.01
B	<i>Cowania mexicana stansburiana</i>	6	4	2.70	1.14
B	<i>Gutierrezia sarothrae</i>	2	5	-	.30
B	<i>Rhus trilobata</i>	0	0	.03	.15
Total for Browse		35	27	5.90	2.82

CANOPY COVER, LINE INTERCEPT --  
 Management unit 17 , Study no: 62

Species	Percent Cover	
	'02	'07
Artemisia tridentata vaseyana	.75	.25
Celtis reticulata	-	.01
Chrysothamnus nauseosus albicaulis	1.20	.75
Cowania mexicana stansburiana	2.73	4.96

KEY BROWSE ANNUAL LEADER GROWTH --  
 Management unit 17 , Study no: 62

Species	Average leader growth (in)	
	'02	'07
Artemisia tridentata vaseyana	6.3	2.0
Cowania mexicana stansburiana	3.3	4.1

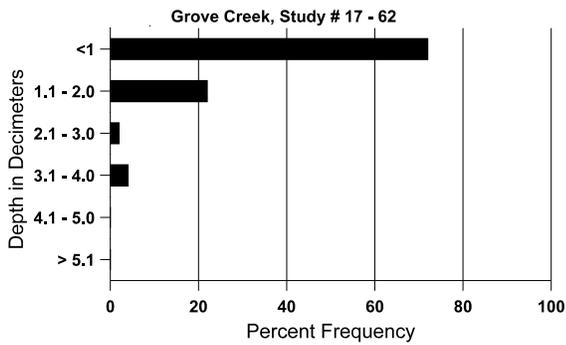
BASIC COVER --  
 Management unit 17 , Study no: 62

Cover Type	Average Cover %	
	'02	'07
Vegetation	35.56	35.43
Rock	9.63	6.43
Pavement	16.01	12.40
Litter	31.64	51.47
Cryptogams	.21	.22
Bare Ground	22.88	10.94

SOIL ANALYSIS DATA --  
 Herd Unit 17, Study no: 62, Grove Creek

Effective rooting depth (in)	Temp °F (depth)	pH	Clay loam			%OM	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
8.7	74.6 (8.6)	7.3	33.3	34.7	32.0	3.4	11.4	198.4	.7

## Stoniness Index



### PELLET GROUP DATA --

Management unit 17 , Study no: 62

Type	Quadrat Frequency		Days use per acre (ha)	
	'02	'07	'02	'07
Bighorn Sheep	25	-	36 (89)	32 (79)
Rabbit	-	8	-	-
Elk	1	14	5 (12)	1 (3)
Deer	11	36	72 (177)	90 (223)

### BROWSE CHARACTERISTICS --

Management unit 17 , Study no: 62

		Age class distribution (plants per acre)					Utilization					
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata vaseyana</i>												
02	<b>380</b>	-	-	180	200	320	26	37	53	37	37	24/35
07	<b>240</b>	-	-	140	100	240	17	58	42	25	42	25/41
<i>Celtis reticulata</i>												
02	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
07	<b>20</b>	-	20	-	-	-	0	0	-	-	0	42/107
<i>Chrysothamnus nauseosus albicaulis</i>												
02	<b>180</b>	-	-	100	80	80	11	0	44	22	22	28/50
07	<b>140</b>	-	-	100	40	40	0	0	29	14	14	37/62
<i>Cowania mexicana stansburiana</i>												
02	<b>120</b>	-	60	60	-	-	17	17	0	-	0	65/79
07	<b>80</b>	-	-	60	20	-	50	25	25	25	25	66/85
<i>Gutierrezia sarothrae</i>												
02	<b>40</b>	-	-	40	-	440	0	0	-	-	0	8/12
07	<b>100</b>	-	-	100	-	-	20	0	-	-	0	10/14