

Trend Study 16C-8-07

Study site name: Pole Canyon Chaining .

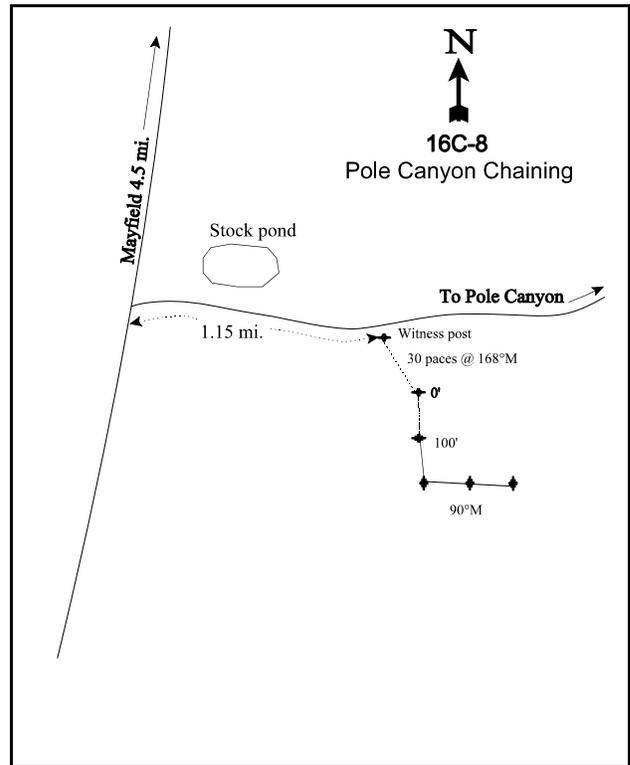
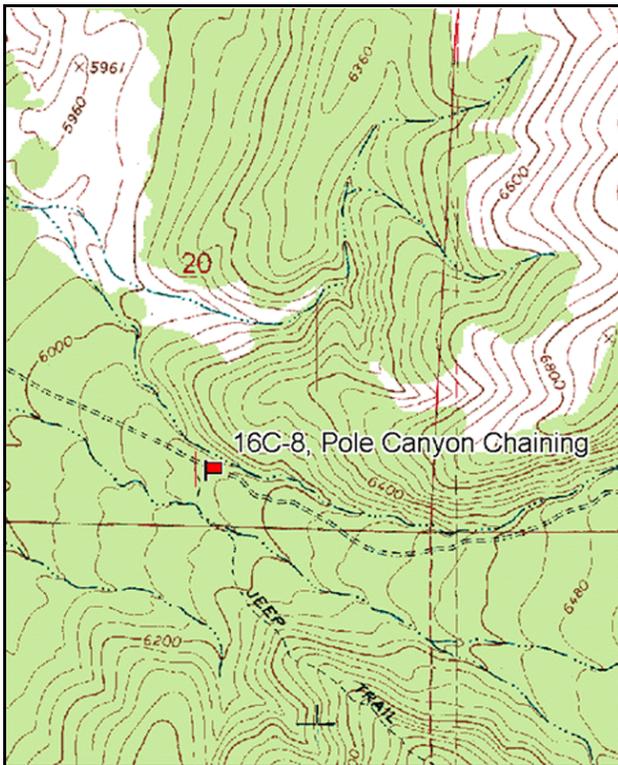
Vegetation type: Chained, Seeded P-J .

Compass bearing: frequency baseline 180 degrees magnetic (line 2-3 @ 90°M).

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

LOCATION DESCRIPTION

From Mayfield, go south down Arapien Valley for 4.5 miles to the Pole Canyon Road. Turn east and go 1.1 miles to a witness post in a chaining. The witness post is 6 paces south of the road. From the witness post to the 0-foot baseline stake is 32 paces at 215 degrees magnetic. Browse tag #4091 marks the 0-foot baseline stake.



Map Name: Mayfield

Diagrammatic Sketch

Township 20S , Range 2E , Section 20

NAD 83 UTM 12S 438289 E 4322411 N

DISCUSSION

Pole Canyon Chaining - Trend Study No. 16C-8

Study Information

This study samples a pre-1960 pinyon pine-Utah juniper (*Pinus edulis-Juniperus osteosperma*) chaining on a level alluvial fan at the mouth of Pole Canyon. It is on Bureau of Land Management (BLM) property at the south end of the Mayfield Face [elevation: 6,150 feet (1,875 m), slope: 2%, aspect: north-west]. There is a stock pond located 0.7 miles (1.1 km) to the west. The same area was sampled by a line-intercept transect in 1978. Just prior to the 2002 sampling, trees on the study were removed in a lop and scatter treatment. It is considered an important wintering area for deer, but pellet group quadrat frequency steadily decreased from 53% in 1997 to 48% in 2002 and 34% in 2007. From the pellet group transect, deer use was estimated at 99 days use/acre (245 ddu/ha) in 2002 and 50 days use/acre (122 ddu/ha) in 2007. Elk use was estimated at 6 days use/acre (15 edu/ha) in 2007. Sheep estimates were 1 day use/acre (3 sdu/ha) in 2002. Cattle estimates were 2 days use/acre (5 cdu/ha) in 2002 and 23 days use/acre (57 cdu/ha) in 2007. Grasses were reported to be heavily to severely grazed by cattle in 1989 and 1997. In the past, this area has been permitted for grazing as part of the South Hollow allotment from May 1 to June 30.

Soil

The soil is in the Fontreen series, which consists of very deep, well-drained, moderately-rapidly permeable soils that formed in alluvium and colluvium from limestone, sandstone, chert, and shale. Fontreen soils are on alluvial fans, hillslopes and mountain slopes (USDA-NRCS 2007). The soil is sandy clay loam in texture and has a slightly alkaline reactivity (pH of 7.4). Litter cover has remained moderately high in all sampling periods. Relative litter cover was 42% in 1997, 50% in 2002, and 32% in 2007. Relative vegetation cover was 28% in 1997, 9% in 2002, and 37% in 2007. Relative bare ground cover was 18% in 1997, 26% in 2002 and 25% in 2007. The decrease in vegetation cover and increase in bare ground cover in 2002 correlated with below normal precipitation (Utah Climate Summaries 2007). In the past, the area was susceptible to sheet erosion and excessive soil movement, and active gullies were present to the north and south. The erosion condition was classified as slight in 2002 due to pedestal formation, gullies with light activity, and light transportation of litter and soil. In 2007, the erosion condition was classified as slight due to pedestal, gully, and rill formation, flow patterns, and the light transportation of soil and surface litter.

Browse

Rubber rabbitbrush (*Chrysothamnus* sp.) is the preferred browse species. The density of rabbitbrush was 932 plants/acre (2,302 plants/ha) in 1989 and 3,000 plants/acre (7,410 plants/ha) in 1997. In 2002 and 2007, rabbitbrush was split into two subspecies, white rubber rabbitbrush (*Chrysothamnus nauseosus* ssp. *albicaulis*), a white-stemmed more palatable form, and threadleaf rubber rabbitbrush (*Chrysothamnus nauseosus* ssp. *consimilis*), a green-stemmed less palatable form. Density of white rubber rabbitbrush was 1,640 plants/acre (4,051 plants/ha) in 2002 and 1,740 plants/acre (4,298 plants/ha) in 2007. The recruitment of young was high at 44%-46% of the population, and decadence was moderate at 15%-18%. Plants classified with poor vigor have been low at less than 10% of the population, and use has been mostly light-moderate. The density of threadleaf rubber rabbitbrush was 740 plants/acre (1,828 plants/ha) in 2002 and 240 plants/acre (593 plants/ha) in 2007. The recruitment of young was 17%-25% of the population, and decadence was low-moderate at 17%-19%. Browse use has been light-moderate. Other preferred species that occur in low densities include four-wing saltbush (*Atriplex canescens*), antelope bitterbrush (*Purshia tridentata*), and true mountain mahogany (*Cercocarpus montanus*).

Even though the original chaining was done prior to 1960, the density of juniper and pinyon has been moderately low. Point-centered quarter data estimated juniper density at 76 trees/acre (188 trees/ha) in 1997. Following the lop and scatter treatment in 2002, tree density was too low to accurately sample. However, juniper density had increased to 37 trees/acre (91 trees/ha) in 2007. The average juniper trunk diameter was

6.7 inches (17.0 cm) in 1997 and 1.6 inches (4.1 cm) in 2007. Pinyon density was estimated at 26 trees/acre (64 trees/ha) in 1997, and 20 trees/acre (49 trees/ha) in 2007. The average diameter for pinyon was 4.8 inches (12.2 cm) in 1997 and 1.9 inches (4.8 cm) in 2007. The area to the east and west have large, mature pinyon and juniper trees that provide thermal and escape cover.

Herbaceous Understory

Perennial grasses and annual forbs dominated the herbaceous understory. The dominant grass is crested wheatgrass (*Agropyron cristatum*). It provided 6% of the total ground cover in 1997, 1% in 2002, and 10% cover in 2007. This species is often heavily grazed, but the decline in 2002 didn't appear to be from livestock use. In 2002, project personnel described crested wheatgrass as being 3 inches of stem with no leaves. The decline was probably due in part to the combination of drought and defoliation by grasshoppers. The dominant annual grass was cheatgrass (*Bromus tectorum*). It provided less than 1% cover in 1997 and 2002, increasing to 2% in 2007.

There are very few perennial forbs. Perennial forbs provided less than 1% of the total ground cover since 1997. Annual forbs are moderately abundant. The dominant forb was bur buttercup (*Ranunculus testiculatus*) an allelopathic annual (Buchanan et al. 1978). It provided 5% cover in 1997, 2% in 2002, and 7% in 2007. Most of the forbs are low growing and/or weedy increasers that provide very little forage or cover.

1997 TREND ASSESSMENT

The browse trend is slightly up. Rubber rabbitbrush density increased from 932 plants/acre (2,303 plants/ha) to 3,000 plants/acre (7,410 plants/ha), although this increase may be partly attributed to the increase in sample area in 1997. However, other parameters also indicate a slightly up trend. The recruitment of young remained high at 57% of the population and decadence remained low at 3%. Vigor remained excellent, with only 1% of the population showing poor vigor. Browse use increased from light to light-moderate. The grass trend is stable. The sum of nested frequency of perennial grasses changed little. The forb trend is down. The sum of nested frequency of perennial forbs decreased 39%. The Desirable Components Index (DCI) score was poor due to very poor browse cover, very little recruitment of young browse, fair perennial grass cover, little annual grass cover, and very little perennial forb cover.

winter range condition (DCI) - poor (17) Low potential scale
browse - slightly up (+1) grass - stable (0) forb - down (-2)

2002 TREND ASSESSMENT

The browse trend is stable. Rubber rabbitbrush was split into two subspecies, white and threadleaf. White rubber rabbitbrush was the most abundant preferred species. Its density was 1,640 plants/acre (4,051 plants/ha). The recruitment of young decreased slightly, but remained high at 44% of the population. Decadence increased to 18% of the population. Plants classified as having poor vigor comprised 5% of the population, and use was mostly light. The grass trend was slightly down. The sum of nested frequency of perennial grasses decreased 61%. Crested wheatgrass, the dominant perennial grass species, significantly declined in nested frequency. The nested frequency of cheatgrass also significantly decreased, and it continued to provided less than 1% total cover. The forb trend is slightly down. The number of perennial forb species sampled decreased from nine to five. The sum of nested frequency of perennial forbs decreased 51% and that of annual forbs decreased 45%. Bur buttercup cover decreased from 5% to 2%. The DCI score was very poor due to a decrease in perennial grass cover.

winter range condition (DCI) - very poor (3) Low potential scale
browse - stable (0) grass - slightly down (-1) forb - slightly down (-1)

2007 TREND ASSESSMENT

The browse trend is stable. The density of white rubber rabbitbrush increased 6%. The recruitment of young

remained high at 46% of the population and decadent plants decreased to 15%. Plants showing poor vigor increased to 8% of the population. Browse use remained mostly light. The grass trend is stable. The sum of nested frequency of perennial grasses increased nearly three-fold, and average cover increased from 1% to 11%. Crested wheatgrass nested frequency significantly increased. The nested frequency of cheatgrass also increased significantly. Cheatgrass cover increased from almost 0% to 2%. The forb trend is down. The sum of nested frequency for perennial forbs decreased 31%. The sum of nested frequency for annual forbs increased three-fold. The nested frequency for bur buttercup increased two-fold. The DCI score improved to poor due to the increase in perennial grass cover.

winter range condition (DCI) - poor (23) Low potential scale
browse - stable (0) grass - stable (0) forb - down (-2)

HERBACEOUS TRENDS --
 Management unit 16C, Study no: 8

T y p e	Species	Nested Frequency				Average Cover %		
		'89	'97	'02	'07	'97	'02	'07
G	Agropyron cristatum	_b 278	_b 262	_a 103	_b 267	5.89	.55	10.49
G	Bromus tectorum (a)	-	_b 91	_a 4	_c 167	.57	.01	2.48
G	Elymus junceus	-	-	-	4	-	-	.30
G	Poa fendleriana	_a 4	_a 3	-	-	.01	-	-
G	Poa secunda	_a 3	-	_a 1	_a 1	-	.00	.01
G	Sitanion hystrix	_a 5	_a 2	-	-	.03	-	-
Total for Annual Grasses		0	91	4	167	0.57	0.00	2.48
Total for Perennial Grasses		290	267	104	272	5.93	0.55	10.80
Total for Grasses		290	358	108	439	6.51	0.56	13.28
F	Alyssum alyssoides (a)	-	_a 50	_a 53	_b 319	.22	.28	7.09
F	Antennaria rosea	-	_a 1	_a 2	-	.00	.01	-
F	Astragalus utahensis	_{ab} 10	_b 18	-	_a 3	.28	-	.01
F	Castilleja linariaefolia	-	2	-	-	.03	-	-
F	Chorispora tenella (a)	-	-	-	1	-	-	.03
F	Collinsia parviflora (a)	-	_a 11	-	_a 18	.02	-	.08
F	Cryptantha sp.	_b 18	_{ab} 13	_a 6	_a 1	.14	.04	.03
F	Descurainia pinnata (a)	-	_a 27	_a 25	_b 50	.09	.28	.46
F	Draba sp. (a)	-	-	-	3	-	-	.00
F	Erodium cicutarium (a)	-	9	-	-	.02	-	-
F	Gilia sp. (a)	-	-	-	10	-	-	.02
F	Haplopappus acaulis	2	-	-	-	-	-	-
F	Lappula occidentalis (a)	-	-	-	4	-	-	.03
F	Lactuca serriola	_b 20	_{ab} 7	-	_a 1	.04	-	.00
F	Leucelene ericoides	-	-	3	-	-	.00	-
F	Lithospermum sp.	_a 7	_a 3	_a 4	-	.15	.05	-

Type	Species	Nested Frequency				Average Cover %		
		'89	'97	'02	'07	'97	'02	'07
F	<i>Machaeranthera canescens</i>	_b 13	_a 3	-	_{ab} 4	.00	-	.06
F	<i>Microsteris gracilis</i> (a)	-	_b 23	-	_a 3	.10	-	.01
F	<i>Phlox longifolia</i>	-	-	-	2	-	-	.00
F	<i>Ranunculus testiculatus</i> (a)	-	_b 299	_a 151	_b 312	4.55	2.01	7.26
F	<i>Senecio multilobatus</i>	2	-	-	-	-	-	-
F	<i>Streptanthus cordatus</i>	_a 14	_a 5	_a 11	_a 5	.01	.03	.06
F	<i>Tragopogon dubius</i>	_a 1	-	-	_a 2	-	-	.03
F	Unknown forb-perennial	-	1	-	-	.01	-	-
Total for Annual Forbs		0	419	229	720	5.01	2.57	15.02
Total for Perennial Forbs		87	53	26	18	0.69	0.14	0.20
Total for Forbs		87	472	255	738	5.71	2.72	15.23

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

BROWSE TRENDS --

Management unit 16C, Study no: 8

Type	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	<i>Atriplex canescens</i>	0	0	1	-	-	.03
B	<i>Chrysothamnus nauseosus albicaulis</i>	51	35	45	3.30	1.14	2.35
B	<i>Chrysothamnus nauseosus consimilis</i>	0	18	11	-	1.49	1.03
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	6	0	0	.78	-	-
B	<i>Gutierrezia sarothrae</i>	77	57	61	4.39	1.24	3.65
B	<i>Juniperus osteosperma</i>	11	1	1	3.08	.03	.30
B	<i>Pinus edulis</i>	6	2	1	1.74	.38	.63
B	<i>Purshia tridentata</i>	1	1	0	.15	.15	.15
B	<i>Quercus gambelii</i>	1	1	0	-	.03	.03
Total for Browse		153	115	120	13.46	4.46	8.18

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

Species	Percent Cover	
	'02	'07
Amelanchier utahensis	-	.28
Chrysothamnus nauseosus albicaulis	1.45	2.73
Chrysothamnus nauseosus consimilis	.80	1.73
Gutierrezia sarothrae	1.06	4.06
Juniperus osteosperma	.21	.13
Pinus edulis	.63	.58

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

Species	Average leader growth (in)	
	'02	'07
Atriplex canescens	6.7	2.8

POINT-QUARTER TREE DATA --
 Management unit 16C, Study no: 8

Species	Trees per Acre		
	'97	'02	'07
Juniperus osteosperma	76	-	37
Pinus edulis	26	-	20

Average diameter (in)		
'97	'02	'07
6.7	-	1.6
4.8	-	1.9

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

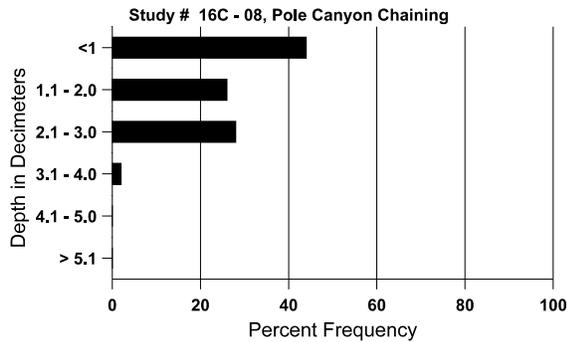
Cover Type	Average Cover %			
	'89	'97	'02	'07
Vegetation	4.00	30.03	9.11	41.15
Rock	5.75	4.93	7.54	5.57
Pavement	19.25	6.02	7.19	2.04
Litter	44.25	45.14	53.75	35.15
Cryptogams	0	1.67	1.52	.01
Bare Ground	26.75	19.13	27.63	27.36

SOIL ANALYSIS DATA --

Herd Unit 16C, Study no: 08, Pole Canyon Chaining

Effective rooting depth (in)	Temp °F (depth)	pH	Sandy clay loam			%OM	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
10.3	61.4 (11.7)	7.4	48.7	27.1	24.2	5.9	11.25	195.2	.5

Stoniness Index



PELLET GROUP DATA --

Management unit 16C, Study no: 8

Type	Quadrat Frequency		
	'97	'02	'07
Sheep	-	1	-
Rabbit	19	28	69
Elk	3	-	3
Deer	53	48	34
Cattle	5	2	12

Days use per acre (ha)	
'02	'07
1 (3)	-
-	-
-	6 (15)
99 (245)	50 (122)
2 (5)	23 (57)

BROWSE CHARACTERISTICS --

Management unit 16C, 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)
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	13/29

		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)
<i>Atriplex canescens</i>												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	50/73
02	0	-	-	-	-	-	0	0	-	-	0	43/44
07	20	-	20	-	-	-	0	0	-	-	0	56/90
<i>Cercocarpus montanus</i>												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	25/32
02	0	-	-	-	-	-	0	0	-	-	0	25/31
07	0	-	-	-	-	-	0	0	-	-	0	28/37
<i>Chrysothamnus nauseosus albicaulis</i>												
89	932	133	466	433	33	-	4	4	4	-	0	28/25
97	3000	40	1700	1220	80	20	22	.66	3	-	1	29/30
02	1640	20	720	620	300	40	16	10	18	5	5	20/23
07	1740	40	800	680	260	20	16	1	15	7	8	24/30
<i>Chrysothamnus nauseosus consimilis</i>												
89	0	-	-	-	-	-	0	0	0	-	0	-/-
97	0	-	-	-	-	-	0	0	0	-	0	-/-
02	740	-	40	560	140	80	30	0	19	-	0	21/27
07	240	-	60	140	40	-	0	0	17	8	17	30/37
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
89	0	-	-	-	-	-	0	0	0	-	0	-/-
97	200	-	20	160	20	-	10	0	10	-	0	32/38
02	0	-	-	-	-	-	0	0	0	-	0	-/-
07	0	-	-	-	-	-	0	0	0	-	0	11/23
<i>Ephedra viridis</i>												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	11/11
<i>Gutierrezia sarothrae</i>												
89	8733	25966	1333	7300	100	-	0	0	1	-	0	10/9
97	14940	120	2460	12420	60	120	.13	0	0	-	0	10/9
02	3740	-	140	2920	680	3140	0	0	18	7	9	7/8
07	4780	2060	20	4680	80	200	0	0	2	.41	.83	10/13

		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)
Juniperus osteosperma												
89	133	33	100	33	-	-	0	0	0	-	0	91/71
97	380	-	240	140	-	80	0	0	0	-	0	-/-
02	20	-	-	20	-	100	0	0	0	-	0	-/-
07	20	-	-	-	20	20	0	0	100	100	100	-/-
Pinus edulis												
89	33	-	-	33	-	-	0	0	-	-	0	71/79
97	120	-	100	20	-	-	0	0	-	-	0	-/-
02	40	-	40	-	-	-	0	0	-	-	50	-/-
07	20	-	-	20	-	-	0	0	-	-	0	-/-
Purshia tridentata												
89	0	-	-	-	-	-	0	0	0	-	0	-/-
97	20	-	-	-	20	-	0	100	100	-	0	10/17
02	20	-	-	-	20	-	0	100	100	100	100	8/31
07	0	-	-	-	-	-	0	0	0	-	0	6/22
Quercus gambelii												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	20	-	-	20	-	-	100	0	-	-	0	85/17
02	20	-	-	20	-	-	0	0	-	-	0	100/22
07	0	-	-	-	-	-	0	0	-	-	0	32/29