

Trend Study 16C-11-07

Study site name: Above South Hollow .

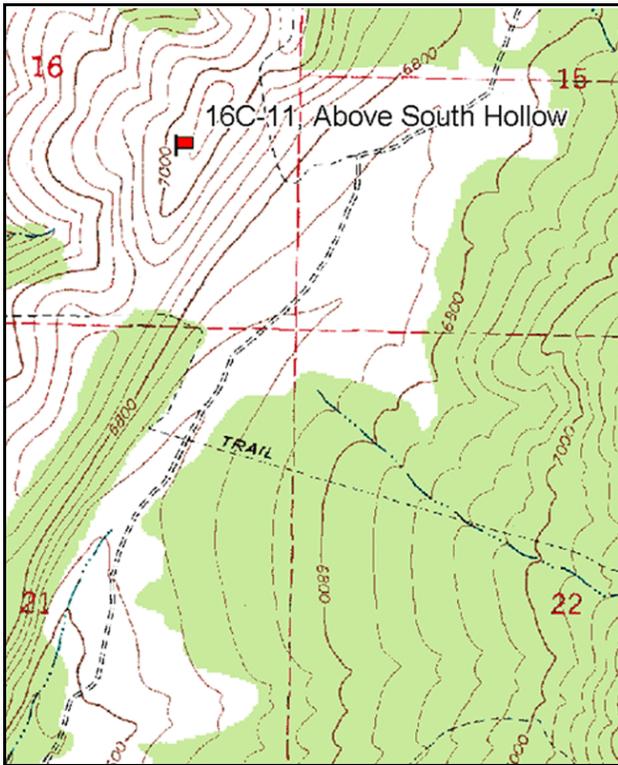
Vegetation type: Chained, Seeded P-J .

Compass bearing: frequency baseline 255 degrees magnetic.

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

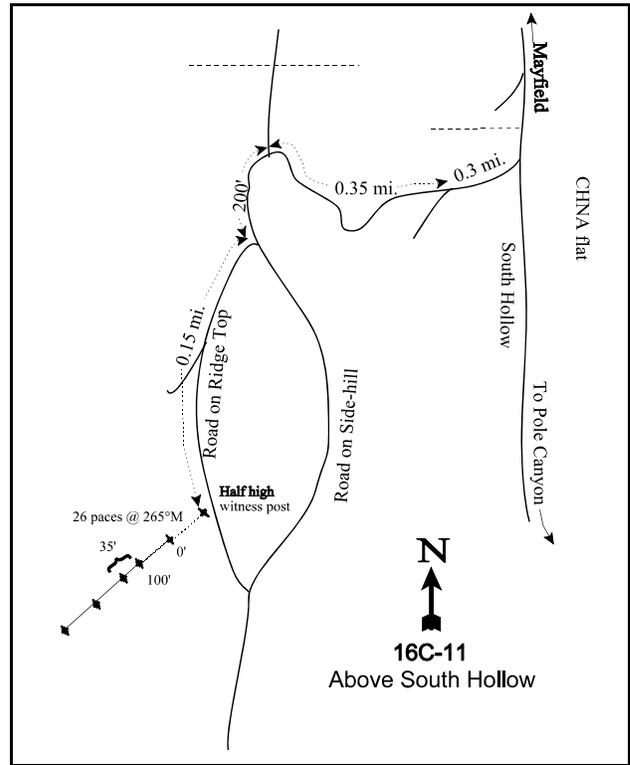
LOCATION DESCRIPTION

From the Mayfield post office, go 1.75 miles up the Twelve Mile Canyon Road. Take the right hand fork south down South Hollow 3 miles to a large rabbitbrush flat. Take the fork past the fence west for 0.3 miles to another fork. Take the right fork up a steep dugway for 0.35 miles to a fence line where the road forks again. Take the left fork south for 200 feet to another fork. Take the right fork up a very steep road for 0.15 miles to a half high witness post on the west side of the road. From here, walk 26 paces at 265 degrees magnetic to the 0-foot baseline stake.



Map Name: Mayfield

Township 20S, Range 2E, Section 16



Diagrammatic Sketch

GPS: NAD 83, UTM 12S 440283 E 4324415 N

DISCUSSION

Above South Hollow - Trend Study No. 16C-11

Study Information

This study samples a pre-1960 chaining on the upper slope of the Mayfield Face west of South Hollow [elevation: 7,000 feet (2,134 m), slope: 20%-25%, aspect: west]. Utah juniper (*Juniperus osteosperma*) and pinyon pine (*Pinus edulis*) trees have re-established, and the populations of both contain large, mature trees. Seeded grasses are still present. From the pellet group transect, deer use was estimated at 60 days use/acre (149 ddu/ha) in 2002 and 55 days use/acre (136 ddu/ha) in 2007. Elk use was estimated at 8 days use/acre (20 edu/ha) in 2002 and 21 days use/acre (51 edu/ha) in 2007. Cattle use was estimated at 11 days use/acre (27 cdu/ha) in 2002 and 3 days use/acre (7 cdu/ha) in 2007. There is a tall fence that encloses a 100 square foot (9.3 sq. m) area at the western end of the transect. Another chaining treatment is planned for the fall of 2008, pending funding.

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). This soil is 10-20 inches (25-51 cm) deep over bedrock and rock fragments are normally present up to 50% in the surface layer. The soil has a clay loam texture and a neutral reactivity (pH of 7.1). Combined relative cover of rock and pavement was estimated at 11%-24% since 1997. With drought conditions in 2002, more rock, pavement, and bare ground was exposed as perennial grass cover decreased. Since 1997, relative bare ground cover was 9%-14%, and combined relative cover of vegetation and litter was 62%-79%. The erosion condition was classified as stable in 2002. In 2007, the erosion condition was classified as slight due to pedestal formation, flow patterns, and light translocation of litter, rock, and soil.

Browse

There are very few preferred browse species. True mountain mahogany (*Cercocarpus montanus*) and antelope bitterbrush (*Purshia tridentata*) have been the dominant preferred browse species. The canopy cover of mahogany was less than 1% in 2002 and had slightly increased to 1% in 2007. Mahogany density was estimated at 33 plants/acre (82 plants/ha) in 1989, 100 plants/acre (247 plants/ha) in 1997, 120 plants/acre (296 plants/ha) in 2002, and 40 plants/acre (99 plants/ha) in 2007. Young plants were only sampled in 1997, comprising 20% of the population. Decadence has fluctuated widely, and accounted for 100% of the population in 1989, 20% in 1997, 83% in 2002, and 0% in 2007. In 1989, all of the sampled plants had poor vigor, and in 2002, 67% of the plants had poor vigor. In both 1997 and 2007, all of the plants had good vigor. The average annual leader growth was 2.0 inches (5.1 cm) in 2002 and 5.8 inches (14.8 cm) in 2007. Browse use has been moderate-heavy. Antelope bitterbrush was first sampled in 1997 at a density of 60 plants/acre (148 plants/ha) and increased to 80 plants/acre (198 plants/ha) in 2002 and 2007. Bitterbrush canopy cover was 1% in both 2002 and 2007. The population was mostly mature with little decadence. Vigor was good on all plants in 1997 and 2007, but 25% of the population displayed poor vigor in 2002. The average annual leader growth was 2.9 inches (7.4 cm) in 2002 and 6.5 inches (16.5 cm) in 2007. Browse use has been heavy. The canopy cover of Gambel oak (*Quercus gambelii*) increased slightly from 1% in 2002 to 2% in 2007. Gambel oak had an estimated density 2,598 stems/acre (6,417 stems/ha) in 1989, of 280 stems/acre (692 stems/ha) in 1997, 760 stems/acre (1,878 stems/ha) in 2002, and 360 stems/acre (890 stems/ha) in 2007. The recruitment of young plants was estimated at 64% of the population in 1989, 0% in 1997, 24% in 2002, and 22% in 2007. The oak population shows low decadence and light-moderate browse use. Vigor has been excellent, except in 2007 when 50% of the plants displayed poor vigor.

The pinyon-juniper overstory that existed prior to treatment has become dominant. Juniper canopy cover decreased from 19% in 2002 to 16% in 2007. The point-centered quarter data estimate of juniper density was

90 trees/acre (222 trees/ha) in 2002 and 2007. The average trunk diameter for juniper was estimated at 7 inches (17.9 cm) in 2002 and 7.3 inches (18.5 cm) in 2007. Canopy cover of pinyon pine increased from 8% in 2002 to 11% in 2007. Pinyon was estimated at 67 trees/acre (165 trees/ha) in 2002 and 75 trees/acre (185 trees/ha) in 2007. The average pinyon trunk diameter was 5.5 inches (14 cm) in 2002 and 6.2 inches (15.7 cm) in 2007. If the combined pinyon-juniper overstory cover increases, it is expected that the browse understory will decrease (Taush and West. 1994). The pinyon-juniper overstory may need to be retreated to maintain a healthy understory.

Herbaceous Understory

The understory is fairly poor for a chained and seeded site. Perennial grasses are moderately abundant. Grass production was high in 1997, providing 15% total ground cover. In 2002, due in part to spring drought conditions (Utah Climate Summaries 2007), grass cover decreased considerably, providing only 7% of the total ground cover. In 2007, grass cover increased, providing 13% of the total ground cover. Smooth brome (*Bromus inermis*) is the dominant seeded species, providing 11% cover in 1997, 6% cover in 2002, and 10% cover in 2007. Crested wheatgrass (*Agropyron cristatum*) was also moderately abundant, providing 4% cover in 1997, 1% cover in 2002, and 2% cover in 2007. Eight other grass species have also been measured, but are not abundant. There are very few forbs. Forbs provided 1% or less of the total ground cover in all samples. Field bindweed (*Convolvulus arvensis*), a noxious weed, was sampled in one quadrat in 1989.

1997 TREND ASSESSMENT

The browse trend is slightly up. The density of true mountain mahogany increased three-fold. No young plants were sampled, but decadence decreased from 100% of the population to 20%. Plant vigor was excellent, and browse use decreased from heavy to light-moderate. Antelope bitterbrush was measured for the first time. There were no young or decadent plants in the population. Plant vigor was excellent, and browse use was heavy. Gamble oak density decreased 89%. Young plants decreased from 64% of the population to 0%, and decadence decreased from 3% to 0%. Plant vigor was excellent, and browse use was mostly light. The change in browse density was due mostly to the increased sample area. The grass trend is stable. The sum of nested frequency for perennial grass changed little. Mutton bluegrass (*Poa fendleriana*) and sedge (*Carex* sp.) decreased significantly in nested frequency. No annual grasses were measured. The forb trend is slightly down. The sum of nested frequency for perennial forbs decreased 38%, however, forbs have been sparse. Field bindweed was sampled in 1989, but was not found in 1997. The Desirable Components Index (DCI) score was very poor-poor due to very low browse cover with low recruitment and high decadence, very little perennial forb cover, and the presence of one noxious weed.

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

browse - slightly up (+1)

grass - stable (0)

forb - slightly down (-1)

2002 TREND ASSESSMENT

The browse trend is slightly down. The density of true mountain mahogany increased 20%. No young plants were sampled and decadence increased to 83% of the population. Plants classified as having poor vigor increased to 67% of the population, and browse use was mostly heavy. The density of bitterbrush increased 33%. No young were measured. Decadence increased to 50% of the population. Plants classified as having poor vigor increased to 25% of the population, and browse use remained heavy. The density of gamble oak increased 63%. Young plants sampled increased to 24% of the population, and decadence increased slightly to 5%. Plants showing poor vigor increased slightly to 3% of the population, and remained mostly light. The grass trend is down. The sum of nested frequency for perennial grasses decreased 21%, and perennial grass cover decreased from 15% to 7%. Smooth brome decreased significantly in nested frequency. Additionally, Japanese brome (*Bromus japonicus*) was sampled for the first time, and had a quadrat frequency of 1%. The forb trend is down. The sum of nested frequency for both perennial and annual forbs decreased 77% and 85%, respectively. However, forb abundance was already quite low. Forb cover decreased from 1% to nearly 0%. The DCI score was very poor due to decreased perennial grass and forb cover.

winter range condition (DCI) - very poor (15) Mid-level potential scale
browse - slightly down (-1) grass - down (-2) forb - down (-2)

2007 TREND ASSESSMENT

The browse trend is slightly down. The density of true mountain mahogany decreased 67%. There were no young or decadent plants in the population. Plant vigor was excellent. Browse use was light-moderate. The density of antelope bitterbrush was stable. No young were measured. Decadence decreased to 0% of the population. Plant vigor was excellent, and browse use remained heavy. The density of gamble oak decreased 53%. The recruitment of young changed little at 22% of the population, and decadent plants increased to 11%. Plants showing poor vigor increased to 50% of the population, and all browse use was light. The grass trend is stable. The sum of nested frequency for perennial grass changed little, but the average cover increased from 7% to 13%. Cheatgrass (*Bromus tectorum*) was measured for the first time at a quadrat frequency of 4%, and provided less than 1% cover. The forb trend is down. The sum of nested frequency for perennial forbs increased two-fold, however, there were very few perennial forbs. The sum of nested frequency for annual forbs increased significantly. Bur buttercup (*Ranunculus testiculatus*) was measured for the first time and provided 54% of the total forb cover. Bur buttercup produces allopathic chemicals that prevent seed germination in many native species (Buchanan et al. 1978). The DCI score remained very poor, despite the increase in perennial grass cover.

winter range condition (DCI) - very poor (26) Mid-level potential scale
browse - slightly down (-1) grass - stable (0) forb - down (-2)

HERBACEOUS TRENDS --
Management unit 16C, Study no: 11

Type	Species	Nested Frequency				Average Cover %		
		'89	'97	'02	'07	'97	'02	'07
G	Agropyron cristatum	_a 94	_a 105	_a 92	_a 91	3.54	.95	2.16
G	Agropyron intermedium	_a 48	_a 26	-	-	.13	-	-
G	Agropyron spicatum	-	_a 1	_a 3	_a 6	.03	.03	.33
G	Bromus inermis	_{ab} 231	_b 271	_a 236	_a 220	11.03	5.71	9.84
G	Bromus japonicus (a)	-	-	_a 3	_a 3	-	.03	.00
G	Bromus tectorum (a)	-	-	-	10	-	-	.19
G	Carex sp.	_b 13	_a 3	-	_a 1	.06	-	.03
G	Oryzopsis hymenoides	13	-	-	-	-	-	-
G	Poa fendleriana	_b 50	_a 3	_a 6	_a 10	.03	.16	.36
G	Poa secunda	-	_a 17	-	_a 6	.34	-	.06
Total for Annual Grasses		0	0	3	13	0	0.03	0.19
Total for Perennial Grasses		449	426	337	334	15.17	6.85	12.80
Total for Grasses		449	426	340	347	15.17	6.88	12.99
F	Astragalus convallarius	-	1	-	-	.00	-	-
F	Astragalus sp.	_a 1	-	-	_a 1	-	-	.00
F	Convolvulus arvensis	1	-	-	-	-	-	-
F	Collinsia parviflora (a)	-	_a 1	_a 6	_a 12	.00	.01	.02

T y p e	Species	Nested Frequency				Average Cover %		
		'89	'97	'02	'07	'97	'02	'07
F	Cryptantha sp.	_a 6	_a 3	_a 1	_a 1	.03	.00	.03
F	Descurainia pinnata (a)	-	_a 5	-	_b 45	.01	-	.20
F	Lappula occidentalis (a)	-	-	-	4	-	-	.01
F	Medicago sativa	_a 11	_a 13	_a 4	-	.87	.03	-
F	Microsteris gracilis (a)	-	_a 30	-	_a 35	.05	-	.08
F	Penstemon humilis	9	-	-	-	-	-	-
F	Phlox longifolia	_b 24	_{ab} 9	_a 2	_{ab} 13	.02	.01	.02
F	Ranunculus testiculatus (a)	-	-	-	60	-	-	.43
F	Senecio multilobatus	_a 3	-	-	_a 3	-	-	.00
F	Tragopogon dubius	_a 1	_a 9	_a 1	-	.17	.00	-
F	Unknown forb-annual (a)	-	3	-	-	.00	-	-
Total for Annual Forbs		0	39	6	156	0.07	0.00	0.74
Total for Perennial Forbs		56	35	8	18	1.09	0.05	0.06
Total for Forbs		56	74	14	174	1.17	0.06	0.80

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

BROWSE TRENDS --

Management unit 16C, Study no: 11

T y p e	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	Cercocarpus montanus	4	4	2	1.48	.39	.09
B	Chrysothamnus nauseosus consimilis	2	1	0	.00	.03	-
B	Juniperus osteosperma	13	9	7	9.55	6.90	4.27
B	Pinus edulis	5	6	5	3.54	6.50	6.30
B	Purshia tridentata	2	3	2	.30	.56	.18
B	Quercus gambelii	4	9	6	2.09	1.99	1.57
Total for Browse		30	32	22	16.98	16.38	12.42

CANOPY COVER, LINE INTERCEPT --
Management unit 16C, Study no: 11

Species	Percent Cover	
	'02	'07
Cercocarpus montanus	.40	.63
Juniperus osteosperma	19.20	16.00
Pinus edulis	8.48	10.83
Purshia tridentata	.90	.95
Quercus gambelii	1.46	1.88

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 16C, Study no: 11

Species	Average leader growth (in)	
	'02	'07
Cercocarpus montanus	2.0	5.8
Purshia tridentata	2.9	6.5

POINT-QUARTER TREE DATA --
Management unit 16C, Study no: 11

Species	Trees per Acre		Average diameter (in)	
	'02	'07	'02	'07
Juniperus osteosperma	90	97	7.0	7.3
Pinus edulis	67	76	5.5	6.2

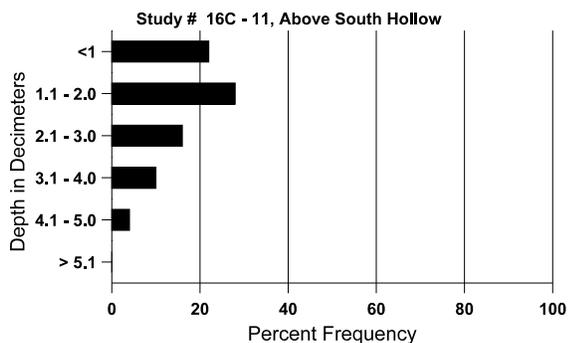
BASIC COVER --
Management unit 16C, Study no: 11

Cover Type	Average Cover %			
	'89	'97	'02	'07
Vegetation	9.00	31.20	23.18	27.92
Rock	8.00	3.42	9.11	3.19
Pavement	11.50	8.08	21.08	15.49
Litter	60.75	50.84	52.78	49.54
Cryptogams	0	.05	0	.18
Bare Ground	10.75	9.65	17.61	15.00

SOIL ANALYSIS DATA --
Herd Unit 16C, Study no: 11, Above South Hollow

Effective rooting depth (in)	Temp °F (depth)	pH	Clay loam			%OM	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
11.0	58.0 (15.4)	7.1	36.4	31.1	32.6	6.6	18.0	268.8	.9

Stoniness Index



PELLET GROUP DATA --

Management unit 16C, Study no: 11

Type	Quadrat Frequency		
	'97	'02	'07
Rabbit	14	18	31
Elk	9	2	6
Deer	31	36	30
Cattle	1	1	-

Days use per acre (ha)	
'02	'07
-	-
8 (20)	21 (51)
60 (149)	55 (136)
11 (27)	3 (7)

BROWSE CHARACTERISTICS --

Management unit 16C, Study no: 11

		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												
89	33	-	-	-	33	-	0	100	100	100	100	-/-
97	100	20	-	80	20	-	40	20	20	-	0	52/50
02	120	-	-	20	100	-	0	83	83	33	67	44/39
07	40	-	-	40	-	20	50	0	0	-	0	45/44
Chrysothamnus nauseosus consimilis												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	40	-	20	20	-	-	50	0	-	-	0	40/40
02	20	-	-	20	-	-	0	0	-	-	0	13/6
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)
<i>Cowania mexicana stansburiana</i>												
89	33	-	-	33	-	-	0	0	-	-	0	30/33
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Ephedra viridis</i>												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	39/29
02	0	-	-	-	-	-	0	0	-	-	0	35/29
07	0	-	-	-	-	-	0	0	-	-	0	55/81
<i>Juniperus osteosperma</i>												
89	232	-	66	166	-	-	0	0	-	-	0	61/67
97	280	-	20	260	-	80	0	0	-	-	0	-/-
02	200	-	20	180	-	100	0	10	-	-	10	-/-
07	160	20	-	160	-	-	0	0	-	-	0	-/-
<i>Pediocactus simpsonii</i>												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	21/81
07	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Pinus edulis</i>												
89	66	-	66	-	-	-	0	0	-	-	0	-/-
97	100	-	20	80	-	-	0	0	-	-	0	-/-
02	120	-	20	100	-	-	0	0	-	-	0	-/-
07	100	20	-	100	-	-	0	0	-	-	0	-/-
<i>Pseudotsuga menziesii</i>												
89	33	-	33	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Purshia tridentata</i>												
89	0	-	-	-	-	-	0	0	0	-	0	-/-
97	60	-	-	60	-	-	0	100	0	-	0	27/58
02	80	-	-	40	40	-	0	100	50	-	25	29/77
07	80	-	-	80	-	-	0	100	0	-	0	29/58

		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												
89	2598	100	1666	866	66	-	1	28	3	-	0	71/33
97	280	-	-	280	-	40	14	0	0	-	0	47/49
02	760	-	180	540	40	-	29	0	5	-	3	47/25
07	360	240	80	240	40	20	0	0	11	-	50	39/34
Sambucus cerulea												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	22/31
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	80/108