

Trend Study 19B-8-07

Study site name: South Pine Canyon.

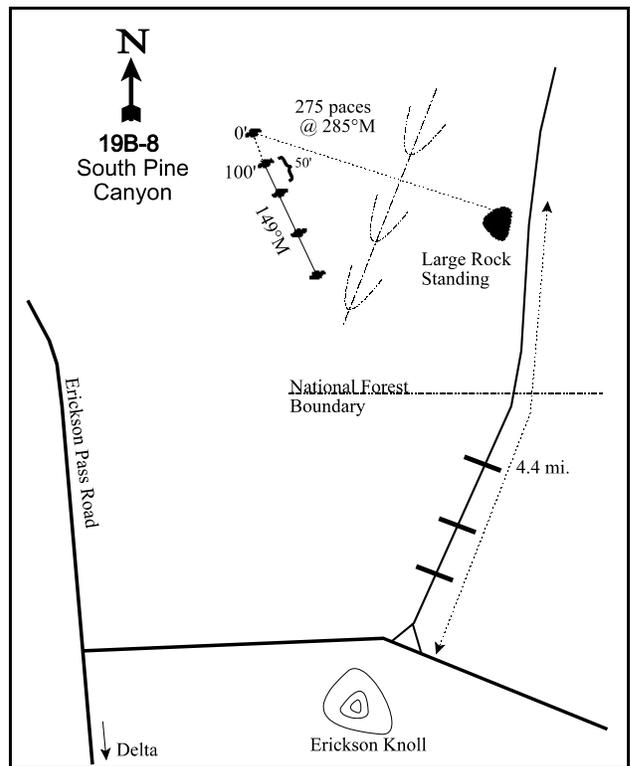
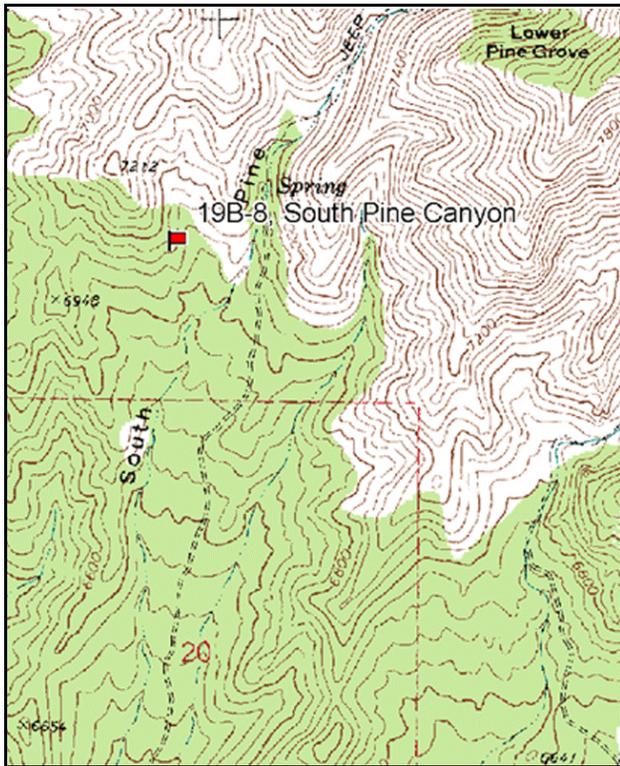
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 149 degrees magnetic.

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

LOCATION DESCRIPTION

Starting on the road north of Erickson Knoll (road #564), take the South Pine Canyon Rd north for 4.4 Miles. In route, you will pass through a series of four gates and the National Forest Service boundary. Stop next to a huge rock on the west side of the road. From the west side of the road, the 0-foot baseline stake is 250 paces away at 285 degrees magnetic (across South Pine wash). The 0-foot baseline is marked by browse tag #3976.



Map Name: Erickson Knoll

Diagrammatic Sketch

Township 10S, Range 6W, Section 17

GPS: NAD 83, UTM 12S 368087 E 4423525 N

DISCUSSION

South Pine Canyon - Trend Study No. 19B-8

Study Information

This study is located on Forest Service administered land and samples important deer winter range [elevation: 6,900 feet (2,103 m), slope: 22%, aspect: south]. An ephemeral stream is located 750 feet to the east (229 m). This study was not sampled during the 1997 rotation because a wildfire had eliminated all of the browse. Before the wildfire, the vegetation consisted of a mountain brush community with a sparse herbaceous understory. Although no wildlife use information was available from that time, deer use was moderate following the fire. From the pellet group transect, there were an estimated 55 deer days use/acre (136 ddu/ha) in 2002, and 27 deer days use/acre (68 ddu/ha) in 2007. Elk use was estimated at 3 days use/acre (7 edu/ha) in 2007. Most of the wildlife use appeared to be from late winter and spring use. Cattle use was estimated at 6 days use/acre (14 cdu/ha) in 2002. Cattle were grazing in the vicinity while the study was sampled in 2002. There were no cattle pats in 2007.

Soil

The study lies within the Reywat-Broad-Rock outcrop soil association, which generally consists of shallow to moderately deep, well-drained soil. Depth to bedrock is 20-40 inches (51-102 cm). The soils in this series formed in colluvium and residuum derived from sandstone and quartzite, or basalt and andesite, and are found on hillsides, mountains, or plateaus (USDA-NRCS 2007). At the study, the soil has a sandy loam texture and a neutral reactivity (pH of 7.1). Rock and pavement have accounted for approximately one-third of the total ground cover since 2002. The profile is also very rocky throughout. Prior to 2002, there were signs of significant pedestalling, as well as sheet and gully erosion. In 2002 and 2007, the erosion condition was classified as stable. Litter and vegetation cover are lacking, but the abundance of rock and pavement armor the surface.

Browse

The key browse species are Utah serviceberry (*Amelanchier utahensis*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and antelope bitterbrush (*Purshia tridentata*). Canopy cover of sagebrush increased from 1% in 2002 to 13% in 2007. Sagebrush density ranged from 100 plants/acre (248 plants/ha) to 533 plants/acre (1,319 plants/ha) between 1983 and 2002. In 2007, the density increased dramatically to 10,620 plants/acre (26,287 plants/ha). Seedling sagebrush plants were not sampled prior to 2007, but there were 4,060 seedlings/acre (10,050 seedlings/ha) in 2007. A similar pattern exists for young plants. Decadent sagebrush were also first sampled in 2007, but at a very low density. The proportion of plants exhibiting poor vigor has been low in each sample year. The average annual leader growth was 2.1 inches (5.3 cm) in 2002 and 1.5 inches (3.8 cm) in 2007. Browse use was light-moderate through 2002 and was light in 2007.

Canopy cover of Utah serviceberry increased from 3% in 2002 to 5% in 2007. The estimated density increased from 800 plants/acre (1,980 plants/ha) in 1983 to 932 plants/acre (2,307 plants/ha) in 1989, but decreased to 200 plants/acre (495 plants/ha) by 2007. No serviceberry seedlings have been measured in any sample year, and young plants were only sampled in 1989. Decadent plants comprised 14% of the population in 1989 and 31% in 2002, but there were no decadent plants in 1983 or 2007. Vigor has been good all sample years except 2002, when 38% of the population had poor vigor. The annual leader growth averaged 1.3 inches (3.3 cm) in 2002 and 1.4 inches (3.6 cm) in 2007. Browse use on serviceberry has oscillated between heavy and moderate with each sampling.

Antelope bitterbrush density has ranged from 60 plants/acre (149 plants/ha) to 1,666 plants/acre (4,124 plants/ha). Only mature and decadent plants have been sampled. Decadence was low, except in 2007 when 33% of the population was classified as such. The bitterbrush are healthy and none have been classified as having poor vigor, despite heavy browse use in each sample year. The average annual leader growth was 2.5

inches (6.4 cm) in 2002 and 1.2 inches (3.0 cm) in 2007.

Herbaceous Understory

The perennial understory was rather sparse before the fire, and was even more so afterwards. Perennial grasses comprised 2% cover in 2002 and 1% in 2007. Bluebunch wheatgrass (*Agropyron spicatum*) has been the dominant perennial grass every sample year, but the nested frequency was significantly lower following the fire. Other perennial grasses include: mutton bluegrass (*Poa fendleriana*), Sandberg bluegrass (*Poa secunda*), and sand dropseed (*Sporobolus cryptandrus*). The composition of the grasses before the fire may have been different than that sampled after the fire. For example, cheatgrass (*Bromus tectorum*) was measured in 94% of the quadrats following the fire, but since annual species were not measured before the fire, it is difficult to determine if cheatgrass increased following the fire. As a result, there is no certainty regarding any changes in composition from perennial to annual grass following the fire. Cheatgrass cover has been approximately 10% since 2002. Cattle were reported to have heavily grazed the limited wheatgrass plants previous to 2007.

Forbs were diverse in 1983 and 1989, but provided little forage. The most common species were American vetch (*Vicia americana*), wild onion (*Allium* sp.), longstalk springparsley (*Cymopterus longipes*), longleaf phlox (*Phlox longifolia*), and thistle (*Cirsium* sp.). More desirable species such as redroot eriogonum (*Eriogonum racemosum*), tapertip hawksbeard (*Crepis acuminata*), and gray lomatium (*Lomatium grayi*) have been sampled infrequently. Perennial forb frequency was much lower in 2002 and 2007 than in previous sample years. Perennials comprised 1% cover in 2002 and 2% in 2007, while annuals comprised less than 1% in 2002 and 3% in 2007. Pale alyssum (*Alyssum alyssoides*) and storksbill (*Erodium cicutarium*) were the dominant forb species, and bur buttercup (*Ranunculus testiculatus*), an allelopathic annual (Buchanan et al. 1978), was sampled for the first time in 2007.

1989 TREND ASSESSMENT

The browse trend is stable. The density of Utah serviceberry and mountain big sagebrush increased 17% and 33%, respectively. Conversely, the density of antelope bitterbrush decreased 28%. No preferred browse seedlings were sampled, though the proportion of the serviceberry plants in the young age class increased from 0% to 14% of the population. Serviceberry and bitterbrush decadence increased, but remained stable for sagebrush. Plants with poor vigor increased from 0% to 13% of the sagebrush population, but all of the sampled serviceberry and bitterbrush plants had good vigor. The grass trend is stable. The sum of nested frequency of perennial grasses increased 10%. Grasses remained a minor component of vegetation. The forb trend is up. The sum of nested frequency increased 31%. Gray lomatium, Douglas chaenactis (*Chaenactis douglasii*), and longleaf phlox all significantly increased in nested frequency, but wild onion decreased.

browse - stable (0)

grass - stable (0)

forb - up (+2)

2002 TREND ASSESSMENT

The browse trend is down. Densities of all the key species declined sharply. The decrease in density was partly attributed to a wildfire that burned through the area, and partly to the larger area sampled beginning in 2002. There were no decadent sagebrush or bitterbrush, but 31% of the serviceberry population was classified as decadent. Browse use shifted to heavy on serviceberry and changed little on sagebrush and bitterbrush. The grass trend is down. The sum of nested frequency of perennial grasses decreased 66%. The nested frequency of bluebunch wheatgrass and Sandberg bluegrass decreased significantly. Cheatgrass was found in 94% of the quadrats and accounted for 10% cover. The forb trend is down. The sum of nested frequency of perennial forbs decreased 93%. The number of forb species decreased from 19 to eight and the nested frequency of three species decreased significantly. The Desirable Components Index (DCI) score was very poor due to the low preferred-browse cover (less than 5%), low perennial grass and forb cover, and high annual grass cover.

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

2007 TREND ASSESSMENT

The browse trend is up. Utah serviceberry and antelope bitterbrush densities remained low, but the density of mountain big sagebrush increased dramatically. Sagebrush density increased from 100 plants/acre (248 plants/ha) to 10,620 plants/acre (26,287 plants/ha). The sagebrush population is approximately half young and half mature plants. There were no decadent serviceberry or sagebrush plants, and only 20 bitterbrush plants/acre (50 plants/ha) were decadent. The proportion of plants with poor vigor decreased for serviceberry and remained low for sagebrush and bitterbrush. Browse use remained high on bitterbrush, shifted to moderate on serviceberry, and shifted to light on sagebrush. The grass trend is down. The sum of nested frequency of perennial grasses decreased 59%. The nested frequency of cheatgrass significantly increased and it was measured in all but one quadrat. The forb trend is up. The sum of nested frequency of perennial forbs increased four-fold. The number of species increased from one to eight for annual species and from seven to 13 for perennial species. The DCI score improved to poor due to the increase in preferred-browse cover and recruitment, and a decrease in browse decadence.

winter range condition (DCI) - poor (46) Mid-level potential scale
browse - up (+2) grass - down (-2) forb - up (+2)

HERBACEOUS TRENDS --
Management unit 19B, Study no: 8

Type	Species	Nested Frequency				Average Cover %	
		'83	'89	'02	'07	'02	'07
G	Agropyron spicatum	bc ₉₀	c ₉₀	ab ₃₃	a ₁₃	1.70	.78
G	Bromus tectorum (a)	-	-	a ₂₉₀	b ₃₁₅	9.86	10.13
G	Poa fendleriana	a ₁	a ₉	a ₃	-	.03	-
G	Poa secunda	b ₁₃	b ₁₅	a ₁	a ₋	.01	.01
G	Sporobolus cryptandrus	-	-	a ₂	a ₃	.03	.15
Total for Annual Grasses		0	0	290	315	9.86	10.13
Total for Perennial Grasses		104	114	39	16	1.77	0.94
Total for Grasses		104	114	329	331	11.63	11.07
F	Agoseris glauca	5	-	-	-	-	-
F	Alyssum alyssoides (a)	-	-	-	179	-	.93
F	Allium sp.	b ₅₄	a ₂₉	-	-	-	-
F	Arabis sp.	-	11	-	-	-	-
F	Arenaria sp.	-	3	-	-	-	-
F	Artemisia ludoviciana	a ₁₁	a ₇	-	a ₁	-	.03
F	Astragalus sp.	a ₃	a ₂	-	-	-	-
F	Calochortus nuttallii	-	2	-	-	-	-
F	Chaenactis douglasii	a ₁	b ₂₁	a ₁	b ₃₀	.00	.22
F	Cirsium sp.	a ₁₃	a ₇	a ₉	a ₂	.45	.25
F	Collomia linearis (a)	-	-	-	4	-	.01

Type	Species	Nested Frequency				Average Cover %	
		'83	'89	'02	'07	'02	'07
F	<i>Comandra pallida</i>	_a 7	_a 11	-	-	-	-
F	<i>Collinsia parviflora</i> (a)	-	-	-	87	-	.29
F	<i>Crepis acuminata</i>	_a 18	_a 24	-	-	-	-
F	<i>Cryptantha</i> sp.	_{ab} 18	_b 20	_a 2	_{ab} 4	.03	.01
F	<i>Cymopterus longipes</i>	_b 29	-	-	_a 10	-	.02
F	<i>Descurainia pinnata</i> (a)	-	_a 3	-	_b 69	-	.68
F	<i>Epilobium brachycarpum</i> (a)	-	-	-	3	-	.01
F	<i>Erodium cicutarium</i> (a)	-	-	_a 14	_b 71	.21	.84
F	<i>Eriogonum racemosum</i>	_a 2	-	-	_b 12	-	.22
F	<i>Hackelia patens</i>	_a 12	_a 12	-	_a 3	-	.03
F	<i>Lappula occidentalis</i> (a)	-	-	-	52	-	.33
F	<i>Lactuca serriola</i>	-	-	_a 10	_a 2	.13	.01
F	<i>Lithospermum ruderale</i>	_a 5	_a 5	_a 5	_a 8	.24	.45
F	<i>Lomatium grayi</i>	_a 11	_b 77	-	_a 7	-	.02
F	<i>Machaeranthera canescens</i>	_a 2	_a 3	-	_a 8	-	.05
F	<i>Microsteris gracilis</i> (a)	-	-	-	4	-	.01
F	<i>Phlox longifolia</i>	_a 2	_b 45	_a 3	_b 43	.00	.30
F	<i>Ranunculus testiculatus</i> (a)	-	-	-	3	-	.00
F	<i>Sanguisorba minor</i>	-	-	2	-	.03	-
F	<i>Tragopogon dubius</i>	-	4	-	-	-	-
F	<i>Vicia americana</i>	_b 140	_b 155	-	_a 2	-	.00
F	<i>Viola</i> sp.	1	-	-	-	-	-
Total for Annual Forbs		0	3	14	472	0.21	3.13
Total for Perennial Forbs		334	438	32	132	0.90	1.64
Total for Forbs		334	441	46	604	1.11	4.77

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

BROWSE TRENDS --

Management unit 19B, Study no: 8

Type	Species	Strip Frequency		Average Cover %	
		'02	'07	'02	'07
B	Amelanchier utahensis	13	9	1.45	3.56
B	Artemisia tridentata vaseyana	5	76	.33	12.03
B	Chrysothamnus nauseosus	0	19	-	.85
B	Chrysothamnus viscidiflorus viscidiflorus	7	58	.56	3.41
B	Juniperus osteosperma	0	0	-	-
B	Mahonia repens	2	2	.06	.30
B	Opuntia sp.	1	3	-	-
B	Purshia tridentata	3	3	.38	1.31
B	Tetradymia canescens	1	0	-	-
Total for Browse		32	170	2.78	21.47

CANOPY COVER, LINE INTERCEPT --

Management unit 19B, Study no: 8

Species	Percent Cover	
	'02	'07
Amelanchier utahensis	2.71	5.08
Artemisia tridentata vaseyana	1.11	12.91
Chrysothamnus nauseosus	-	.95
Chrysothamnus viscidiflorus viscidiflorus	.86	3.95
Mahonia repens	-	.25
Purshia tridentata	.40	2.21

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 19B, Study no: 8

Species	Average leader growth (in)	
	'02	'07
Amelanchier utahensis	-	1.4
Artemisia tridentata vaseyana	2.1	1.5
Purshia tridentata	2.5	1.2

BASIC COVER --

Management unit 19B, Study no: 8

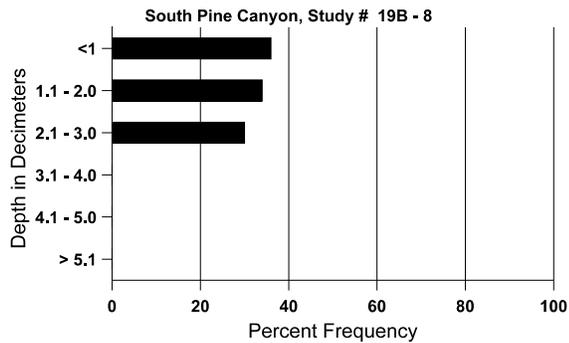
Cover Type	Average Cover %			
	'83	'89	'02	'07
Vegetation	2.75	6.25	15.07	35.24
Rock	6.75	9.50	13.52	13.41
Pavement	1.75	2.75	24.91	21.13
Litter	65.25	62.75	27.26	16.01
Cryptogams	.25	.25	0	.00
Bare Ground	23.25	18.50	26.89	22.06

SOIL ANALYSIS DATA --

Herd Unit 19B, Study no: 8, South Pine Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	Sandy loam			%OM	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
11.4	67.0 (11.7)	7.1	69.3	16.7	14.0	2.5	13.8	227.2	.6

Stoniness Index



PELLET GROUP DATA --

Management unit 19B, Study no: 8

Type	Quadrat Frequency		Days use per acre (ha)	
	'02	'07	'02	'07
Rabbit	1	6	-	-
Elk	-	5	-	3 (7)
Deer	20	17	55 (136)	27 (68)
Cattle	5	1	6 (14)	-

BROWSE CHARACTERISTICS --
Management unit 19B, 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 utahensis												
83	800	-	-	800	-	-	0	100	0	-	0	45/53
89	932	-	133	666	133	-	79	0	14	-	0	45/48
02	320	-	-	220	100	-	0	88	31	31	38	21/44
07	200	-	-	200	-	-	70	10	0	-	10	33/59
Artemisia tridentata vaseyana												
83	400	-	-	400	-	-	50	0	0	-	0	28/36
89	533	-	-	533	-	-	63	0	0	-	13	11/13
02	100	-	40	60	-	200	40	0	0	-	0	20/34
07	10620	4060	5900	4700	20	60	9	2	0	.18	.18	15/25
Atriplex canescens												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	10/22
07	0	-	-	-	-	-	0	0	-	-	0	-/-
Chrysothamnus nauseosus												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	540	-	40	500	-	20	26	4	-	-	4	16/20
Chrysothamnus viscidiflorus viscidiflorus												
83	332	-	66	200	66	-	0	0	20	-	0	14/10
89	266	-	-	266	-	-	0	0	0	-	0	9/9
02	220	-	-	220	-	-	9	0	0	-	0	15/33
07	4980	240	1440	3180	360	-	16	0	7	4	11	14/29
Gutierrezia sarothrae												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	20	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)
Juniperus osteosperma												
83	66	-	-	66	-	-	0	0	-	-	0	67/173
89	66	-	-	66	-	-	0	0	-	-	0	197/157
02	0	-	-	-	-	20	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	-/-
Mahonia repens												
83	0	-	-	-	-	-	0	0	0	-	0	-/-
89	0	-	-	-	-	-	0	0	0	-	0	-/-
02	200	-	20	180	-	-	0	0	0	-	80	2/6
07	960	-	-	740	220	100	0	0	23	-	88	5/7
Opuntia sp.												
83	866	-	-	866	-	-	0	0	0	-	0	10/17
89	866	-	200	600	66	-	0	0	8	8	54	7/28
02	20	-	-	20	-	-	0	0	0	-	0	6/18
07	60	-	-	60	-	-	0	0	0	-	33	5/25
Purshia tridentata												
83	1666	-	-	1600	66	-	4	96	4	-	0	17/25
89	1199	-	-	1066	133	-	33	67	11	-	0	14/31
02	60	-	-	60	-	-	0	100	0	-	0	8/24
07	60	-	-	40	20	-	0	100	33	-	0	15/61
Symphoricarpos oreophilus												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	21/40
Tetradymia canescens												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
02	20	-	20	-	-	-	100	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	17/69