Trend Study 19A-7-07

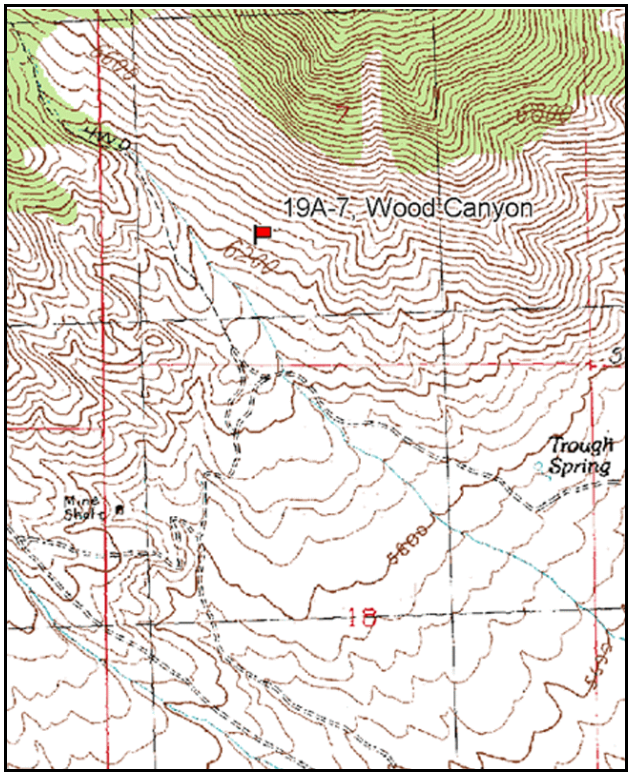
Study site name: Wood Canyon . Vegetation type: Desert Shrub .

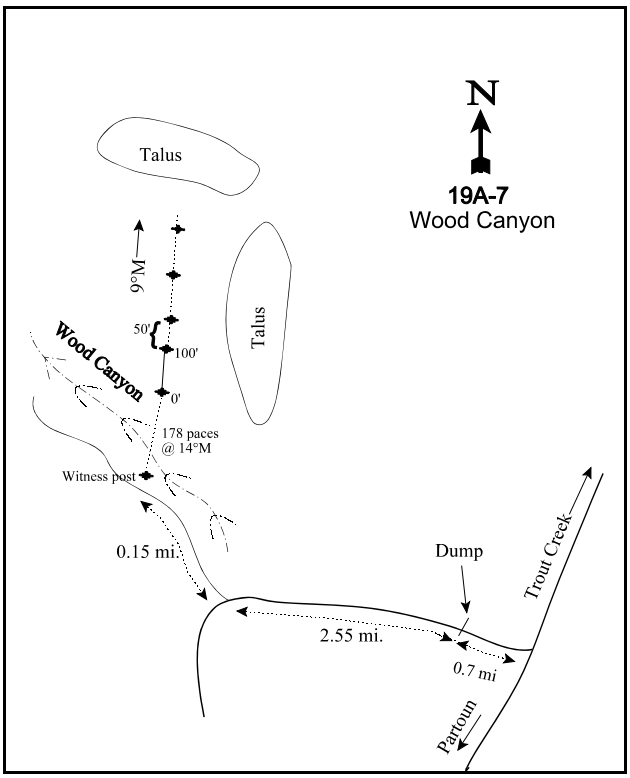
Compass bearing: frequency baseline 9 degrees magnetic.

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

LOCATION DESCRIPTION

From Trout Creek on the Gandy Road through Snake Valley, go south to the old Partoun dump (Now covered over). Turn west and continue 0.7 miles to the Trough Springs turnoff. Take this road west for 3.25 miles to the turn-off to Wood Canyon. Turn right and go 0.15 miles to a witness post on the right side of the road. From the witness post, walk 178 paces north (14°M) to the 0 foot baseline stake which is behind a large rock. The baseline runs uphill at 9 degrees magnetic.





Map Name: Partoun

Diagrammatic Sketch

Township 13S , Range 18W , Section 7

GPS: NAD 83, UTM 12S 249326 E 4398446 N

DISCUSSION

Wood Canyon - Trend Study No. 19A-7

Study Information

This study is located on the southeast end of the Deep Creek Mountains [elevation: 6,200 feet (1,880 m) slope: 32-35%, aspect: south]. Rugged cliffs cap the ridge north of the study, and it is surrounded by miles of vast open desert to the south and east. It was established in 1989 primarily to monitor bighorn sheep habitat, but it mainly receives winter use by deer. Chukars were heard on the nearby ledges in both 1989 and 1997. In 2007, pronghorn were spotted a half mile east of the study. A stock pond 1 mile (1.6 km) to the east is the closest apparent water source. From the pellet group transect, deer use was estimated at 10 days use/acre (25 ddu/ha) in 2002 and 2 days use/acre (5 ddu/ha) in 2007. Elk use estimates were 1 day use/acre (2 edu/ha) in 2002 and 3 days use/acre (8 edu/ha) in 2007. Pronghorn use estimates were 4 days use/acre (10 pdu/ha) in 2002 and 11 days use/acre (28 pdu/ha) in 2007. Cattle use estimates were 8 days use/acre (20 cdu/ha) in 2007 and 6 days use/acre (14 cdu/ha) in 2007. Horse use estimates were 3 days use/acre (7 hdu/ha) in 2002 and 1 day use/acre (1 hdu/ha) in 2007. There were 17 sage-grouse pellet groups/acre (42 groups/ha) in 2002. Because of the difficulty distinguishing between deer and pronghorn pellets, it is quite possible there could be overlap in the estimates between the two.

Soil

The soil is a very gravelly loam with a mildly alkaline reaction (pH 7.4). Relative vegetation cover was 27% in 1997, 13% in 2002, and 25% in 2007. Relative bare ground cover was 6% in 1997, 13% in 2002, and 4% in 2007. Erosion has been negligible in spite of only fair vegetation and litter cover because boulders, rocks and pavement are very abundant and armor the soil. The erosion condition was classified as stable in 2002 and 2007.

Browse

The browse component consists of a variety of species. Shadscale (*Atriplex confertifolia*) had an estimated density of 1,400 plants/acre (3,458 plants/ha) in 1997, 1,140 plants/acre (2,816 plants/ha) in 2002, and 800 plants/acre (1,976 plants/ha) in 2007. The recruitment of young in the population was 10% in 1997, 30% in 2002, and 0% in 2007. Percent decadence was 23% in 1997, 44% in 2002, and 38% in 2007. The proportion of decadent plants classified as dying has been high at 75% or greater in 1997, 2002, and 2007. Plants classified as having poor vigor increased from 20% of the population in 1997 to 48% in 2007. Utilization has been light all years.

Nevada ephedra (*Ephedra nevadensis*) had an estimated density of 160 plants/acre (395 plants/ha) in 1997 and 320 plants/acre (790 plants/ha) in 2002 and 2007. Young plants increased from 0% of the population in 1997, to 25% in 2002, and 31% in 2007. The proportion of the population exhibiting poor vigor significantly increased from 0% in 1997, to 75% in 2002, and 50% in 2007. Utilization has been mostly light-moderate in all samples.

Broom snakeweed (*Gutierrezia sarothrae*) is the dominant browse with an estimated density of 5,200 plants/acre (12,844 plants/ha) in 1997, 3,320 plants/acre (8,200 plants/ha) in 2002, and 4,040 plants/acre (9,979 plants/ha) in 2007. This is a mature population that fluctuates with precipitation changes. Percent decadence and poor vigor seem to vary as well with environmental conditions. Recruitment of young into the population was low in all years.

Other low density browse species that were sampled include winterfat (*Ceratoides lanata*), summer cypress (*Kochia americana*), black sagebrush (*Artemisia nova*), cottonthorn horsebrush (*Tetradymia spinosa*), stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *stenophyllus*), and pricklypear cactus (*Opuntia* sp.).

Herbaceous Understory

Cheatgrass (*Bromus tectorum*) is the most abundant grass. It provided 6% of the total ground cover in 1997, decreased to 2% in 2002, and increased to 9% in 2007. Galleta (*Hilaria jamesii*) is the most abundant perennial grass. It provided 4% of the total ground cover in 1997 and 1% in 2002 and 2007. Other perennials sampled include Indian ricegrass (*Oryzopsis hymenoides*), Sandberg bluegrass (*Poa secunda*), bottlebrush squirreltail (*Sitanion hystrix*), sand dropseed (*Sporobolus cryptandrus*), and needle-and-thread grass (*Stipa comata*). Average cover for perennial grasses was 8% in 1997, 3% in 2002, and 5% in 2007. Incidentally, the decrease in the average cover for perennial and annual grasses in 2002 coincided with drought conditions (Utah Climate Summaries 2007).

The forb component is sparse, especially perennial species. Four perennial species were sampled in 1989, three in 1997, none in 2002, and one in 2007. Storksbill (*Erodium cicutarium)*, a winter annual, was moderately abundant in 2002 and 2007 and provided nearly all forb cover both years. It increased in cover and nested frequency every sample year from 1997 to 2007. Storksbill has been shown to outcompete and prevent the establishment of native species (Kimball and Schiffman 2003).

1997 TREND ASSESSMENT

The browse trend is stable, with little utilization on any browse species. Shadscale density increased 24%. However this increase may be due in part to the increased sample area. The recruitment of young increased from 0% of the population to 10%, and decadence increased from 18% to 23%. Plants classified as having poor vigor increased from 0% of the population to 20%. Browse use was mostly light. Nevada ephedra density declined 52%. The recruitment of young decreased from 40% of the population to 0%., and decadence decreased from 20% to zero. Plant vigor was excellent, and browse use was mostly ight. The grass trend is up. The sum of the nested frequency of perennial grasses increased 68%, and the nested frequency of galleta and needle-and-thread grass increased significantly. The forb trend is stable. The nested frequency for perennial forbs changed little. Annual forbs were measured for the first time. The Desirable Components Index (DCI) score was poor due to the overall lack of browse species, moderate annual grass cover, and lack of perennial forb cover.

winter range condition (DCI) - poor (15) Low potential scale
browse - stable (0) grass - up (+2) forb - stable (0)

2002 TREND ASSESSMENT

The browse trend is slightly down. Shadscale density declined 19%. The recruitment of young increased to 30% of the population and decadence increased to 44%. The number of dead plants sampled increased to 1,060 plants/acre (2,618 plants/ha). Plants classified as having poor vigor increased to 35% of the population, and browse use remained mostly light. Nevada ephedra density doubled. The recruitment of young increased to 25% of the population, and decadence increased to 13%. Plants classified with poor vigor increased from 0% of the population to 75%,and browse use increased to mostly moderate. The grass trend is slightly down. Perennial grasses decreased 23% in the sum of nested frequency. Cheatgrass nested frequency also decreased significantly, though not as greatly as that of perennial grasses. The forb trend is stable. No perennial forbs were sampled in 2002. However, storksbill nested frequency significantly increased. The DCI rating was very poor due to low browse cover, low perennial grass and forb cover, and moderate annual grass.

winter range condition (DCI) - very poor (7) Low potential scale
browse - slightly down (-1) grass - slightly down (-1) forb - stable (0)

2007 TREND ASSESSMENT

The browse trend is down. The shadscale density decreased 30%. The recruitment of young decreased to 0% of the population, and decadence decreased to 38%. Plants with poor vigor increased to 48% of the population, and use remained mostly light. The density of Nevada ephedra did not change. The recruitment of young

increased to 31% of the population, and decadence increased to 19%. Plants classified as having poor vigor declined to 50%, and browse use decreased to mostly light. The density of winterfat increased from 40 plants/acre (99 plants/ha) to 260 plants/acre (644 plants/ha). The grass trend is slightly up. The nested frequency of perennial grasses increased 25%, with significant increases in the nested frequencies of Sandberg bluegrass and bottlebrush squirreltail. However, cheatgrass nested frequency also increased significantly. The forb trend is stable. The perennial forb component consisted of two longleaf phlox (*Phlox lonifolia*) plants. Storksbill nested frequency increased significantly, and cover increased from 2% to 5%. The DCI score remained very poor.

winter range condition (DCI) - very poor (6) Low potential scale
browse - down (-2) grass - slightly up (+1) forb - stable (0)

HERBACEOUS TRENDS --
Management unit 19A, Study no: 7

Type	Species	Nested Frequency				Average Cover %		
		'89	'97	'02	'07	'97	'02	'07
G	Bromus tectorum (a)	-	$_{b}$351	$_{a}$304	$_{b}$342	6.15	2.00	8.62
G	Hilaria jamesii	$_{a}$59	$_{b}$119	$_{ab}$78	$_{ab}$84	4.03	.97	1.47
G	Oryzopsis hymenoides	$_{b}$63	$_{ab}$47	$_{a}$27	$_{a}$25	1.81	.60	.39
G	Poa secunda	-	$_{a}$5	$_{a}$6	$_{b}$24	.06	.04	.23
G	Sitanion hystrix	$_{ab}$15	$_{ab}$17	$_{a}$2	$_{b}$28	.34	.03	1.06
G	Sporobolus cryptandrus	-	$_{a}$3	$_{b}$24	$_{b}$37	.06	.20	.66
G	Stipa comata	$_{a}$8	$_{b}$52	$_{b}$50	$_{ab}$36	1.50	1.16	.92
Total for Annual Grasses		0	351	304	342	6.15	2.00	8.62
Total for Perennial Grasses		145	243	187	234	7.82	3.01	4.75
Total for Grasses		145	594	491	576	13.98	5.01	13.37
F	Alyssum alyssoides (a)	-	$_{a}$11	$_{a}$5	$_{b}$69	.02	.01	.33
F	Astragalus sp.	$_{a}$3	$_{a}$1	-	-	.03	-	-
F	Erodium cicutarium (a)	-	$_{a}$83	$_{b}$239	$_{c}$296	1.17	1.92	4.83
F	Erigeron sp.	-	7	-	-	.03	-	-
F	Gilia sp. (a)	-	-	-	3	-	-	.00
F	Halogeton glomeratus (a)	$_{a}$13	$_{a}$3	-	$_{a}$1	.00	-	.03
F	Lappula occidentalis (a)	-	-	-	6	-	-	.01
F	Phlox longifolia	-	-	-	2	-	-	.00
F	Sphaeralcea grossulariifolia	$_{a}$9	$_{a}$2	-	-	.03	-	-
F	Unknown forb-perennial	2	-	-	-	-	-	-
Total for Annual Forbs		13	97	244	375	1.20	1.93	5.21
Total for Perennial Forbs		14	10	0	2	0.09	0	0.00
Total for Forbs		27	107	244	377	1.29	1.93	5.22

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

BROWSE TRENDS --
Management unit 19A, Study no: 7

Type	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	Atriplex confertifolia	42	33	26	2.31	.72	.52
B	Ceratoides lanata	3	2	4	-	-	.15
B	Chrysothamnus viscidiflorus stenophyllus	5	4	6	.53	.30	.33
B	Echinocereus sp.	0	9	8	-	.01	.04
B	Ephedra nevadensis	6	10	10	.78	1.25	1.86
B	Gutierrezia sarothrae	87	72	81	4.98	2.21	3.49
B	Kochia americana	0	5	1	.03	.03	-
B	Opuntia sp.	18	24	23	1.03	.82	.67
B	Tetradymia spinosa	5	5	6	1.34	.21	.42
Total for Browse		166	164	165	11.01	5.58	7.49

CANOPY COVER, LINE INTERCEPT --
Management unit 19A, Study no: 7

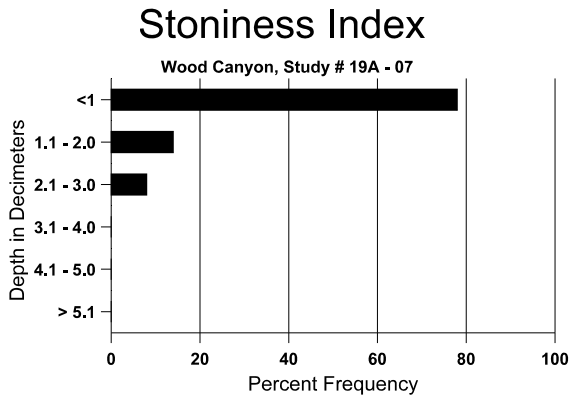
Species	Percent Cover	
	'02	'07
Atriplex confertifolia	.81	.68
Ceratoides lanata	-	.01
Chrysothamnus viscidiflorus stenophyllus	.16	.30
Ephedra nevadensis	1.75	1.29
Gutierrezia sarothrae	2.29	4.15
Kochia americana	.43	-
Opuntia sp.	.80	.31
Tetradymia spinosa	-	1.14

BASIC COVER --
Management unit 19A, Study no: 7

Cover Type	Average Cover %			
	'89	'97	'02	'07
Vegetation	7.25	29.85	13.73	27.17
Rock	23.25	29.92	34.00	31.52
Pavement	38.75	23.06	27.17	23.67
Litter	23.50	21.44	18.53	23.85
Cryptogams	0	.31	.44	.01
Bare Ground	7.25	6.78	13.98	3.96

SOIL ANALYSIS DATA --
Herd Unit 19A, Study no: 7, Wood Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	Loam			%0M	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
10.4	71.0 (11.3)	7.4	50.0	31.4	18.6	1.5	9.2	233.6	.8



PELLET GROUP DATA --
Management unit 19A, Study no: 7

Type	Quadrat Frequency			Days use per acre (ha)	
	'97	'02	'07	'02	'07
Rabbit	4	4	8	-	-
Horse	-	1	1	-	1 (1)
Elk	2	-	-	1 (2)	3 (8)
Deer	9	10	-	10 (25)	2 (5)
Cattle	-	-	1	8 (20)	6 (14)
Antelope	-	-	6	4 (10)	11 (28)

BROWSE CHARACTERISTICS --
Management unit 19A, Study no: 7

		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)
Artemisia nova												
89	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	-	0	13/20
02	**0**	-	-	-	-	60	0	0	-	-	0	8/17
07	**0**	-	-	-	-	180	0	0	-	-	0	11/27

		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)
Atriplex confertifolia												
89	**1133**	-	-	933	200	-	0	0	18	-	0	10/17
97	**1400**	20	140	940	320	500	14	7	23	17	20	10/23
02	**1140**	-	340	300	500	1060	4	4	44	33	35	6/15
07	**800**	-	-	500	300	220	3	0	38	28	48	7/19
Ceratoides lanata												
89	**99**	-	-	66	33	-	0	0	33	-	0	11/15
97	**60**	-	-	60	-	-	33	0	0	-	0	9/10
02	**40**	-	-	20	20	-	0	100	50	50	50	5/10
07	**260**	-	-	260	-	-	0	8	0	-	0	6/10
Chrysothamnus viscidiflorus stenophyllus												
89	**100**	-	-	100	-	-	0	0	0	-	0	8/10
97	**100**	-	-	80	20	-	0	0	20	20	20	48/16
02	**80**	-	-	40	40	40	0	25	50	25	25	7/17
07	**120**	-	-	100	20	-	17	0	17	-	17	8/17
Echinocereus sp.												
89	**66**	-	66	-	-	-	0	0	-	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
02	**200**	-	40	160	-	-	0	0	-	-	0	3/6
07	**160**	20	20	140	-	20	0	0	-	-	0	3/6
Ephedra nevadensis												
89	**332**	-	133	133	66	-	0	0	20	-	0	11/21
97	**160**	-	-	160	-	-	13	0	0	-	0	17/35
02	**320**	-	80	200	40	-	56	6	13	13	75	18/46
07	**320**	-	100	160	60	-	13	19	19	-	50	18/48
Gutierrezia sarothrae												
89	**4533**	-	800	2700	1033	-	0	0	23	2	12	7/6
97	**5200**	60	360	4160	680	860	0	0	13	10	11	8/12
02	**3320**	-	140	2240	940	900	0	.60	28	14	33	5/9
07	**4040**	-	120	3360	560	80	.49	0	14	5	5	8/14
Kochia americana												
89	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
02	**240**	-	140	100	-	-	0	8	-	-	0	5/8
07	**40**	-	-	40	-	-	100	0	-	-	0	9/15

		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)
Opuntia sp.												
89	**599**	-	333	233	33	-	0	0	6	6	6	5/12
97	**460**	-	40	400	20	-	0	0	4	4	4	10/17
02	**500**	-	80	340	80	40	0	0	16	8	20	4/13
07	**520**	-	-	440	80	80	4	0	15	8	12	5/15
Tetradymia glabrata												
89	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	-	0	10/23
02	**0**	-	-	-	-	-	0	0	-	-	0	-/-
07	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Tetradymia spinosa												
89	**66**	-	-	-	66	-	0	0	100	-	0	-/-
97	**100**	-	-	60	40	-	20	0	40	20	20	16/29
02	**100**	-	-	-	100	20	0	0	100	60	100	18/32
07	**120**	-	-	-	120	20	0	0	100	100	100	17/47
Yucca sp.												
89	**33**	-	-	33	-	-	0	0	-	-	0	18/37
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
02	**0**	-	-	-	-	-	0	0	-	-	0	-/-
07	**0**	-	-	-	-	-	0	0	-	-	0	21/23