Trend Study 25C-26-08

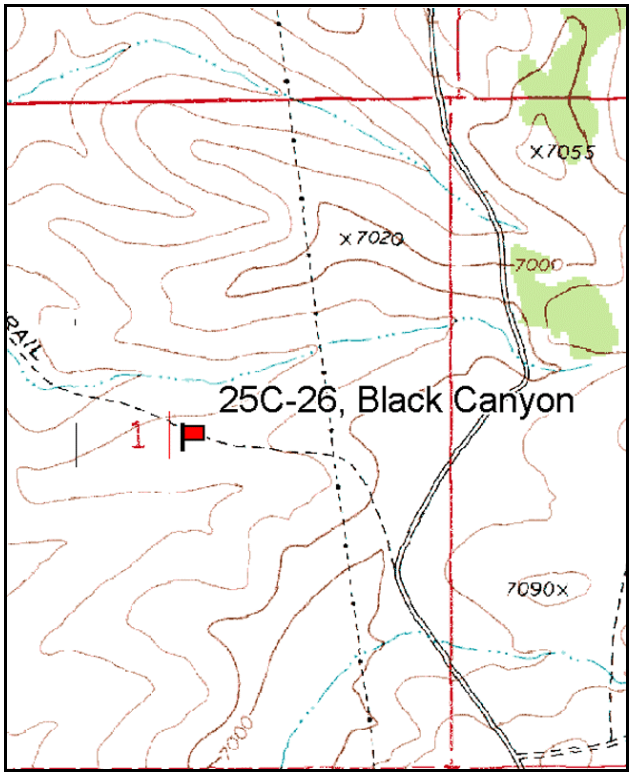
Study site name: Black Canyon . Vegetation type: Big-Black Sagebrush .

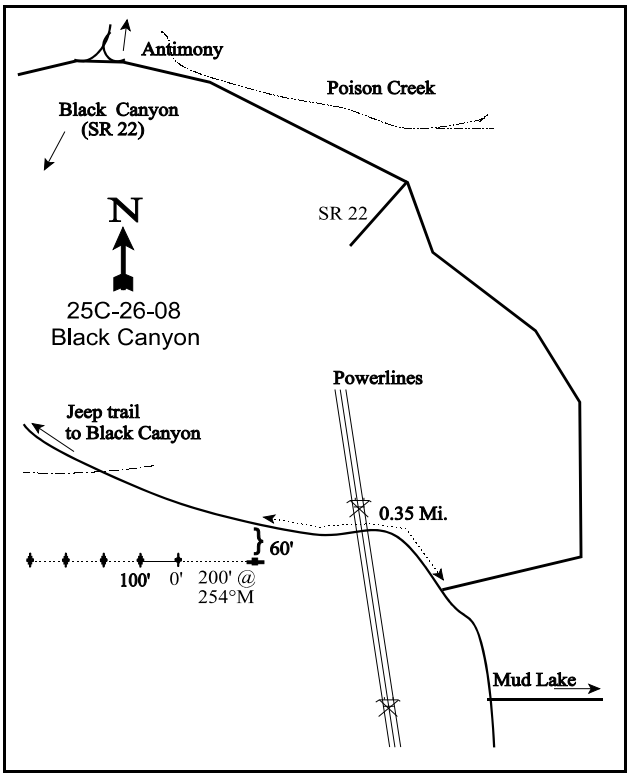
Compass bearing: frequency baseline 254 degrees magnetic.

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

LOCATION DESCRIPTION

From Antimony, travel south on SR 22 to the turnoff to the Mud Lake road. Turn east, go along Poison Creek for 1.2 miles to a fork, stay right. Continue southeast for 2.2 miles to another major fork. At this point there is a faint jeep trail heading back to the north. Follow this jeep trail 0.35 miles, under the powerlines and up on the ridge to a green fence post (witness post) about 20 yards off the south side (left) of the road. The transect starts 200 feet west of the witness post. It is marked by $1^{1/2}$ foot tall fenceposts.





Map Name: Antimony

Diagrammatic Sketch

Township 32S , Range 2W , Section 1

GPS: NAD 83, UTM 12S 416110 E, 4211914 N

DISCUSSION

Black Canyon - Trend Study No. 25C-26

Study Information

This study samples a critical deer winter range south of Antimony [elevation: 6,950 feet (2,118 m), slope: 2%-5%, aspect: southeast at top of ridge, northwest at end of transect]. Antelope also use the area during the fall and spring. Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) was the dominant shrub when the study was initiated, but identification has become complicated because of hybridization with black sagebrush (*Artemisia nova*). These hybrid plants now dominate most of this low, rolling bench. The country is marked with short, dry washes which drain west into Black Canyon of the East Fork of the Sevier River. Deer use was estimated to be moderate in 1998 (37 ddu/acre:91 ddu/ha), and antelope use was estimated to be lightly moderate (19 adu/acre:47 adu/ha). Deer and antelope use were estimated together in 2003 due to difficulty separating pellet groups, and was considered to be light (15 ddu/acre:38 ddu:ha). Deer use was estimated to be lightly moderate in 2008 (20 ddu/acre:50 ddu/ha) with no antelope droppings encountered. Elk use was estimated to be light in 1998 (6 edu/acre:15 edu/ha), and no sign of elk encountered in 2003 and 2008. Cattle use was light in 1998, 2003, and 2008 (6 cdu/acre:15 cdu/ha, 4 cdu/acre:10 cdu/ha, and 2 cdu/acre:4 cdu/ha, respectively). The area is within an allotment which receives spring use by cattle from May 15 to June 15.

Soil

The soil is rocky, hard-packed and moderately deep with an estimated effective rooting depth of almost 14 inches. Texture is a sandy clay loam which is neutral in reaction (pH 7.1). Phosphorus is low at only 3.5 ppm (Tiedemann and Lopez 2004). A hard pan appears to be present starting around 14 inches in depth. Relative combined vegetation and litter cover was 49% in 1998, 47% in 2003, and 54% in 2008. Relative combined rock and pavement cover was 40% in 1998, 37% in 2003, and 42% in 2008. Relative bare ground cover was 11% in 1998, 15% in 2003, and 5% in 2008. The erosion condition class was considered to be stable in 2003 and slight in 2008.

Browse

Except for the rocky slopes covered with pinyon pine (*Pinus edulis*) and juniper (*Juniperus osteosperma*), the dominant shrub for many miles is Wyoming big sagebrush. The plants are short in stature, and in some places are associated with black sagebrush. On the study site, there were only two plants identified as black sagebrush in 1991. Wyoming big sagebrush numbered 6,799 plants/acre in 1987 and 8,732 by 1991. During the 1998 and 2003 surveys, many of the sagebrush were classified as black sagebrush. It is apparent that these two species are hybridizing which makes identification difficult. Some plants had the color of Wyoming big sagebrush, but the growth form of black sagebrush and vice versa. Combined black/Wyoming big sagebrush density has remained relatively stable since 1987 estimates at around 7,000 plants/acre. Utilization was moderate to heavy in 1987 and 1991 but more light to moderate in 1998, 2003, and 2008. Vigor has been good on most plants during all readings but the number of plants displaying poor vigor was higher in 1991, 2003, and 2008. Decadence has also been low with the exception of 1991, 2003, and 2008 which had moderate decadence rates of 27%, 32%, and 31%, respectively. Young recruitment was excellent in 1987 and 1991, and good in 1998. No seedlings or young plants were sampled in 2003, but increased to 220 young sagebrush plants/acre in 2008.

Other common shrubs include two increasers, broom snakeweed (*Gutierrezia sarathae*) and narrowleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *stenophyllus*). During the 1987 reading, it appeared that the broom snakeweed population (11,999 plants/acre) would increase on the site. By 1991, the population had crashed from 11,999 plants/acre to only 2,266 plants/acre, an 81% decrease. This decline continued in 1998 to only 360 plants/acre before doubling to 760 plants/acre in 2003. The broom snakeweed density decreased slightly again to 580 plants/acre in 2008. Narrowleaf low rabbitbrush has a more stable population of 1,065 plants/acre in 1987, declining slightly to 980 in 1998, increasing to 1,160 plants/acre in 2003, and decreasing again to 820 plants/acre in 2008.

Herbaceous Understory
The herbaceous understory is poor and totally dominated by blue grama (*Bouteloua gracilis*) which provided nearly all of the herbaceous cover in both 1998, 2003, and 2008. Other grasses are rare. Only 5 forb species were sampled during the 1998 and 2003 readings, and only 3 species in the 2008 reading. These forbs combined to produce less than 1% cover in 1998 and less than 0.1% cover in 2003. The lack of herbaceous vegetation lowers the value of this area for deer during the spring period.

1991 TREND ASSESSMENT
The key browse species is Wyoming big sagebrush. It's population has grown by 22% to 8,732 plants/acre. The rate of decadency has risen to 26% which is not uncommon for a Wyoming sagebrush site, especially considering the past few years of below normal precipitation. The broom snakeweed population has experienced large reductions in density (11,999 down to 2,266 plants/acre) which again is not unusual during a long period of drought. Trend for browse is up. The herbaceous understory is mostly made up of one species, blue grama. By the inspection of the sum of nested frequencies for grasses and forbs, the trend for both is stable.

browse - up (+2) grass - stable (0) forb - stable (0)

1998 TREND ASSESSMENT
Trend for browse is stable. Density of black/Wyoming big sagebrush has declined, however this is almost all due to a decline in density of young plants which were extremely abundant in 1991. Currently, utilization is lighter, vigor improved and decadence is lower (26% to 11%). In addition, density of broom snakeweed has continued to decline to only 360 plants/acre. Trend for both the grasses and forbs is stable. Sum of nested frequency of grasses declined slightly, although the frequency of the dominant grass, blue grama, remained similar to 1991 estimates. Sum of nested frequency of perennial forbs increased slightly. Composition is still poor and perennial forbs are lacking.

winter range condition (DCI) - good (59) Low potential scale
browse - stable (0) grass - stable (0) forb - stable (0)

2003 TREND ASSESSMENT
Key browse consists of a mix of black sagebrush and Wyoming big sagebrush. Difficulty in distinguishing these hybridizing species requires combining sagebrush data to determine trends. Combined black/Wyoming big sagebrush density increased by about 1,000 plants/acre. On the down side, decadence increased from 11% to 32% and plants displaying poor vigor also increased. Use was lighter. No sagebrush seedlings were sampled in 2003 and young plants were rare. The number of mature sagebrush is basically unchanged and it appears that some of the decadent plants will be thinned. A return to normal precipitation patterns should bring about an improvement in young recruitment. Trend for browse is considered slightly down. The grass composition is poor and totally dominated by the low growing, warm season, blue grama. It provides 98% of the total grass cover and 97% of the total herbaceous cover. Two other native perennial species, bottlebrush squirreltail (*Sitanion hystrix*) and needle-and-thread (*Stipa comata*), occur rarely. Sum of nested frequency of perennial grasses declined slightly, but remained relatively stable. The trend for grasses is stable. Forbs are lacking with only 5 species sampled in 2003. All of these 5 species occurred in only 1 quadrat. Sum of nested frequency of perennial forbs declined sharply. Trend for forbs is down and forbs are nearly nonexistent on the site.

winter range condition (DCI) - good (52) Low potential scale
browse - down slightly (-1) grass - stable (0) forb - down (-2)

2008 TREND ASSESSMENT
Trend for browse is stable. The key browse species consist of a mixture of Wyoming big sagebrush and black sagebrush. Due to identification problems from hybridization of these two species, data was combined to analyze trends. Combined black/Wyoming big sagebrush density remained stable. Plants displaying poor

vigor and decadence are similar to the 2003 reading. Recruitment improved slightly with 3% of the sagebrush population comprised of young plants. The density of the increaser shrubs, broom snakeweed and narrowleaf low rabbitbrush, decreased slightly. The trend for grasses is stable. There was a slight increase in the sum of nested frequency of perennial grasses, and production increased from 14% cover in 2003 to 18% in 2008. The frequency of bottlebrush squirreltail and needle-and-thread grass both increased as well as their production, however, they are still rare. Trend for forbs is stable. The sum of nested frequency of perennial forbs increased slightly, but there were only 3 forb species encountered on the site.

winter range condition (DCI) - good (59) Low potential scale
browse - stable (0) grass - stable (0) forb - stable (0)

HERBACEOUS TRENDS --
Management unit 25C, Study no: 26

Type	Species	Nested Frequency					Average Cover %		
		'87	'91	'98	'03	'08	'98	'03	'08
G	Aristida purpurea	$_{b}$8	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
G	Bouteloua gracilis	$_{b}$261	$_{ab}$251	$_{ab}$245	$_{a}$239	$_{a}$240	12.51	13.68	17.22
G	Sitanion hystrix	1	1	11	4	8	.06	.06	.16
G	Sporobolus cryptandrus	$_{a}$2	$_{b}$17	$_{a}$3	$_{a}$-	$_{a}$1	.03	-	.03
G	Stipa comata	11	12	8	14	27	.04	.28	.76
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		283	281	267	257	276	12.65	14.03	18.19
Total for Grasses		283	281	267	257	276	12.65	14.03	18.19
F	Astragalus sp.	$_{ab}$15	$_{b}$32	$_{b}$26	$_{a}$-	$_{a}$1	.48	-	.03
F	Chenopodium sp. (a)	-	$_{b}$43	$_{a}$4	$_{a}$4	$_{a}$-	.01	.00	-
F	Descurainia pinnata (a)	-	-	-	3	-	-	.00	-
F	Draba sp. (a)	-	-	1	-	-	.00	-	-
F	Erigeron pumilus	$_{ab}$7	$_{a}$-	$_{b}$20	$_{a}$-	$_{a}$1	.15	-	.00
F	Lesquerella sp.	-	-	-	2	-	-	.00	-
F	Machaeranthera canescens	1	-	-	1	-	-	.00	-
F	Phlox longifolia	5	1	5	1	4	.01	.00	.01
F	Sphaeralcea coccinea	9	6	-	-	-	-	-	-
F	Unknown forb-perennial	$_{b}$15	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
Total for Annual Forbs		0	43	5	7	0	0.01	0.00	0
Total for Perennial Forbs		52	39	51	4	6	0.64	0.01	0.04
Total for Forbs		52	82	56	11	6	0.66	0.02	0.04

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

BROWSE TRENDS --
Management unit 25C, Study no: 26

Type	Species	Strip Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
B	Artemisia nova	56	81	90	6.09	10.05	16.56
B	Artemisia tridentata wyomingensis	73	38	7	5.59	5.55	.68
B	Chrysothamnus viscidiflorus stenophyllus	12	23	18	.14	.90	.69
B	Ephedra nevadensis	1	1	1	.03	.03	.03
B	Gutierrezia sarothrae	13	24	18	.17	.41	.20
B	Opuntia sp.	3	4	4	.03	.03	.18
B	Pediocactus simpsonii	0	0	1	.00	-	.00
Total for Browse		158	171	139	12.06	16.97	18.36

CANOPY COVER, LINE INTERCEPT --
Management unit 25C, Study no: 26

Species	Percent Cover	
	'03	'08
Artemisia nova	7.09	22.39
Artemisia tridentata wyomingensis	7.71	.86
Chrysothamnus viscidiflorus stenophyllus	.88	1.06
Gutierrezia sarothrae	.33	.20
Opuntia sp.	-	.03

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 25C, Study no: 26

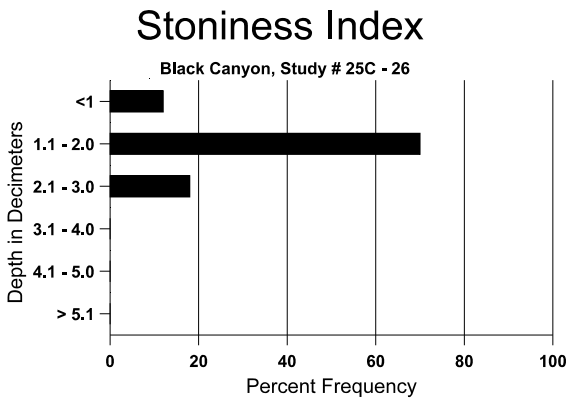
Species	Average leader growth (in)	
	'03	'08
Artemisia nova	0.8	.03
Artemisia tridentata wyomingensis	1.1	-

BASIC COVER --
Management unit 25C, Study no: 26

Cover Type	Average Cover %				
	'87	'91	'98	'03	'08
Vegetation	12.00	14.50	28.67	30.86	39.18
Rock	7.00	7.50	7.03	7.77	9.67
Pavement	34.00	43.75	34.29	32.42	36.64
Litter	36.25	24.50	21.10	21.11	21.23
Cryptogams	0	0	.59	.46	.13
Bare Ground	10.75	9.75	11.03	16.04	5.08

SOIL ANALYSIS DATA --
Management unit 25C, Study no: 26, Study Name: Black Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
			%sand	%silt	%clay				
13.6	60.0 (9.5)	7.1	62.0	19.4	26.6	1.8	3.5	134.4	0.4



PELLET GROUP DATA --
Management unit 25C, Study no: 26

Type	Quadrat Frequency		
	'98	'03	'08
Rabbit	13	2	42
Elk	2	-	-
Deer/antelope	21	7	12
Cattle	1	-	1

Days use per acre (ha)		
'98	'03	'08
-	-	-
6 (15)	-	-
37 (91)	15 (38)	20 (50)
6 (15)	4 (9)	2 (4)

BROWSE CHARACTERISTICS --
Management unit 25C, Study no: 26

		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												
87	**0**	-	-	-	-	-	0	0	0	-	0	-/-
91	**133**	-	-	-	133	-	100	0	100	15	50	-/-
98	**2800**	140	240	2160	400	620	14	.71	14	7	7	10/21
03	**6060**	-	20	4280	1760	880	8	.33	29	14	14	7/15
08	**6920**	20	200	4520	2200	1300	20	0	32	19	25	9/22
Artemisia tridentata wyomingensis												
87	**6798**	533	4399	2066	333	-	53	29	5	-	0	11/18
91	**8731**	133	4799	1666	2266	-	83	11	26	5	17	7/17
98	**3720**	180	520	2900	300	460	32	4	8	5	5	11/22
03	**1520**	-	-	820	700	140	21	0	46	20	20	16/33
08	**220**	-	20	160	40	40	0	0	18	-	0	18/40
Chrysothamnus viscidiflorus stenophyllus												
87	**1065**	66	666	333	66	-	13	0	6	-	0	10/13
91	**1598**	-	199	933	466	-	50	0	29	6	21	5/6
98	**980**	120	200	540	240	60	0	0	24	12	12	8/15
03	**1160**	-	-	860	300	120	0	0	26	5	5	7/12
08	**820**	20	40	480	300	20	5	0	37	10	27	7/12
Ephedra nevadensis												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**20**	-	20	-	-	-	0	0	-	-	0	12/14
03	**20**	-	-	20	-	-	0	0	-	-	0	15/10
08	**20**	-	20	-	-	-	0	0	-	-	0	15/12
Gutierrezia sarothrae												
87	**11999**	799	3333	8133	533	-	0	0	4	-	1	7/6
91	**2265**	66	333	1733	199	-	9	0	9	2	6	6/6
98	**360**	200	140	200	20	-	0	0	6	-	0	8/10
03	**760**	-	-	720	40	40	0	0	5	-	0	7/8
08	**580**	60	140	360	80	140	0	0	14	7	10	7/9

		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.												
87	**66**	-	-	66	-	-	0	0	-	-	0	3/4
91	**66**	-	66	-	-	-	0	0	-	-	0	-/-
98	**60**	-	20	40	-	-	0	0	-	-	0	4/12
03	**80**	-	-	80	-	-	0	0	-	-	0	5/14
08	**100**	-	-	100	-	-	0	0	-	-	0	5/13
Pediocactus simpsonii												
87	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	-	0	-/-
08	**20**	-	-	20	-	-	0	0	-	-	0	1/3