

Trend Study 10-12-05

Study site name: Wolf Den.

Vegetation type: Wyoming Big Sagebrush.

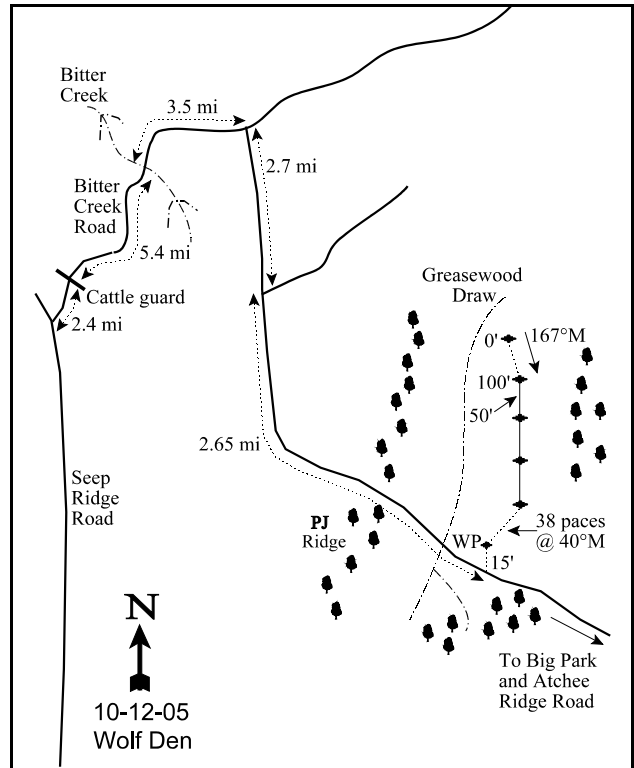
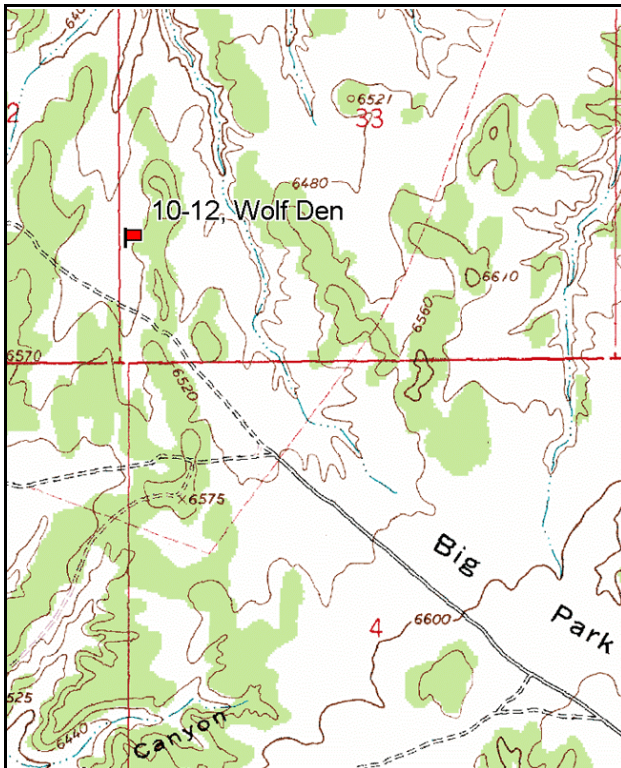
Compass bearing: frequency baseline 167 degrees magnetic.

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

LOCATION DESCRIPTION

From the Seep Ridge Road, about 10 miles north of Pine Spring, turn onto the Bitter Creek Road near McCoy Reservoir. Drive easterly on this road for 2.4 miles to a cattle guard. Continue 5.4 miles to a corral in the bottom of Bitter Creek. Drive up out of the Bitter Creek canyon 3.5 miles. Where the road tops out, turn right off the main road. Go 2.7 miles to a minor fork. Continue straight on the main road for 2.65 miles to the east edge of a sagebrush/greasewood draw. There is a witness post 15 feet off the north side of the road. From the witness post walk 38 paces bearing 40° to the 400 ft. baseline stake. The 0-foot baseline stake, tagged #9098, is 400 feet north.

Alternate route: From the intersection of Atchee Ridge Road and Big Park Road travel north toward Big Park 3.45 miles to a fork. Stay left and continue 0.15 to another fork. Go straight to Big Park for 5.7 miles to a cattle guard and a fork. Proceed right for 0.4 miles to the witness post.



Map Name: Burnt Timber Canyon.

Diagrammatic Sketch

Township 12S, Range 24E, Section 33

GPS: NAD 27, UTM 12S 4398777 N, 650483 E

## DISCUSSION

### Wolf Den - Trend Study No. 10-12

The Wolf Den trend study is located in a very dense stand of Wyoming big sagebrush along a wide swale between low ridges of pinyon and juniper. The study site slopes gently to the northwest at an elevation of 6,500 feet. This area, near Big Park, is considered critical deer winter range, and also has some light use by elk. Pellet group estimates have been very high on this study site. Pellet group transect data in 2000 indicated heavy use by deer with an estimated 116 deer days use/acre (287 ddu/ha) and light use by elk, estimated at 3 elk days use/acre (7 edu/ha). No cattle pats were sampled in 2000, although cows were in the general area surrounding the Wolf Den transect when the site was read in June 2000. This area is used by cattle on a rotational deferment system anytime from November through April, depending on amounts of snow and other management considerations. Pellet group data in 2005 estimated 261 deer days use/acre (645 ddu/ha).

The dense sagebrush provides excellent cover, but the understory is very limited (less than 5% of total vegetation cover) and the low amounts of litter are easily displaced. Cryptogamic crusts exist almost entirely underneath the sagebrush crowns. The soil is relatively deep with an estimated effective rooting depth of over 26 inches. A stoniness index determined from penetrometer readings illustrates the deepness of the soil with nearly all measurements being over 20 inches in depth. Very little rock was sampled in the profile and the index at this site is more a measure of a restrictive layers of soil than actual rockiness. The soil is a loam that is low in phosphorus at 3.5 ppm (Tiedemann and Lopez 2004). The soil reaction is moderately alkaline (pH of 8). An erosion condition class assessment rated erosion as slight in 2005.

This study is located on a site dominated by Wyoming big sagebrush. Shadscale is found on the upper, more shallow portions of the swale, while greasewood grows along the lower reaches of the depression. The sagebrush on the site is so dense that it is difficult to walk through it. Sagebrush cover was 32% in both 1995 and 2000. It was estimated at 27% in 2005 using quadrats and 33% using the line intercept method. On average sagebrush has made up three quarters of the total vegetation cover. Shrub density estimates for 1988 indicated a population of 18,133 plants/acre. Density of sagebrush was estimated at 7,580 plants/acre in 1995, 7,260 plants/acre in 2000, and 7,740 plants/acre in 2005. The difference in population estimates is primarily the result of the increased sample size and better sampling distribution used after mid-1992. These modifications enlarge the sampling area and give much better estimates for shrubs with discontinuous and/or clumped distributions. This old sagebrush stand contained 78% mature and 19% decadent individuals in 1995. Decadence increased in 2000 to 42% and to 45% in 2005. Thirteen percent of the population was classified as dying in 2000 and 9% in 2005. Recruitment from the young age class has been low, but seedlings were very abundant in 2005. Use has been moderate to heavy from 1995 to 2005. This population has remained stable for a number of years, but shows no sign of decline. This condition of high decadence is probably due to intraspecific competition combined with drought and use by wintering deer.

Greasewood density was 800 plants/acre in 2000 and increased to 940 plants/acre in 2005. Greasewood has averaged 2-5% cover, which is about 12% of the total vegetation cover at the site. Decadence increased from 11% in 1995, to 30% in 2000, and to 34% in 2005. High to moderate use was noted in 2005.

The high sagebrush density and cover severely limits understory plants. Only four or five species of perennial grass were sampled in any year. Total grass cover was less than one half of one percent in 1995 and 2005. In 2000 it was just over 2% in 2000. Grasses and forbs combined, including annuals, have only accounted for about 5% of the total vegetation cover in any sampling year. Perennial forbs are nearly non-existent with only one perennial forb sampled in 1988, 1995, and 2005. No perennial forbs were sampled in 2000, and only one annual was encountered. Without some type of sagebrush thinning treatment, the herbaceous understory will continue to be extremely poor.

## 1988 APPARENT TREND ASSESSMENT

Under the shrubs, there is an almost complete cover of pavement-sized fragments, estimated at 32% of the ground cover. Litter cover from the shrubs is almost 50% and basal vegetation cover is low at 6%. The amount of bare soil exposed is also low at 7%, due to very high amounts of pavement. The sagebrush population appears stable with enough young and seedlings to replace dying individuals. The herbaceous understory is in extremely poor condition due to the dominance of sagebrush.

## 1995 TREND ASSESSMENT

The soil is adequately covered by sagebrush cover to protect it from high intensity summer storm impacts, but there is little protection of the soil from erosion caused from the associated runoff. However, due to the gentle slope, erosion does not appear to be a major problem. Trend is considered stable, yet in poor condition. Browse trend is stable and fairly stagnant. There is a change in the proportion of individuals in the younger age classes which have declined, yet there are not an inordinately large number of dead plants in the population. Utilization is heavier with 20% of the sagebrush displaying heavy use. Percent decadence has declined and vigor is good on all but 3% of the population. There may be some fluctuations in population density in the future associated with prolonged drought, but the sagebrush will continue to dominate this site without some sort of mechanical or chemical manipulation. The herbaceous understory is severely suppressed and nearly non-existent at this time. This will remain the case until the sagebrush canopy is reduced. Trend for the herbaceous understory is stable, but in very poor condition. The Desirable Components Index (see methods) rated this site as fair. The browse cover is excellent, but the herbaceous understory is very poor.

### TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

winter range condition (DC Index) - fair (42) Lower potential scale

## 2000 TREND ASSESSMENT

Trend for soil is slightly down and is in poor condition with very little herbaceous cover and an increase in bare ground. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) decreased from 1:4.1 in 1995 to 1:2.9 in 2000. Trend for browse is stable. The Wyoming big sagebrush population increased in decadence from 19% to 42%, but due to the abundance of sagebrush at the site, this increase is not detrimental. It appears that the sagebrush population may enter a self-thinning period with the extended drought and high intraspecific competition for resources. Trend for the herbaceous understory is slightly up due to increases in mutton bluegrass and bottlebrush squirreltail. However, the understory is severely depleted due to high sagebrush density and cover. The Desirable Components Index (see methods) rated this site as fair. The decadence of sagebrush increased, lowering the DCI score.

### TREND ASSESSMENT

soil - slightly down (-1)

browse - stable (0)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - fair (40) Lower potential scale

## 2005 TREND ASSESSMENT

The soil trend is stable. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) has slightly improved from 1:2.9 to 1:3.4. The amount of bare ground (on a relative scale)

remained stable at 14%. Erosion is slight. The browse trend is stable. This mature sagebrush stand has remained in a decadent state throughout the drought. There has been very little change in age structure and density. The herbaceous understory is slightly down and is similar to conditions in 1995. Perennial grasses are sparse and perennial forbs are nearly non-existent. The DCI score continued to be fair, but decreased due to increased decadence, decrease in number of young, and a decrease in the herbaceous understory.

**TREND ASSESSMENT**

soil - stable (0)

browse - stable (0)

herbaceous understory -slightly down (-1)

winter range condition (DC Index) - fair (33) Lower potential scale

**HERBACEOUS TRENDS --**

Management unit 10 , Study no: 12

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	c <sub>59</sub>	b <sub>35</sub>	a <sub>1</sub>	a <sub>-</sub>	.22	.00	-
G	Agropyron spicatum	a <sub>-</sub>	a <sub>-</sub>	a <sub>-</sub>	b <sub>26</sub>	-	-	.08
G	Bromus tectorum (a)	-	3	-	-	.01	-	-
G	Oryzopsis hymenoides	3	2	5	6	.03	.06	.02
G	Poa fendleriana	a <sub>1</sub>	a <sub>3</sub>	b <sub>51</sub>	a <sub>4</sub>	.00	.66	.01
G	Sitanion hystrix	a <sub>24</sub>	ab <sub>52</sub>	b <sub>76</sub>	a <sub>30</sub>	.18	1.35	.08
Total for Annual Grasses		0	3	0	0	0.00	0	0
Total for Perennial Grasses		87	92	133	66	0.43	2.08	0.19
Total for Grasses		87	95	133	66	0.44	2.08	0.19
F	Chenopodium fremontii (a)	-	a <sub>-</sub>	a <sub>-</sub>	b <sub>20</sub>	-	-	.36
F	Chenopodium leptophyllum(a)	-	b <sub>84</sub>	a <sub>-</sub>	b <sub>76</sub>	.34	-	.22
F	Cryptantha sp.	1	2	-	-	.00	-	-
F	Descurainia pinnata (a)	-	c <sub>148</sub>	a <sub>3</sub>	b <sub>56</sub>	1.46	.00	.77
F	Lappula occidentalis (a)	-	ab <sub>11</sub>	a <sub>-</sub>	b <sub>14</sub>	.07	-	.06
F	Schoenrambe linifolia	a <sub>-</sub>	a <sub>-</sub>	a <sub>-</sub>	b <sub>8</sub>	-	-	.06
F	Unknown forb-annual (a)	-	4	-	-	.01	-	-
Total for Annual Forbs		0	247	3	166	1.88	0.00	1.42
Total for Perennial Forbs		1	2	0	8	0.00	0	0.06
Total for Forbs		1	249	3	174	1.89	0.00	1.49

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

BROWSE TRENDS --

Management unit 10 , Study no: 12

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia frigida	36	46	33	1.85	3.03	.22
B	Artemisia tridentata wyomingensis	97	98	97	32.26	32.55	26.90
B	Atriplex canescens	1	0	2	-	-	-
B	Atriplex confertifolia	16	18	8	1.69	.97	.03
B	Gutierrezia sarothrae	2	14	3	.01	.07	-
B	Juniperus osteosperma	0	7	8	.15	.18	.38
B	Opuntia sp.	4	3	1	-	.03	-
B	Pinus edulis	0	0	1	-	-	-
B	Sarcobatus vermiculatus	17	19	17	2.62	5.28	3.64
Total for Browse		173	205	170	38.59	42.13	31.18

CANOPY COVER, LINE INTERCEPT --

Management unit 10 , Study no: 12

Species	Percent Cover
	'05
Artemisia frigida	.11
Artemisia tridentata wyomingensis	32.84
Atriplex confertifolia	.03
Juniperus osteosperma	.75
Sarcobatus vermiculatus	3.43

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 10 , Study no: 12

Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	2.0

BASIC COVER --

Management unit 10 , Study no: 12

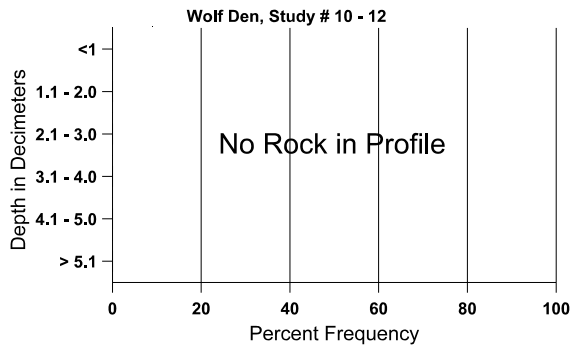
Cover Type	Average Cover %			
	'88	'95	'00	'05
Vegetation	5.75	43.86	41.80	31.92
Rock	.75	.74	.02	.02
Pavement	32.25	19.73	15.25	18.66
Litter	49.50	43.14	45.29	40.06
Cryptogams	5.00	6.84	9.23	9.01
Bare Ground	6.75	8.53	19.11	16.12

SOIL ANALYSIS DATA --

Herd Unit 10, Study # 12, Study Name: Wolf Den

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
26.1	56.0 (18.1)	8.0	46.0	33.4	20.6	1.8	3.5	115.2	0.6

### Stoniness Index



PELLET GROUP DATA --

Management unit 10 , Study no: 12

Type	Quadrat Frequency		
	'95	'00	'05
Rabbit	7	6	70
Elk	3	4	8
Deer	52	47	77

Days use per acre (ha)	
'00	'05
-	-
3 (9)	-
116 (287)	261 (645)

BROWSE CHARACTERISTICS --  
Management unit 10 , Study no: 12

		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>Artemisia frigida</i>												
88	<b>4532</b>	866	666	3733	133	-	4	10	3	-	0	7/5
95	<b>2040</b>	600	400	1640	-	-	0	0	0	-	0	11/11
00	<b>3700</b>	40	540	3160	-	-	1	0	0	-	0	5/9
05	<b>1300</b>	840	400	740	160	20	8	0	12	11	11	5/5
<i>Artemisia tridentata wyomingensis</i>												
88	<b>18133</b>	1066	1533	11800	4800	-	25	6	26	1	10	21/16
95	<b>7580</b>	240	240	5920	1420	1080	65	20	19	3	3	27/32
00	<b>7260</b>	60	420	3820	3020	1280	38	18	42	13	13	26/33
05	<b>7740</b>	1880	80	4160	3500	2340	54	22	45	9	9	29/34
<i>Atriplex canescens</i>												
88	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
95	<b>20</b>	-	-	-	20	-	100	0	100	-	0	43/22
00	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
05	<b>40</b>	-	-	-	40	-	50	0	100	50	50	-/-
<i>Atriplex confertifolia</i>												
88	<b>465</b>	-	133	266	66	-	0	0	14	-	0	22/18
95	<b>380</b>	160	40	280	60	-	0	0	16	-	0	20/23
00	<b>520</b>	-	100	320	100	20	12	8	19	15	15	19/26
05	<b>160</b>	20	20	60	80	-	25	38	50	50	50	26/20
<i>Gutierrezia sarothrae</i>												
88	<b>866</b>	133	266	600	-	-	0	0	-	-	0	7/6
95	<b>60</b>	180	-	60	-	-	0	0	-	-	0	12/8
00	<b>900</b>	-	180	720	-	-	0	0	-	-	0	5/6
05	<b>60</b>	140	20	40	-	20	0	33	-	-	0	3/2
<i>Juniperus osteosperma</i>												
88	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
95	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
00	<b>140</b>	20	60	80	-	20	0	0	0	-	0	-/-
05	<b>160</b>	-	80	-	80	-	13	0	50	25	50	-/-
<i>Opuntia sp.</i>												
88	<b>66</b>	-	66	-	-	-	0	0	-	-	0	-/-
95	<b>80</b>	-	-	80	-	-	0	0	-	-	0	3/4
00	<b>60</b>	-	-	60	-	-	0	0	-	-	0	5/9
05	<b>20</b>	-	-	20	-	-	0	0	-	-	0	2/4

		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)
<b>Pinus edulis</b>												
88	<b>0</b>	66	-	-	-	-	0	0	-	-	0	-/-
95	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
00	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
05	<b>20</b>	-	20	-	-	-	0	0	-	-	0	-/-
<b>Sarcobatus vermiculatus</b>												
88	<b>266</b>	-	-	266	-	-	0	0	0	-	0	33/26
95	<b>3860</b>	-	-	3440	420	-	0	0	11	-	0	37/50
00	<b>800</b>	-	60	500	240	60	15	10	30	13	13	40/54
05	<b>940</b>	20	20	600	320	20	72	28	34	9	9	35/49