

Trend Study 2-31-06

Study site name: South Crawford Mountains .

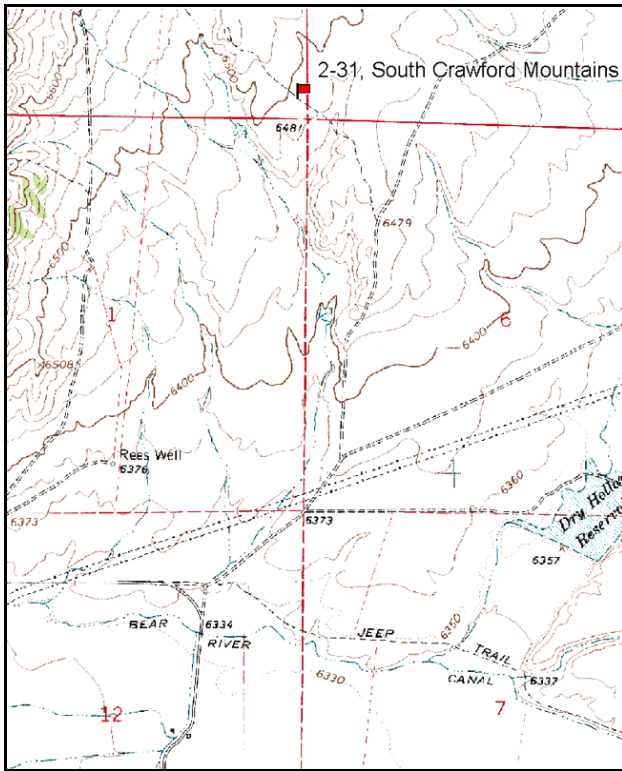
Vegetation type: Big Sagebrush .

Compass bearing: frequency baseline 165 degrees magnetic.

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

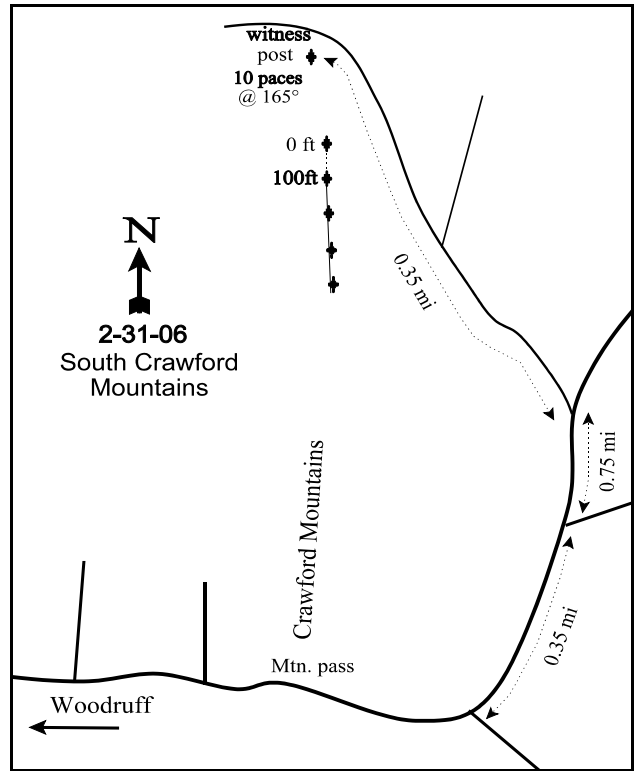
LOCATION DESCRIPTION

From the intersection of Wilson Lane and Little Crawford Road east of Woodruff proceed east 1.6 miles through the small pass to the east side of the mountains. Take the left fork and travel northeast for 0.35 miles. Turn left here and proceed northeast for 0.75 miles. At this point, turn left onto a lightly used jeep trail and travel northwest for an additional 0.35 miles to a witness post on the left hand side of the road. From the witness post walk 10 paces at 165 degrees magnetic to the 0-foot baseline stake of the baseline. The baseline is marked by browse tag #7940.



Map Name: Woodruff Narrows

Township 10N, Range 7E, Section 36



Diagrammatic Sketch

UTM NAD 27, UTM 12T 4600223 N, 492408 E

DISCUSSION

South Crawford Mountains - Trend Study No. 2-31

Study Information

This study is located on the southeastern foothills of the Crawford Mountains, just northeast of Woodruff on land administered by the BLM (elevation: 6,500 feet, slope: 3-5%, aspect: southeast). It samples a Wyoming big sagebrush type and is an important wintering area for deer and elk. It is also used intermittently year-round by pronghorn and sage grouse. Cattle graze the area in spring and summer, and were present during the 1996 reading. Quadrat frequency of deer pellet groups was moderately high at 31% in 1996. A pellet group transect read in 2001 estimated 23 deer/pronghorn, 1 elk, and 13 cow days use/acre (56 ddu/ha and 32 cdu/ha). Deer and pronghorn pellet groups were combined due to their similarity in appearance. Pellet group data from 2006 was estimated at 8 deer/pronghorn, 9 elk, and 10 cow days use/acre (20 ddu/ha, 22 edu/ha, and 25 cdu/ha). Three sage grouse pellet groups were also sampled in 2001 and 2006.

Soil

Soil is classified in the Woodpass series, a widely distributed series in this area. It is a deep, well-drained soil that forms in alluvial deposits derived from sandstone and limestone. Permeability is slow and available water capacity is high (Campbell and Lacey 1982; USDA-NRCS 2006). Soil texture is a sandy clay loam with a neutral pH (7.1) in the upper horizons. Effective rooting depth was estimated at just over 12 inches with a rocky calcium carbonate layer starting at about 12 inches. This layer appears to limit rooting depth at the end of the baseline where black sagebrush was encountered. Potassium is low at 51 ppm, which could be a limiting factor. Potassium values less than 60 ppm may limit plant development and growth (Tiedemann and Lopez 2004). Exposed bare ground cover is common, averaging 31% between in 1984 and 2006. Wind and water erosion are not severe due to the gentle terrain, but are apparent. The ratio of protective cover (vegetation, litter, and cryptograms) to bare ground remained fair at 2.9:1 in 2006. The erosion condition class was determined to be stable in 2001 with slight pedestalling of sagebrush, but was classified as slight in 2006 with signs of soil cracking from shrinking and swelling.

Browse

The dominant browse is a fairly dense stand of Wyoming big sagebrush that generally receives light to moderate use. Cover has averaged about 18% since 1996, while density has varied from 8,266 plants in 1984 to 6,260 plants/acre in 2006. Young recruitment has averaged 3-5% of the population since 1996 and seedlings were very abundant in 2006. Decadence was very high in 1990 with 72% of population displaying decadence, but since then has averaged about 24%. Annual leader growth was relatively poor in both 2001 and 2006, averaging 1.0 inch or less. Other shrubs of secondary importance that appear to have relatively stable populations include: black sagebrush, narrowleaf low rabbitbrush, slenderbush eriogonum, prickly phlox, pricklypear, and gray horsebrush,

Herbaceous Understory

Grasses and forbs are sparsely distributed and include a mix of species common in a Wyoming big sagebrush type. Four perennial grass species provide the bulk of the herbaceous forage, which is supplemented by low-growing, low-value forbs. Annual grasses and forbs are rare. Sandberg bluegrass is the most common perennial grass, which has averaged 5-6% cover since 1996. Although needle-and-thread increased significantly in 2006, it only averaged 3% cover. Forbs are fairly diverse for this type, yet only hoods phlox is abundant.

1990 TREND ASSESSMENT

Trend for key browse is slightly down. Wyoming big sagebrush density declined by 6% due to a decrease in young plants, but the combined density of mature and decadent plants actually increased by 11% since 1984. The large young population in 1984 appears to have contributed to the overall population. The percentage of decadent sagebrush increased from 21% in 1984 to 72% of the population with very few young plants

encountered. The sagebrush is moderately to heavily hedged and has poor vigor and low growth. Sagebrush canopy cover averages 16%. Trend for grasses is slightly down. Perennial grass sum of nested frequency decreased by 14% mainly due to a large decrease in bottlebrush squirreltail and bluebunch wheatgrass. Trend for forbs is down. Several perennial forbs nested frequency decreased significantly, these include: drummond rockcress, cryptantha, timber poison milkvetch, and a clover species.

browse - slightly down (-1) grasses - slightly down (-1) forbs - down (-2)

1996 TREND ASSESSMENT

Trend for Wyoming big sagebrush is stable. Total density declined 18% since 1990, but utilization is more moderate, vigor has improved, and decadence has declined from 72% to 30%. Some of the difference in density may be due to the larger sample used in 1996. Young plants are more abundant this year, although seedlings are limited. Trend for grasses is stable. There was very little change in perennial grasses. Trend for forbs is slightly down. Perennial forb sum of nested frequency continue to decline even though they are not very abundant. Hoods phlox, the most abundant forb, decreased significantly in nested frequency. The Desirable Components Index rated this study as good due to excellent browse cover, moderate decadence, and fair perennial grass cover.

winter range condition (DC Index) - good (57) Low Potential scale
browse - stable (0) grasses - stable (0) forbs - slightly down (-1)

2001 TREND ASSESSMENT

Trend for the key browse species, Wyoming big sagebrush, is up slightly. Density has increased by 13%, utilization is mostly light, average vigor has improved, and percent decadence has declined from 30% to 20%. No seedlings were sampled; however, young plants account for 3% of the population. Annual leader growth appears to be poor, averaging less than 1 inch. Narrowleaf low rabbitbrush appears to have a stable population of about 3,000 plants/acre. Trend for grasses is stable. Perennial grasses have not changed much since 1996 and still average 9% cover. Trend for forbs is stable. Perennial forbs remained similar to 1996 and are still not very abundant. The Desirable Components Index rated this study as good-excellent due to excellent browse cover, moderate decadence, and fair perennial grass cover.

winter range condition (DC Index) - good-excellent (67) Low Potential scale
browse - slightly up (+1) grasses - stable (0) forbs - stable (0)

2006 TREND ASSESSMENT

Trend for key browse, Wyoming big sagebrush, is down slightly. Density has decreased by 16%, from 7,420 plants/acre in 2001 to 6,260 in 2006. The percentage of plants classified as dying increased slightly to 15% and decadence continues to average about 20%. Trend for grasses is stable. Perennial grass sum of nested frequency has changed very little, although cover increased from 9% to 11%. Trend for forbs is slightly up. Perennial forb sum of nested frequency increased by 16% and cover increased from 4% in 2001 to 7% in 2006. The Desirable Components Index rated this study as excellent due to high browse cover, moderate decadence, and good perennial grass cover.

winter range condition (DC Index) - excellent (72) Low Potential scale
browse - slightly down (-1) grasses - stable (0) forbs - slightly up (+1)

HERBACEOUS TRENDS --
Management unit 02 , Study no: 31

T y p e	Species	Nested Frequency					Average Cover %		
		'84	'90	'96	'01	'06	'96	'01	'06
G	<i>Agropyron smithii</i>	a-	a-	a-	a ⁴	b ¹⁶	-	.06	.03
G	<i>Agropyron spicatum</i>	c ¹⁴⁰	a ⁵³	ab ⁸¹	b ⁹⁷	ab ⁷³	.84	1.12	1.32
G	<i>Bromus tectorum</i> (a)	-	-	1	-	1	.00	-	.00
G	<i>Carex</i> sp.	a-	a-	a-	b ¹²	c ³⁰	-	.07	.18
G	<i>Oryzopsis hymenoides</i>	b ⁶⁰	ab ⁴⁵	a ²¹	a ³⁰	a ³⁴	.21	.64	.68
G	<i>Poa fendleriana</i>	a-	a-	b ³⁰	a ²	a ³	.50	.00	.03
G	<i>Poa secunda</i>	a ²³¹	b ²⁷⁵	ab ²⁴⁶	b ²⁷²	a ²²⁶	5.18	6.03	6.13
G	<i>Sitanion hystrix</i>	c ¹⁰⁷	a ³	b ²⁹	ab ¹⁷	ab ¹⁰	.22	.13	.07
G	<i>Stipa comata</i>	a ¹⁶	c ⁹⁸	bc ⁷⁹	ab ⁵⁶	c ¹¹⁶	1.06	.64	2.90
Total for Annual Grasses		0	0	1	0	1	0.00	0	0.00
Total for Perennial Grasses		554	474	486	490	508	8.03	8.72	11.35
Total for Grasses		554	474	487	490	509	8.03	8.72	11.36
F	<i>Agoseris glauca</i>	1	-	-	-	-	-	-	-
F	<i>Alyssum alyssoides</i> (a)	-	-	a-	b ¹⁵	c ⁷⁴	-	.04	.16
F	<i>Antennaria rosea</i>	a-	b ¹²	ab ³	a-	c ²⁰	.04	-	.52
F	<i>Arabis drummondii</i>	b ³¹	a-	a ⁶	a ⁴	a ⁴	.07	.01	.01
F	<i>Astragalus convallarius</i>	c ⁶⁰	a ¹	ab ⁸	ab ¹⁹	b ²⁸	.04	.12	.15
F	<i>Astragalus</i> sp.	a-	a-	a-	a-	b ¹⁰	-	-	.05
F	<i>Astragalus utahensis</i>	10	8	13	10	9	.19	.09	.05
F	<i>Cordylanthus ramosus</i> (a)	-	-	a ²	b ²⁹	a ¹⁰	.01	.27	.15
F	<i>Cryptantha</i> sp.	c ⁸⁰	b ⁴⁰	ab ²⁴	a ¹¹	ab ¹⁹	.19	.02	.28
F	<i>Draba</i> sp. (a)	-	-	-	2	3	-	.00	.00
F	<i>Epilobium brachycarpum</i> (a)	-	-	-	-	1	-	-	.00
F	<i>Erigeron pumilus</i>	8	-	6	2	3	.01	.00	.03
F	<i>Eriogonum umbellatum</i>	-	-	1	1	2	.00	.00	.15
F	<i>Haplopappus acaulis</i>	3	-	1	1	1	.03	.03	.03
F	<i>Lappula occidentalis</i> (a)	-	-	a-	b ³¹	a ⁴	-	.08	.01
F	<i>Melilotus officinalis</i>	-	-	-	-	2	-	-	.00
F	<i>Microsteris gracilis</i> (a)	-	-	-	-	1	-	-	.00
F	<i>Phlox hoodii</i>	b ²²⁰	b ²⁰⁰	a ¹⁵³	ab ¹⁸⁰	ab ¹⁸³	3.00	3.80	5.26
F	<i>Phlox longifolia</i>	-	-	8	2	3	.01	.01	.01
F	<i>Tragopogon dubius</i>	4	-	-	-	-	-	-	-
F	<i>Trifolium</i> sp.	b ²⁶	a ²	a-	ab ¹⁵	a-	-	.06	-
Total for Annual Forbs		0	0	2	77	93	0.00	0.39	0.33
Total for Perennial Forbs		443	263	223	245	284	3.61	4.17	6.57

T y p e	Species	Nested Frequency					Average Cover %		
		'84	'90	'96	'01	'06	'96	'01	'06
	Total for Forbs	443	263	225	322	377	3.62	4.57	6.91

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

BROWSE TRENDS --

Management unit 02 , Study no: 31

T y p e	Species	Strip Frequency			Average Cover %		
		'96	'01	'06	'96	'01	'06
B	Artemisia nova	7	7	10	.19	1.24	1.50
B	Artemisia tridentata wyomingensis	98	98	98	16.34	20.70	18.17
B	Chrysothamnus viscidiflorus stenophyllus	70	62	76	1.77	1.83	2.78
B	Eriogonum microthecum	23	15	23	.29	.34	.24
B	Gutierrezia sarothrae	0	0	3	-	-	.03
B	Leptodactylon pungens	14	11	15	.24	.19	.31
B	Opuntia sp.	4	5	7	.03	-	.04
B	Tetradymia canescens	1	1	1	-	-	-
	Total for Browse	217	199	233	18.87	24.31	23.08

CANOPY COVER, LINE INTERCEPT --

Management unit 02 , Study no: 31

Species	Percent Cover
	'06
Artemisia nova	1.79
Artemisia tridentata wyomingensis	24.85
Chrysothamnus viscidiflorus stenophyllus	2.59
Eriogonum microthecum	.16
Leptodactylon pungens	.30

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 02 , Study no: 31

Species	Average leader growth (in)	
	'01	'06
Artemisia tridentata wyomingensis	0.7	0.7

BASIC COVER --

Management unit 02 , Study no: 31

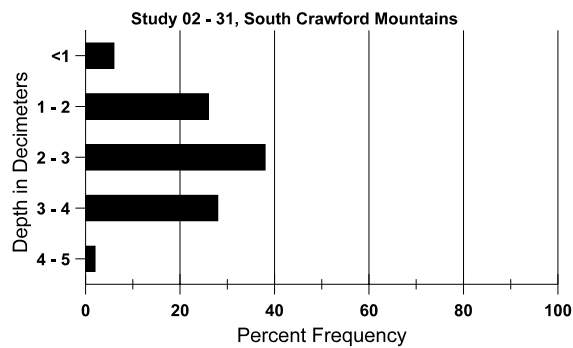
Cover Type	Average Cover %				
	'84	'90	'96	'01	'06
Vegetation	9.25	9.75	29.03	37.43	40.09
Rock	.25	.75	1.10	.13	.10
Pavement	8.00	3.00	7.37	2.61	5.19
Litter	52.25	26.00	30.34	34.68	30.29
Cryptogams	5.00	25.25	9.66	7.50	5.74
Bare Ground	25.25	35.25	32.97	37.84	39.94

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 31, South Crawford Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	Sandy clay loam			%OM	PPM P	PPM K	dS/m
			%sand	%silt	%clay				
12.5	57.8 (13.0)	7.1	55.3	17.4	27.4	1.9	160.3	51.2	0.6

Stoniness Index



PELLET GROUP DATA --
Management unit 02 , Study no: 31

Type	Quadrat Frequency		
	'96	'01	'06
Rabbit	3	7	16
Grouse	-	2	1
Elk	2	-	4
Deer	31	13	15
Cattle	1	1	7

Days use per acre (ha)	
'01	'06
-	-
26 groups/acre	26 groups/acre
1 (2)	9 (22)
23 (56)	8 (20)
13 (32)	10 (25)

BROWSE CHARACTERISTICS --
Management unit 02 , Study no: 31

		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												
84	0	-	-	-	-	-	0	0	0	-	0	-/-
90	0	-	-	-	-	-	0	0	0	-	0	-/-
96	320	-	20	280	20	40	6	0	6	6	6	9/14
01	440	-	20	400	20	-	86	0	5	-	0	12/16
06	660	340	-	600	60	-	0	0	9	9	9	10/16
Artemisia tridentata wyomingensis												
84	8266	2333	1333	5200	1733	-	68	26	21	.48	5	14/21
90	7799	66	133	2066	5600	-	50	40	72	5	50	12/19
96	6420	40	360	4160	1900	1300	63	4	30	11	11	15/27
01	7420	-	240	5700	1480	1140	23	3	20	7	7	16/25
06	6260	2160	280	4560	1420	860	18	3	23	15	19	16/26
Chrysothamnus viscidiflorus stenophyllus												
84	6999	-	800	6066	133	-	42	0	2	-	0	9/12
90	6465	-	666	2533	3266	-	36	14	51	4	21	6/6
96	2880	-	140	2400	340	20	3	7	12	6	9	9/11
01	2940	-	40	2600	300	40	5	2	10	4	4	8/10
06	3840	-	140	3560	140	20	.52	0	4	2	2	8/12
Eriogonum microthecum												
84	333	-	-	333	-	-	60	0	0	-	0	5/8
90	733	-	133	600	-	-	27	9	0	-	0	5/7
96	700	-	-	680	20	-	0	0	3	-	0	6/9
01	540	-	-	500	40	-	4	0	7	-	0	4/7
06	680	-	40	540	100	20	12	3	15	3	3	5/8

		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)
<i>Gutierrezia sarothrae</i>												
84	0	-	-	-	-	-	0	0	-	-	0	-/-
90	0	-	-	-	-	-	0	0	-	-	0	-/-
96	0	-	-	-	-	-	0	0	-	-	0	-/-
01	0	-	-	-	-	-	0	0	-	-	0	-/-
06	80	20	-	80	-	-	0	0	-	-	0	6/13
<i>Leptodactylon pungens</i>												
84	0	-	-	-	-	-	0	0	0	-	0	-/-
90	133	-	-	-	133	-	0	0	100	30	100	-/-
96	400	-	-	380	20	-	0	0	5	-	0	6/12
01	440	-	-	400	40	-	0	0	9	-	0	4/9
06	420	-	40	360	20	-	0	0	5	5	10	5/11
<i>Opuntia sp.</i>												
84	266	-	-	266	-	-	0	0	0	-	0	4/5
90	532	-	466	66	-	-	0	0	0	-	0	3/6
96	80	-	-	60	20	-	0	0	25	-	0	4/12
01	100	-	-	100	-	-	0	0	0	-	0	3/10
06	160	-	20	120	20	20	0	0	13	13	13	4/9
<i>Tetradymia canescens</i>												
84	0	-	-	-	-	-	0	0	-	-	0	-/-
90	0	-	-	-	-	-	0	0	-	-	0	-/-
96	20	-	-	20	-	-	0	0	-	-	0	4/9
01	20	-	-	20	-	-	0	0	-	-	0	3/13
06	20	-	-	20	-	-	0	0	-	-	0	4/7