

Trend Study 14-23-04

Study site name: South Plain .

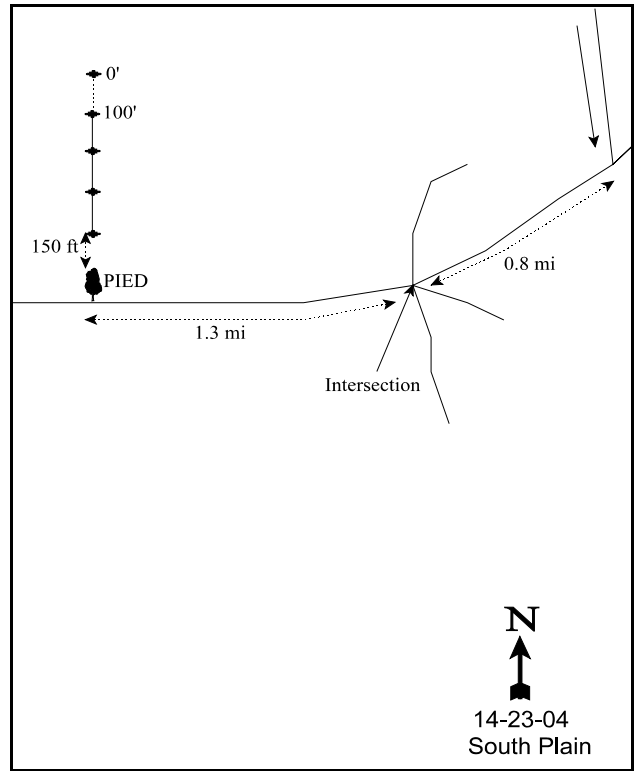
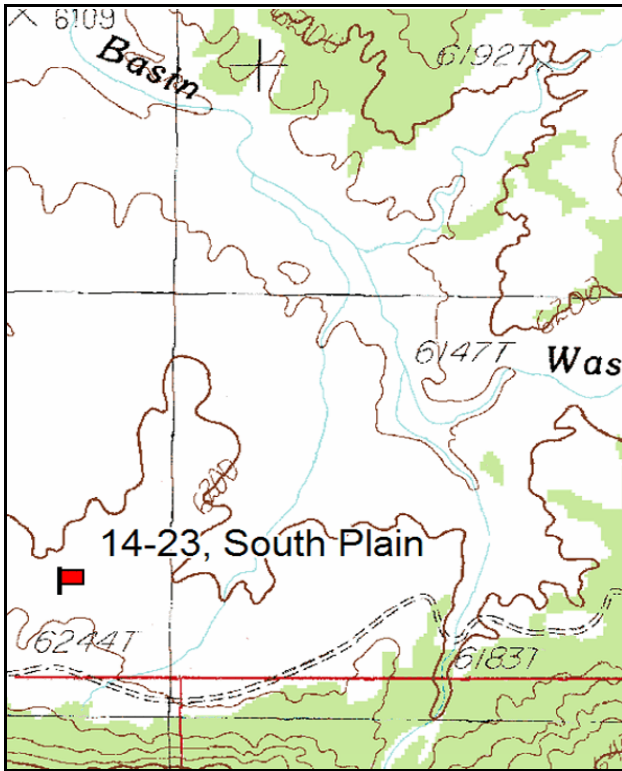
Vegetation type: Wyoming Big Sagebrush .

Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

At the junction of the Elk Ridge-Salt Creek Mesa-Beef Basin Roads, go north down into the Beef Basin area. Follow the main road for 9.1 miles, passing the FS/BLM boundary down to an intersection where there is a BLM register box. Stay left on County Road #104 and proceed 1.45 miles to the turnoff to an enclosure. Stay left for 0.45 miles to a fork. Stay right again and go 0.4 miles to a fork. Go right at the intersection with the Beef Basin Canyon Road and go 0.8 miles to a 5-way intersection. Take west fork straight through the intersection (left fork goes to Indian ruins) and continue 1.3 miles to a large pinyon pine on the right. Stop here. The 400-stake of the transect starts 150 feet north of the pinyon.



Map Name: Warren Canyon

Diagrammatic Sketch

Township 32S , Range 18E , Section 34

GPS: NAD 27, UTM 12S 4200277 N, 594761 E

DISCUSSION

South Plain - Trend Study No. 14-23

This trend study is located in the southern part of Beef Basin, in an area known as South Plain. This study was set up to monitor the condition and trend of Wyoming big sagebrush on critical, heavily used winter range. The gently rolling plain is dominated by an old stand of Wyoming big sagebrush with openings of dense blue gramma. The whole flat is surrounded by pinyon-juniper covered hills and slickrock. There is very little cover over two feet in height out in the flat. Drainage of the open flat is to the west through Beef Basin Wash in the low center of the flat. The elevation of the site is 6,300 feet with drainage and aspect basically to the north.

Besides heavy winter-spring use by deer, Beef Basin also receives heavy grazing pressure from cattle. The BLM permits 150-290 cattle January to June 15. The area was rested for 2 years in 2002 and 2003, but cows have returned the area. Deer pellet groups were numerous in 1986 with no elk sign observed. There are plans for additional water developments to help distribute livestock use to the north part of the basin. A DWR pellet group transect in the area shows years of continuous high use. The 5-year average of 110 deer days use/acre (274 ddu/ha) was estimated from 1982-1986 (Jense et al. 1986) which was coincidentally during the exceptionally high precipitation years. The 5-year average between 1987 and 1992 went down to 70 deer days use/acre (173 ddu/ha) (Jense et al. 1992) which is second only to Deer Flat in deer use on the Elk Ridge unit. Deer days use averaged 83 per acre (205 ddu/ha) between 1993 and 1996. Pellet group data taken along the study site baseline in 1999 estimated 76 deer days use/acre (188 ddu/ha) and 13 cow days use/acre (32 cdu/ha). Most of the cattle pats were from last fall, but about 10% were from the spring. Nearly all of the deer pellet groups were from winter. Pellet group data from 2004 estimated only 40 deer days use/acre (99 ddu/ha). Cattle use was estimated at 17 days use/acre.

The soil is a light red, sandy loam with a slightly alkaline pH of 7.6. Effective rooting depth is estimated at nearly 20 inches with no rooting restrictions noted. There is a one inch thick compacted layer about 3 inches below the surface, but past this the soil appears uniform. Phosphorus and potassium are low at 5.3 and 67.2 ppm respectively. Values less than 10 ppm for phosphorus and 70 ppm for potassium may limit normal plant growth and development. Due to the sandy nature of the soil, average soil temperature was measured at nearly 71°F in 1999 and 65°F in 2004 at an average depth between 15-17 inches. High soil temperatures give winter annuals like cheatgrass a competitive advantage over perennial grasses, especially during dry years. Alkali deposits are present in the creek nearby, but none were found on the study site. Litter and soil are building under plants. However, most of the plant interspaces were completely bare of cover in 1986. The soil was loose and easily moved by wind or water. Gullies are common, but the severity of erosion is limited by the gentle slope.

A moderately dense stand of Wyoming big sagebrush dominated the area in 1986 with a population density of 3,000 plants/acre. However, the stand was overly mature, heavily hedged and in poor vigor. Density increased slightly in 1992, but the change is likely due to the greatly increased sample size now used. Use was still heavy, vigor poor on most plants, and percent decadence increased from 47% to 81%. By 1999, the population had declined to only 1,160 plants/acre. Use was similar to 1992, vigor continued to be poor on 52% of the sagebrush sampled, and percent decadence increased to 91%. In addition, 45% of the population sampled were classified as dying. Recruitment was poor with few seedlings and young plants present. There was relatively good leader growth on sagebrush, but seed production was non-existent. Data from 2004 show nearly a 50% decline in sagebrush density to only 600 plants/acre. The remaining plants were in poor vigor and 77% were determined as decadent, while 60% were classified as dying. Utilization was heavy, young recruitment poor, and no seedlings were encountered. The livestock enclosure in Beef Basin is a dramatic example of overuse and subsequent decline of sagebrush compared to a protected stand in the total enclosure.

Another preferred browse species on the study site is winterfat. Selected by both cattle and deer, most of these small shrubs show heavy hedging, but still maintain good vigor. The population has shown a steady decline in density between 1986 and 1999. Density increased slightly in 2004 to 440 plants/acre. Narrowleaf low rabbitbrush is also common. It has shown light use on most plants but moderate to heavy use on some. This species of rabbitbrush is usually rarely utilized. There are also a few scattered pinyon pine and juniper throughout the site and into the flat.

Grasses are an important part of the community, providing more than twice as much ground cover as the shrubs. The most abundant species in 1986 and 1992 was blue gramma. It is a warm season grass that cures to palatable winter forage but often escapes grazing because of its low growth habit and dormancy from November through June when livestock are present. Annual cheatgrass occurred in small numbers in 1992 and increased exponentially by 1999. Quadrat frequency increased from 11% in 1992 to 97% by 1999. Cheatgrass provided 88% of the grass cover in 1999. Drought conditions prior to the 2004 reading caused cheatgrass to decline in frequency and cover, but was still very abundant with almost 10% cover and was found in 81% of the quadrats. Other grasses that provide some spring grazing are needle-and-thread, bottlebrush squirreltail, sand dropseed, and Indian ricegrass. The cool season grasses receive excessive use in the fall and spring (livestock are on the site from November until June) when they tend to green-up. Perennial forbs are relatively scarce and provide little forage.

1986 APPARENT TREND ASSESSMENT

Based on excessive use, poor form and vigor, and low reproduction of the key species, Wyoming big sagebrush, the apparent range trend is downward. It appeared that a reduction in use would be the best management approach. This was tried by the DWR with post season antlerless permits issued to reduce the number of wintering deer. Cattle are also contributing to the problem and a reduction in winter grazing should be considered. Spring use by livestock would promote shrub growth by impacting grass production, but if there are no cool season grasses available, then they will utilize sagebrush. The presence of several annuals and increaser species validates the continued downward trend in plant composition and succession. The high amount of bare soil, presence of active gullies, soil movement, and wind erosion indicate a declining soil trend. However, erosion does not appear severe or unusual for such a sandy soil.

1992 TREND ASSESSMENT

This has been an area that historically has been heavily utilized by both cattle and deer. Trend for soil appears stable with a decline in litter cover somewhat compensated by a reduction in percent bare ground. The browse trend is down. The two key species, Wyoming big sagebrush and winterfat have notable downward trends. Sagebrush density shows a slight increase which is more reflective of the larger sample size now used than any change in their actual population. What should be understood is that the proportion of the plants that are considered to have poor vigor have increased from 36% up to 61% and that the proportion of the population that are decadent has also risen from 47% to 81%. To further compound the problem, seedlings are rare and account for less than 1% of the population and the proportion of young in the population is 18%. These last two values are low, but in 1986 there were no seedlings or young. Winterfat makes up less than 5% of the browse cover and the only real positive aspect of this small population is that percent decadency has gone down from 64% to 28%. The trend for the grasses is slightly up with a slight increase in nested frequency values. The trend for forbs is down, but they are relatively uncommon and only make up 1% of the herbaceous understory cover. The overall trend for the herbaceous understory would be stable. The Desirable Components Index (see methods) rating is fair at 39. High decadence negatively impacts the rating for this site.

TREND ASSESSMENT

soil - stable (3)

browse - down (1)

herbaceous understory - stable (3)

winter range condition (DC Index) - 39 (fair) Wyoming big sagebrush type

1999 TREND ASSESSMENT

Trend for soil appears stable with similar ground cover characteristics compared to 1992. Trend for the key browse species, Wyoming big sagebrush is down due to a three-fold decline in population density, continued heavy use, and a continuing increase in percent decadence from 81% to 91%. The other preferred shrub, winterfat, is also heavily hedged. It has declined in density but shows improved vigor and lower percent decadence. Trend for the herbaceous understory is down. Cheatgrass has increased dramatically and now dominates the site by providing 88% of the grass cover and 87% of the total herbaceous cover. It was present on the site in 1992, but in low numbers. It had a quadrat frequency of only 11% and a cover value of 2% in 1992. In 1999, cheatgrass quadrat frequency increased to 97% with a cover value of almost 27%. Nested frequency of perennial grasses declined since 1992. The frequency of the most abundant perennial, blue grama, declined significantly. The only perennial grass that did not decline is needle-and-thread grass. The decline of blue grama, a warm season grass, could indicate very dry summers in this area since 1992. Forbs are still an insignificant contributor of cover. The DCI score dropped to very poor (-14). Preferred browse, especially sagebrush, cover has dropped while percent decadence is very high and proportion of young plants is very low. Perennial grass cover has declined, while cheatgrass has greatly increased which negatively impacts the rating.

TREND ASSESSMENT

soil - stable, but poor (3)

browse - down and in very poor condition (1)

herbaceous understory - down and now dominated by cheatgrass (1)

winter range condition (DC Index) - -14 (very poor) Wyoming big sagebrush type

2004 TREND ASSESSMENT

Trend for soil is slightly down due to a moderate increase in bare ground cover. Litter and vegetation cover declined and average grass cover dropped 32%. Most of this drop is from the loss of annual grass cover as perennial grass cover actually increased. Erosion is not severe however, due to the level terrain. Trend for the key browse species, Wyoming big sagebrush continues to be down. Density has steadily declined since 1992 and has dropped nearly 50% since 1999 to only 600 plants/acre. Utilization remains heavy (but difficult to determine because of the lack of significant annual growth), vigor poor, and decadence high at 77%. More than 75% of the decadent sagebrush sampled were rated as dying. Total line intercept canopy cover of sagebrush is less than 1%. No seedlings were encountered and young plants are rare. Winterfat is has remained stable at around 400 plants/acre. It displays heavy use, good vigor and low decadence. Trend for the herbaceous understory is up slightly. Sum of nested frequency of perennial grasses increased slightly while frequency and cover of cheatgrass declined significantly. Blue grama is the most abundant perennial species. It increased significantly in nested frequency and cover rose more than 4 fold (1.2% to 5.5%). Sand dropseed and needle-and-thread are also fairly abundant and increased in frequency and cover since 1999. Cheatgrass was very abundant in 1999 with a cover value of nearly 27%. It provided 88% of the total grass cover in 1999. Drought conditions for the past few years have caused a significant decline in its nested frequency and cover declined nearly 3 fold to 9.6%. It still provides 45% of the grass cover however. Forbs continue to be rare and unimportant on this site. The DCI score improved slightly, but is still poor at 21. Perennial grasses are higher, while cheatgrass is lower.

TREND ASSESSMENT

soil - down (1)

browse - down and in very poor condition (1)

herbaceous understory - up slightly (4)

winter range condition (DC Index) - 21 (poor) Wyoming big sagebrush type

HERBACEOUS TRENDS --

Management unit 14 , Study no: 23

Type	Species	Nested Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
G	<i>Bouteloua gracilis</i>	_b 141	_c 192	_a 58	_b 100	18.76	1.20	5.47
G	<i>Bromus tectorum</i> (a)	-	_a 27	_c 336	_b 268	1.95	26.46	9.62
G	<i>Oryzopsis hymenoides</i>	_a -	_{ab} 7	_{ab} 2	_b 12	.21	.03	.16
G	<i>Sitanion hystrix</i>	_a 42	_b 96	_a 48	_a 36	1.10	.46	.41
G	<i>Sporobolus cryptandrus</i>	_b 95	_b 92	_a 20	_a 42	4.32	.32	2.07
G	<i>Stipa comata</i>	_a 67	_a 54	_{ab} 74	_b 100	1.50	1.57	2.70
G	<i>Vulpia octoflora</i> (a)	-	_b 21	_a 5	_a 1	.10	.01	.00
Total for Annual Grasses		0	48	341	269	2.06	26.47	9.63
Total for Perennial Grasses		345	441	202	290	25.90	3.60	10.82
Total for Grasses		345	489	543	559	27.97	30.07	20.45
F	<i>Antennaria rosea</i>	-	-	-	1	-	-	.00
F	<i>Astragalus mollissimus</i>	9	18	12	-	.06	.06	-
F	<i>Calochortus nuttallii</i>	-	1	-	-	.00	-	-
F	<i>Chenopodium leptophyllum</i> (a)	-	11	-	1	.03	-	.00
F	<i>Collinsia parviflora</i> (a)	-	-	-	10	-	-	.02
F	<i>Descurainia pinnata</i> (a)	-	-	1	5	-	.00	.02
F	<i>Eriogonum cernuum</i> (a)	-	4	-	-	.01	-	-
F	<i>Erigeron pumilus</i>	_b 35	_a 7	_a 2	_a 2	.06	.06	.03
F	<i>Gayophytum ramosissimum</i> (a)	-	-	5	-	-	.01	-
F	<i>Lappula occidentalis</i> (a)	-	-	-	4	-	-	.04
F	<i>Machaeranthera canescens</i>	12	8	7	1	.07	.09	.00
F	<i>Phlox austromontana</i>	-	3	-	3	.03	-	.15
F	<i>Phlox longifolia</i>	-	-	2	5	-	.00	.01
F	<i>Plantago patagonica</i> (a)	-	_a 18	_{ab} 28	_b 35	.03	.16	.45
F	<i>Sphaeralcea coccinea</i>	2	-	-	-	-	-	-
Total for Annual Forbs		0	33	34	55	0.07	0.18	0.53
Total for Perennial Forbs		58	37	23	12	0.24	0.21	0.20
Total for Forbs		58	70	57	67	0.31	0.40	0.74

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

BROWSE TRENDS --

Management unit 14 , Study no: 23

Type	Species	Strip Frequency				Average Cover %		
		'86	'92	'99	'04	'92	'99	'04
B	Artemisia tridentata wyomingensis	0	60	38	22	4.69	2.00	.99
B	Atriplex canescens	0	3	2	3	.00	.15	.15
B	Ceratoides lanata	0	10	7	5	.30	.53	.33
B	Chrysothamnus viscidiflorus stenophyllus	0	47	51	42	3.82	4.67	4.76
B	Gutierrezia sarothrae	0	0	1	0	-	-	-
B	Juniperus osteosperma	0	0	1	0	-	.03	-
B	Opuntia spp.	0	6	4	6	.15	.15	.06
B	Pinus edulis	0	0	2	1	.85	.63	.85
B	Sclerocactus whipplei	0	5	8	6	.04	.12	.12
Total for Browse		0	131	114	85	9.87	8.31	7.27

CANOPY COVER, LINE INTERCEPT --

Management unit 14 , Study no: 23

Species	Percent Cover
	'04
Artemisia tridentata wyomingensis	.68
Atriplex canescens	.90
Ceratoides lanata	.66
Chrysothamnus viscidiflorus stenophyllus	5.31
Opuntia spp.	.06
Pinus edulis	1.04
Sclerocactus whipplei	.05

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 14 , Study no: 23

Species	Average leader growth (in)
	'04
Artemisia tridentata wyomingensis	1.4
Atriplex canescens	2.2
Ceratoides lanata	3.4

POINT-QUARTER TREE DATA --
Management unit 14 , Study no: 23

Species	Trees per Acre	
	'99	'04
Juniperus osteosperma	10	-
Pinus edulis	11	-

Average diameter (in)	
'99	'04
6.8	-
7.7	-

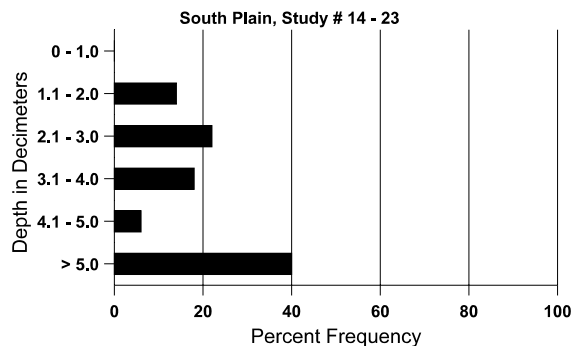
BASIC COVER --
Management unit 14 , Study no: 23

Cover Type	Average Cover %			
	'86	'92	'99	'04
Vegetation	9.50	39.09	37.93	32.02
Rock	0	1.76	.06	.00
Pavement	0	0	.65	.33
Litter	52.75	30.99	34.20	24.15
Cryptogams	0	.68	.33	.38
Bare Ground	37.75	33.59	33.42	52.01

SOIL ANALYSIS DATA --
Management unit 14, Study no: 23, Study Name: South Plain

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
19.8	65.3 (14.8)	7.6	60.0	23.4	16.6	0.8	5.3	67.2	.4

Stoniness Index



PELLET GROUP DATA --
Management unit 14 , Study no: 23

Type	Quadrat Frequency		
	'92	'99	'04
Rabbit	25	28	9
Elk	-	-	2
Deer	47	47	32
Cattle	1	6	17

Days use per acre (ha)	
'99	'04
-	-
-	1 (2)
76 (188)	40 (99)
13 (32)	17 (43)

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 23

		Age class distribution (plants per acre)					Utilization					
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata wyomingensis</i>												
86	3000	-	-	1600	1400	-	0	96	47	7	36	19/23
92	3520	20	620	60	2840	-	19	77	81	11	61	-/-
99	1160	140	20	80	1060	1120	22	66	91	45	52	18/23
04	600	-	40	100	460	1240	0	93	77	60	60	17/24
<i>Atriplex canescens</i>												
86	0	-	-	-	-	-	0	0	-	-	0	-/-
92	60	-	-	60	-	-	67	0	-	-	0	-/-
99	40	-	-	40	-	-	0	0	-	-	0	39/58
04	60	20	-	60	-	-	67	33	-	-	0	41/59
<i>Ceratoides lanata</i>												
86	933	-	-	333	600	-	36	64	64	-	0	11/8
92	640	20	420	40	180	-	25	53	28	-	13	-/-
99	400	-	-	380	20	-	0	100	5	5	5	16/12
04	440	20	80	360	-	-	18	64	0	-	0	11/11
<i>Chrysothamnus viscidiflorus stenophyllus</i>												
86	2333	200	533	400	1400	-	17	6	60	2	23	12/14
92	2320	-	720	1200	400	-	9	0	17	-	22	-/-
99	1920	-	80	1480	360	20	13	2	19	3	3	18/28
04	1500	-	-	1200	300	60	0	0	20	16	16	16/27
<i>Gutierrezia sarothrae</i>												
86	0	-	-	-	-	-	0	0	-	-	0	-/-
92	0	-	-	-	-	-	0	0	-	-	0	-/-
99	20	-	-	20	-	-	100	0	-	-	0	9/10
04	0	-	-	-	-	-	0	0	-	-	0	7/7

		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)
Juniperus osteosperma												
86	0	-	-	-	-	-	0	0	-	-	0	-/-
92	0	-	-	-	-	-	0	0	-	-	0	-/-
99	20	-	20	-	-	-	0	0	-	-	0	-/-
04	0	-	-	-	-	-	0	0	-	-	0	-/-
Opuntia spp.												
86	0	-	-	-	-	-	0	0	0	-	0	-/-
92	200	60	200	-	-	-	0	0	0	-	30	-/-
99	80	20	20	60	-	-	0	0	0	-	0	6/13
04	220	-	-	200	20	-	0	0	9	9	9	4/12
Pinus edulis												
86	0	66	-	-	-	-	0	0	-	-	0	-/-
92	0	-	-	-	-	-	0	0	-	-	0	-/-
99	40	-	-	40	-	-	0	0	-	-	0	-/-
04	20	-	-	20	-	-	0	0	-	-	0	-/-
Sclerocactus whipplei												
86	0	-	-	-	-	-	0	0	-	-	0	-/-
92	100	20	60	40	-	-	0	0	-	-	0	-/-
99	160	-	-	160	-	-	0	0	-	-	0	4/6
04	120	-	-	120	-	-	0	0	-	-	0	5/6