

Trend Study 16B-19-04

Study site name: North Spring Bench .

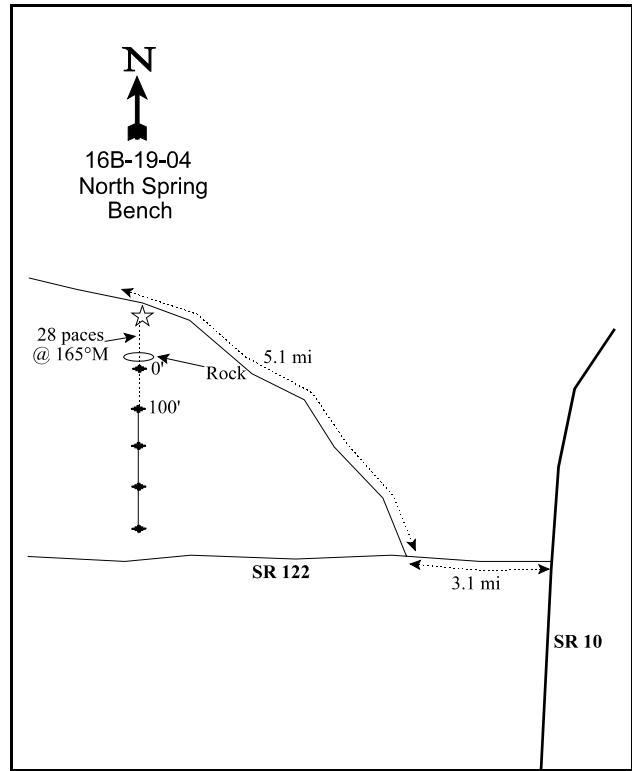
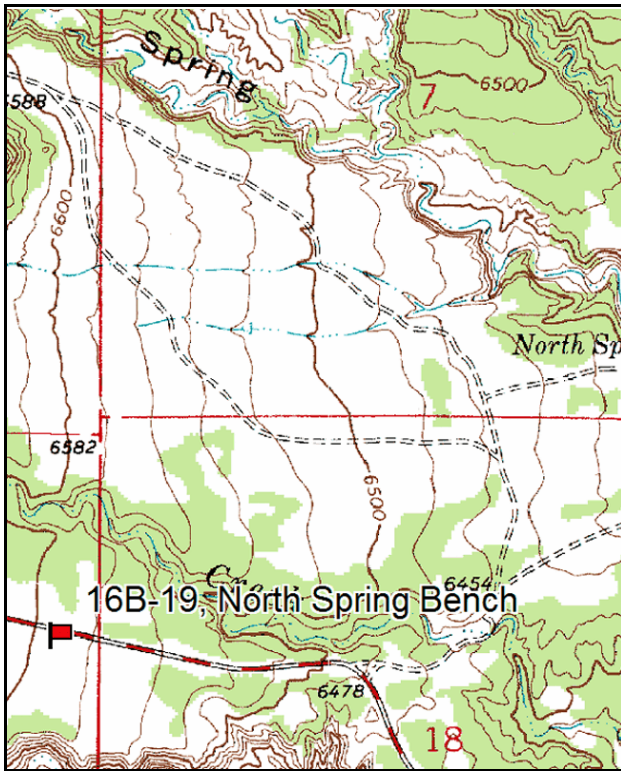
Vegetation type: Wyoming Big Sagebrush .

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 junction of state highways 10 and 122 south of Price, go west on SR 122. Go 3.1 miles to a major fork. Go right towards Wattis for 5.1 miles. Look for a witness post 10 feet off the south side of the road in a sagebrush flat. The first baseline stake is 28 paces south of the witness post at 165° M, and located behind a large rock. It is marked with a red browse tag (#9013). The other study posts, all 18" fenceposts, are south at 100 foot intervals.



Map Name: Pinnacle Peak

Diagrammatic Sketch

Township 15S , Range 9E , Section 18

GPS: NAD 27, UTM 12S 4374591 N, 502899 E

## DISCUSSION

### North Spring Bench - Trend Study No. 16B-19

The North Spring Bench trend study samples part of the critical deer winter range below Watis in the Spring Creek area. The study is located on a sagebrush flat surrounded by mature pinyon-juniper at an elevation of 6,600 feet and a slope of 3-4%. Drainage and aspect is generally to the east. Deer often occupy the area until the first of May. Managed by the BLM, the North Springs allotment is used by sheep from May 1 to June 30. This southern end of the Gordon Creek sagebrush range receives heavy use by deer. Deer use was extremely high in 1999 with an estimated 159 deer days use/acre (392 ddu/ha) and increased to 263 deer days use/acre (650 ddu/ha) in 2004. There were also 10 elk days use/acre (25 edu/ha) estimated in 2004.

The soil is a sandy clay loam with a neutral pH (7.2). The soil is moderately deep with an estimated effective rooting depth of 16 inches. A stoniness index shows rock to be uniformly distributed throughout the upper 20 inches of the profile. A calcium carbonate hardpan is present about 12 inches below the surface which may be restrictive to plants roots. Surface runoff has caused pedestalling and moderate soil movement. The gentle slope, vegetation, and litter cover help keep erosion at a minimal level. There are no major gullies, but nearby washes show continued down cutting and active erosion. Ratio of protective cover (vegetation, litter, and cryptogams) to bare ground decreased from 1:2.7 in 1999 to 1:2.3 in 2004. Dry conditions have reduced cryptogam cover from 8% in 1999 to 2% in 2004. Relative percent bare soil during this same time period has increased from 32% to 41%.

The key browse species is Wyoming big sagebrush. There were many indicators of a downward trend during the 1988 and 1994 readings. The population declined by 24% between 1988 and 1994, however much of this change can be attributed to the much larger sample size which began in 1994. Over one-half the population was decadent (52% in 1988, and 62% in 1994) and 1 in 5 shrubs was classified as dead. Very few plants were classified as young in either 1988 or 1994. During the 1994 reading, more seedlings were encountered. Heavy use was noted on 32% of the plants in 1988. In 1994, only 8% showed heavy use. Vigor declined however, from 10% with poor vigor in 1988 to 27% by 1994. Decadency in 1999 decreased from 62% to 31% and plants with poor vigor decreased from 27% to 14%. Recruitment of young plants was relatively high at 23%. Only 14% of the population displayed poor vigor. Heavy use was higher in 1999 with 48% of the population displaying heavy use. In 2004, density was three times lower and down to 2,060 plants/acre. Decadency increased to 97% while 91% of the population showed signs of poor vigor. No plants were classified as mature and only 3% of the population were young. Heavy use increased to 88% in 2004. The combination of heavy use and drought conditions, especially from 2001-2003, have put this sagebrush population in peril. This area will not be able to support the amount of deer that have historically used this site without a healthy sagebrush population.

Increaser species, most notably broom snakeweed, have varied in abundance throughout each sampling year. This is reflective of precipitation cycles. Populations were high in 1988 and 1999 and very low in 1994 and 2004. Prickly pear decreased from 4,900 plants/acre in 1999 to 1,920 plants/acre in 2004.

Pinyon and juniper trees surround the site and are encroaching into the sagebrush flat. Point quarter data from 1999 estimated a density of 100 pinyon trees/acre with an average stem diameter of 2.1 inches. In 2004, pinyon increased to 146 trees/acre with an average stem diameter of 2.6 inches. Most of the trees are smaller and 53% were classified as 1-4 feet tall, which is an indication of the encroachment of pinyon.

Blue grama has been the most dominant species on this site with about 6% cover in both 1994 and 1999. In 2004, cover for blue grama decreased to 2.7%. Sum of nested frequency was significantly lower in 2004. Western wheatgrass and Indian ricegrass also decreased significantly. Needle-and-thread was the only perennial grass that increased significantly in both sum of nested frequency and cover. A good trend in 2004

was the significant decrease of cheatgrass, which never has had more than 1% cover. Perennial forbs increased in cover but sum of nested frequency remained about the same. Scarlet globemallow did not significantly increase in sum of nested frequency, but was more robust. Cover increased from 0.2% in 1999 to 1.5% in 2004. Annual forbs have increased dramatically from only 0.2% cover in 1999 to over 7% cover in 2004. Fremont goosefoot, slimleaf goosefoot, nodding eriogonum, groundsmoke, gilia, annual stickseed, wooly plantain, and russian thistle all increased significantly.

#### 1994 TREND ASSESSMENT

Ground cover characteristics have improved on this site. Vegetation cover is quite high for a Wyoming big sagebrush site. Even though grasses and forbs make up only 33% of the vegetation cover, it appears to be evenly dispersed. Percent cover of litter has improved from 27% to 34%. The high sum of nested frequency for litter indicates well dispersed litter cover. Percent bare ground declined from 53% to 47%. Erosion on the site is minimal due to the protective cover combined with the gentle terrain. Even with decreased heavy use on the Wyoming big sagebrush, the browse trend is down because the sagebrush community has increased percent decadence (52-62%), the proportion of shrubs in poor vigor has increased (10-27%), and there is one dead plant to every five live plants. Trend for herbaceous understory has also declined since 1988. Sum nested frequency of perennial grasses and forbs have declined. Normal precipitation patterns will likely reverse this trend. The Desirable Components Index (see methods) rating is fair at 36 for a Wyoming big sagebrush community. Sagebrush is very abundant, but decadence is high. Perennial grasses and forbs are also abundant.

##### TREND ASSESSMENT

soil - up slightly (4)

browse - down (1)

herbaceous understory - down slightly (2)

winter range condition (DC Index) - 36 (fair) Wyoming big sagebrush type

#### 1999 TREND ASSESSMENT

Trend for soil is slightly improved, but is still only in fair condition. Some soil movement is apparent, but the gentle terrain keeps erosion at minimal levels directly on the site. Vegetation cover increased and bare ground decreased. Trend for browse is up slightly. The key species, Wyoming big sagebrush, shows improving trends with decreased decadency from 62% to 31%. Plants displaying poor vigor also decreased from 27% to 14%. Recruitment from young plants is currently high at 23%, and biotic potential is moderate at 12%. The main concern is that heavy use increased to 48%. Continued heavy use (and drought), could reverse current upward trend. Broom snakeweed drastically increased in 1999 due to more normal precipitation patterns in recent years. The herbaceous understory trend is stable. Sum of nested frequency for perennial species increased in 1999. Perennial grasses dominate the herbaceous component at this site. The DCI score increased to 61 which is considered good. Perennial grasses and forbs increased, while sagebrush decadence was much lower.

##### TREND ASSESSMENT

soil - up slightly (4)

browse - up slightly (4)

herbaceous understory - stable (3)

winter range condition (DC Index) - 61 (good) Wyoming big sagebrush type

## 2004 TREND ASSESSMENT

Trend for soil is slightly down. The ratio of bare ground to protective cover (vegetation, litter, and cryptogams) decreased from 1:2.7 in 1999 to 1:2.3 in 2004. Perennial grass cover dropped from 12 to 6% in 2004 and cryptogam cover decreased from 8.3% in 1999 to 2.4% in 2004. Browse trend is down. Cover for Wyoming big sagebrush decreased from 13.7% in 1999 to 1.8% in 2004. Density is three times lower and 97% of the population is decadent. There are very few young or seedlings to replace the dying plants. Heavy use is extremely high at 88%. The herbaceous understory trend is slightly down. Sum of nested frequency and cover for perennial grasses is down. Seven annual forbs significantly increased in 2004 and 6 of these had never been previously sampled on this site. Perennial forb cover was higher, but nested frequency did not increase very much. The DCI score decreased to poor. Sagebrush die off and very high decadence are the biggest reason for the decline.

### TREND ASSESSMENT

soil - slightly down (2)

browse - down (1)

herbaceous understory - slightly down (2)

winter range condition (DC Index) - 10 (poor) Wyoming big sagebrush type

### HERBACEOUS TRENDS --

Management unit 16B, Study no: 19

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'94	'99	'04	'94	'99	'04
G	Agropyron smithii	<sub>b</sub> 99	<sub>b</sub> 125	<sub>c</sub> 171	<sub>a</sub> 18	.85	2.81	.18
G	Agropyron spicatum	-	-	-	6	-	-	.01
G	Bouteloua gracilis	<sub>c</sub> 213	<sub>b</sub> 147	<sub>b</sub> 136	<sub>a</sub> 96	6.20	5.74	2.65
G	Bromus tectorum (a)	-	<sub>a</sub> 7	<sub>b</sub> 96	<sub>a</sub> 15	.01	.88	.08
G	Oryzopsis hymenoides	<sub>ab</sub> 37	<sub>a</sub> 23	<sub>b</sub> 64	<sub>a</sub> 30	.22	1.22	.13
G	Sitanion hystrix	<sub>b</sub> 153	<sub>a</sub> 76	<sub>a</sub> 80	<sub>a</sub> 75	1.57	1.72	1.00
G	Sporobolus cryptandrus	-	9	-	-	.04	-	-
G	Stipa comata	<sub>b</sub> 35	<sub>b</sub> 35	<sub>a</sub> 1	<sub>c</sub> 120	.36	.15	2.13
Total for Annual Grasses		0	7	96	15	0.01	0.87	0.08
Total for Perennial Grasses		537	415	452	345	9.26	11.65	6.12
Total for Grasses		537	422	548	360	9.27	12.53	6.21
F	Astragalus convallarius	-	-	3	4	-	.00	.03
F	Caulanthus crassicaulis	2	-	-	-	-	-	-
F	Castilleja linariaefolia	-	-	2	-	-	.06	-
F	Calochortus nuttallii	-	-	-	1	-	-	.01
F	Chaenactis douglasii	-	-	1	-	-	.00	-
F	Chenopodium fremontii (a)	-	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 31	-	-	.18
F	Chenopodium leptophyllum(a)	-	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 154	-	-	1.35
F	Cryptantha spp.	<sub>a</sub> -	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 35	-	-	.78
F	Cymopterus spp.	-	-	1	5	-	.00	.01

Type	Species	Nested Frequency				Average Cover %		
		'88	'94	'99	'04	'94	'99	'04
F	<i>Descurainia pinnata</i> (a)	-	19	5	10	.03	.01	.04
F	<i>Eriogonum cernuum</i> (a)	-	ab <sup>5</sup>	a <sup>-</sup>	b <sup>15</sup>	.03	-	.08
F	<i>Erigeron</i> spp.	3	-	-	-	-	-	-
F	<i>Gayophytum ramosissimum</i> (a)	-	a <sup>-</sup>	a <sup>-</sup>	b <sup>110</sup>	-	-	.97
F	<i>Gilia</i> spp. (a)	-	a <sup>-</sup>	a <sup>-</sup>	b <sup>117</sup>	-	-	1.12
F	<i>Lappula occidentalis</i> (a)	-	a <sup>-</sup>	b <sup>15</sup>	c <sup>122</sup>	-	.06	1.34
F	<i>Leucelene ericoides</i>	-	-	-	-	-	-	.00
F	<i>Oenothera</i> spp.	-	-	-	1	-	-	.00
F	<i>Phlox longifolia</i>	a <sup>11</sup>	a <sup>1</sup>	b <sup>47</sup>	b <sup>41</sup>	.00	.15	.16
F	<i>Plantago patagonica</i> (a)	-	a <sup>10</sup>	b <sup>50</sup>	c <sup>129</sup>	.02	.15	1.88
F	<i>Salsola iberica</i> (a)	-	a <sup>-</sup>	a <sup>-</sup>	b <sup>23</sup>	-	-	.21
F	<i>Schoenocrambe linifolia</i>	a <sup>-</sup>	a <sup>-</sup>	b <sup>22</sup>	b <sup>16</sup>	-	.04	.14
F	<i>Sphaeralcea coccinea</i>	a <sup>23</sup>	a <sup>23</sup>	b <sup>48</sup>	b <sup>50</sup>	.05	.17	1.47
F	<i>Thermopsis montana</i>	-	-	1	-	-	.00	-
F	<i>Townsendia</i> spp.	-	-	2	1	-	.00	.00
F	Unknown forb-perennial	1	-	-	-	-	-	-
Total for Annual Forbs		0	34	70	711	0.09	0.22	7.20
Total for Perennial Forbs		40	24	127	154	0.05	0.46	2.64
Total for Forbs		40	58	197	865	0.15	0.68	9.84

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

#### BROWSE TRENDS --

Management unit 16B, Study no: 19

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	<i>Artemisia tridentata wyomingensis</i>	86	95	62	12.75	13.66	3.66
B	<i>Atriplex canescens</i>	0	1	0	-	-	-
B	<i>Ephedra viridis</i>	0	0	1	-	-	-
B	<i>Gutierrezia sarothrae</i>	28	88	30	.08	3.01	.32
B	<i>Juniperus osteosperma</i>	0	0	1	1.25	-	.15
B	<i>Opuntia fragilis</i>	75	76	51	1.29	2.41	1.03
B	<i>Pinus edulis</i>	0	3	3	3.08	4.51	2.00
Total for Browse		189	263	148	18.48	23.60	7.18

CANOPY COVER, LINE INTERCEPT --

Management unit 16B, Study no: 19

Species	Percent Cover	
	'99	'04
Artemisia tridentata wyomingensis	-	1.79
Gutierrezia sarothrae	-	.21
Opuntia fragilis	-	.20
Pinus edulis	10.19	12.06

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 16B, Study no: 19

Species	Average leader growth (in)
	'04
Artemisia tridentata wyomingensis	2.1

POINT-QUARTER TREE DATA --

Management unit 16B, Study no: 19

Species	Trees per Acre	
	'99	'04
Juniperus osteosperma	17	-
Pinus edulis	100	146

Average diameter (in)	
'99	'04
2.7	-
2.1	2.6

BASIC COVER --

Management unit 16B, Study no: 19

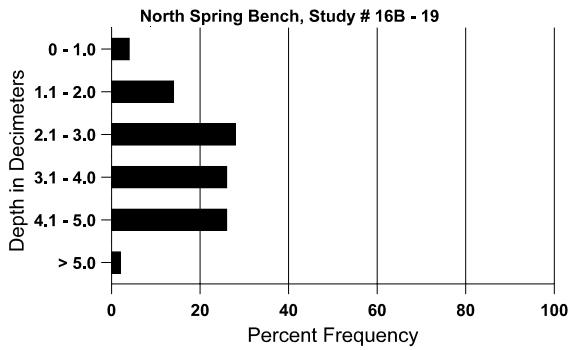
Cover Type	Average Cover %			
	'88	'94	'99	'04
Vegetation	12.25	26.72	36.40	22.96
Rock	1.25	1.11	.79	.83
Pavement	.25	.20	.27	.54
Litter	27.25	34.23	32.38	37.97
Cryptogams	6.50	2.03	8.32	2.43
Bare Ground	52.50	46.56	36.29	45.27

SOIL ANALYSIS DATA --

Management unit 16B, Study no: 19, Study Name: North Spring Bench

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
16.0	60.3 (11.8)	7.2	57.3	20.2	22.6	1.2	10.9	51.2	0.6

# Stoniness Index



## PELLET GROUP DATA --

Management unit 16B, Study no: 19

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	45	54	44
Elk	4	-	12
Deer	76	82	68

Days use per acre (ha)	
'99	'04
-	-
-	10 (25)
159 (392)	263 (650)

## BROWSE CHARACTERISTICS --

Management unit 16B, Study no: 19

		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>												
88	<b>6065</b>	-	266	2666	3133	-	53	32	52	2	10	14/18
94	<b>4580</b>	1180	120	1640	2820	1180	49	8	62	27	27	37/35
99	<b>6320</b>	760	1480	2900	1940	1720	15	48	31	12	14	17/26
04	<b>2060</b>	20	60	-	2000	3440	3	88	97	91	91	12/18
<i>Atriplex canescens</i>												
88	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
94	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
99	<b>60</b>	-	60	-	-	-	100	0	-	-	0	-/-
04	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
88	<b>199</b>	-	66	133	-	-	67	0	-	-	33	6/5
94	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
99	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
04	<b>0</b>	-	-	-	-	-	0	0	-	-	0	10/9

		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)
<i>Ephedra viridis</i>												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	0	-	-	-	-	-	0	0	-	-	0	-/-
04	40	-	-	40	-	-	0	0	-	-	0	13/18
<i>Gutierrezia sarothrae</i>												
88	17266	1200	4733	11933	600	-	4	.77	3	-	.38	7/5
94	860	-	200	640	20	-	0	0	2	-	0	6/6
99	16500	1020	3920	12540	40	-	9	.36	0	.24	.60	4/6
04	1340	160	100	1240	-	20	6	0	0	-	0	5/6
<i>Juniperus osteosperma</i>												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	0	20	-	-	-	-	0	0	-	-	0	-/-
04	20	-	20	-	-	-	0	0	-	-	0	-/-
<i>Opuntia fragilis</i>												
88	7199	-	2333	3733	1133	-	0	0	16	.55	22	2/4
94	4800	-	160	4640	-	-	0	0	0	-	0	2/8
99	4900	-	740	3800	360	100	0	0	7	7	19	2/6
04	1920	-	260	1560	100	100	0	0	5	3	3	3/7
<i>Pinus edulis</i>												
88	266	-	200	66	-	-	75	0	-	-	0	109/118
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	60	-	40	20	-	-	0	0	-	-	0	-/-
04	60	-	-	60	-	-	0	0	-	-	0	-/-