

Trend Study 1-18-06

Study site name: Bedke Spring .

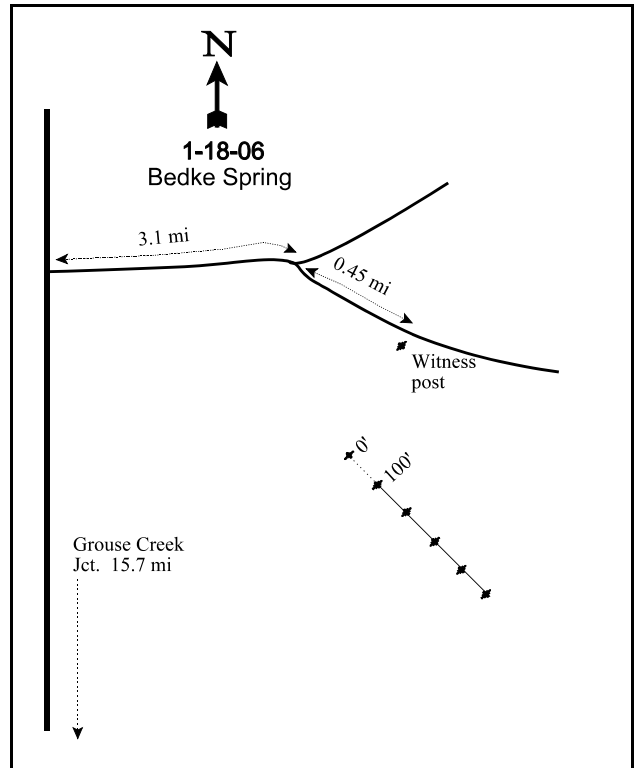
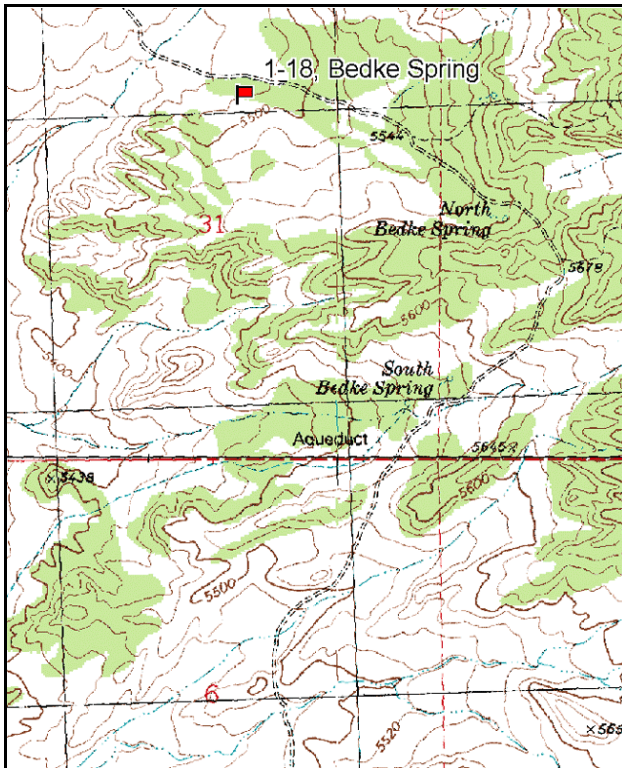
Vegetation type: Big Sagebrush .

Compass bearing: frequency baseline: 110 degrees magnetic.

Frequency belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From the Grouse Creek Junction on U-30 travel north for 15.7 miles. Turn right and travel east for 3.1 miles. Stay right and continue 0.45 miles to a witness post on the right hand side of the road. The baseline is approximately 300 feet in a southerly direction on a small bench. The baseline runs 110 degrees magnetic.



Map Name: Ingham Canyon

Diagrammatic Sketch

Township 11N, Range 17W, Section 31

UTM NAD 27, UTM 12T 4613021 N, 263661 E

## DISCUSSION

### Bedke Spring - Trend Study No. 1-18

#### Study Information

This trend study samples a Wyoming big sagebrush flat surrounded by juniper and pinyon located just west of North Bedke Spring (elevation: 5,500 feet, slope: 3-5%, aspect: northwest). The area is managed by the BLM. Cattle use the area during the spring as part of the Red Butte allotment. A pellet group transect in 2001 estimated 2 deer and 11 cow days use/acre (5 ddu/ha and 27 cdu/ha). In 2006, 5 elk, 6 deer, and 15 cow days use/acre (12 edu/ha, 15 ddu/ha, and 36 cdu/ha) were estimated. Quadrat frequency of rabbit pellets was very high in 2006.

#### Soil

The Puett soil series consists of shallow, well drained soils that formed in residuum and colluvium derived from tuff and tuffaceous sedimentary rocks (USDA-NRCS 2006). Effective rooting depth was estimated at 18 inches using a soil penetrometer. Soil texture is a clay loam with few rocks on the surface or within the profile. Soil reaction is slightly alkaline (7.7 pH). Phosphorus is low (5.4 ppm), which may limit plant growth (Tiedemann and Lopez 2004). The soil is light colored in the interspaces with little organic matter buildup in the surface horizon. There are large areas of unprotected bare soil. Water movement is evident on the surface and soil is pedestalled underneath shrubs. There are no active gullies and erosion is not severe due to the gentle slope. The erosion condition class was determined to be slight to moderate in 2001 and slight in 2006.

#### Browse

Wyoming big sagebrush is the dominant browse species, but has been in a state of decline from 1996 to 2006. Sagebrush cover was 8% in 1996, but declined to about 5% by 2006. Density has also declined from 3,360 plants/acre in 1996 to 2,060 plants/acre in 2006. Decadence has increased from 26% to 41% of the population. In 2006, a quarter of the plants sampled were classified as dying. Utilization has been light each time the area was sampled. The decline of this population of sagebrush is likely due to drought and winter injury. Winter injury occurs when water in the cell freezes and ruptures the cell membrane during a cold spell in early fall or spring (Walser et al. 1990). Another injury classified as winter injury is when the plant breaks dormancy during a warm spell in February or March and there is no moisture available to the plant due to drought or frozen ground, which causes the death of the sagebrush crown (Nelson and Tiernan 1983). Winter injury was quite common across the state during the winter of 2002-2003.

Other shrubs contributing additional forage include shadscale, black sagebrush, and a few scattered spiny hopsage. Utilization of these shrubs is light with the exception of a few heavily hedged spiny hopsage which occur in very low numbers.

Narrowleaf low rabbitbrush (an increaser) is very abundant. Cover was 7% in 1996, but dropped to 3% in 2001 and 2% in 2006. Density was 6,600 plants/acre in 1996, but dropped to about 3,800 plants/acre in 2001 and 2006. Black greasewood and threadleaf rubber rabbitbrush are increasers, but not abundant.

#### Herbaceous Understory

The herbaceous understory is fairly well developed for a Wyoming big sagebrush community. Perennial grasses are fairly diverse and on average produce about 7% cover. The most abundant perennial species consist of Sandberg bluegrass, bottlebrush squirreltail, and bluebunch wheatgrass. Since the establishment of this study in 1996, western wheatgrass abundance has increased and bottlebrush squirreltail abundance has decreased. Annual cheatgrass produced less than 1% total cover in 1996, but nested frequency was significantly higher in 2001 and cover was about 3%. In 2006, cheatgrass cover was up to 7%, which was nearly half of the total grass cover. Cheatgrass quadrat frequency has increased from 36% in 1996, to 84% in 2001, to 93% in 2006. The forb composition is also diverse with 23 perennial and 12 annual species sampled since 1996. Hoods phlox is the most abundant forb, producing on average 7% cover.

2001 TREND ASSESSMENT

The browse trend is slightly down. Wyoming big sagebrush, the key species, has declined. Density dropped from 3,360 plants/acre to 2,540 plants/acre. Decadence increased from 26% to 35% of the population. Recruitment is fair (17% of population classified as young) and utilization light. Shadscale density increased 43% and cover increased from 0.3% to 1.2%. The population of the increaser, narrowleaf low rabbitbrush, appears to be decreasing (down by 42%) with decadence increasing from 2% to 43%. The herbaceous understory is fairly diverse and abundant for a Wyoming big sagebrush type. The grass trend is slightly down. The sum of nested frequency for perennial grasses declined by about 10% and cheatgrass significantly increased. The forb trend is down as perennial forbs have declined, while sum of nested frequency of annuals have increased. The DCI score was slightly higher in 2001 due to a greater percentage of young shrubs.

1996 winter range condition (DC Index) - fair-good (45) Lower potential scale

2001 winter range condition (DC Index) - good (49) Lower potential scale

browse - slightly down (-1)      grass - slightly down (-1)      forb - down (-2)

2006 TREND ASSESSMENT

The browse trend is down. Wyoming big sagebrush continued to decline. Density was down by 19%, while decadence increased again, from 35% to 41%. A quarter of the population was classified as dying and young plants were less numerous. Drought and winter injury have likely caused the decline of this sagebrush population. Shadscale was also less abundant in 2006. The grass trend is stable. The abundance of both perennial species and cheatgrass changed very little, although cheatgrass cover was higher. The forb trend is also stable. The DCI score declined due to increased decadence and cheatgrass cover.

winter range condition (DC Index) - fair (43) Lower potential scale

browse - down (-2)      grass - stable (0)      forb - stable (0)

HERBACEOUS TRENDS --

Management unit 01 , Study no: 18

T y p e	Species	Nested Frequency			Average Cover %		
		'96	'01	'06	'96	'01	'06
G	Agropyron cristatum	7	11	14	.30	.10	.72
G	Agropyron smithii	<sub>a</sub> 30	<sub>a</sub> 21	<sub>b</sub> 85	.19	.12	.82
G	Agropyron spicatum	<sub>a</sub> 51	<sub>b</sub> 89	<sub>a</sub> 22	.72	1.11	.73
G	Bromus tectorum (a)	<sub>a</sub> 115	<sub>b</sub> 310	<sub>b</sub> 351	.30	3.50	7.17
G	Elymus sp.	10	-	-	.12	-	-
G	Festuca sp.	2	-	-	.03	-	-
G	Poa fendleriana	2	-	-	.03	-	-
G	Poa secunda	216	218	247	2.92	4.32	5.17
G	Sitanion hystrix	<sub>b</sub> 135	<sub>a</sub> 71	<sub>a</sub> 55	1.19	.89	1.11
Total for Annual Grasses		115	310	351	0.30	3.50	7.17
Total for Perennial Grasses		453	410	423	5.51	6.55	8.56
Total for Grasses		568	720	774	5.82	10.05	15.73
F	Agoseris glauca	-	-	3	-	-	.03
F	Allium acuminatum	1	13	11	.00	.03	.02

Type	Species	Nested Frequency			Average Cover %		
		'96	'01	'06	'96	'01	'06
F	<i>Alyssum alyssoides</i> (a)	-	-	6	-	-	.01
F	<i>Antennaria rosea</i>	a-	a-	b12	-	-	.25
F	<i>Arabis</i> sp.	5	1	-	.04	.03	-
F	<i>Astragalus beckwithii</i>	21	43	33	.12	.59	.65
F	<i>Astragalus cibarius</i>	b35	a7	b41	.20	.05	1.43
F	<i>Astragalus purshii</i>	b13	a5	b19	.14	.00	.16
F	<i>Aster scopulorum</i>	-	-	1	-	-	.00
F	<i>Castilleja angustifolia</i>	2	-	3	.03	-	.03
F	<i>Camelina microcarpa</i> (a)	a-	a3	b66	-	.01	.34
F	<i>Chaenactis douglasii</i>	b23	a3	a7	.05	.00	.04
F	<i>Collomia linearis</i> (a)	4	-	-	.01	-	-
F	<i>Collinsia parviflora</i> (a)	b32	a10	ab19	.10	.02	.06
F	<i>Cordylanthus ramosus</i> (a)	2	-	3	.00	-	.00
F	<i>Crepis acuminata</i>	-	1	-	-	.00	-
F	<i>Cryptantha</i> sp.	b12	a-	a1	.06	-	.00
F	<i>Delphinium nuttallianum</i>	-	4	3	-	.01	.00
F	<i>Descurainia pinnata</i> (a)	a11	b122	a5	.01	.42	.01
F	<i>Erigeron</i> sp.	a-	a6	b14	-	.18	.11
F	<i>Eriogonum ovalifolium</i>	1	3	-	.00	.00	-
F	<i>Erigeron pumilus</i>	b50	a10	a5	.34	.02	.01
F	<i>Eriogonum umbellatum</i>	-	1	2	-	.00	.03
F	<i>Gilia</i> sp. (a)	a2	b29	a3	.01	.10	.00
F	<i>Lathyrus brachycalyx</i>	-	1	-	-	.00	-
F	<i>Lappula occidentalis</i> (a)	a22	b77	b48	.06	.13	.16
F	<i>Lomatium</i> sp.	-	-	-	-	-	.01
F	<i>Microsteris gracilis</i> (a)	a-	b33	c114	-	.08	.79
F	<i>Penstemon cyananthus</i>	b24	a-	a4	.25	-	.04
F	<i>Phlox hoodii</i>	240	240	217	6.65	8.27	6.41
F	<i>Phlox longifolia</i>	b67	ab52	a32	.32	.45	.31
F	<i>Ranunculus testiculatus</i> (a)	11	196	183	.01	1.57	1.25
F	<i>Tragopogon dubius</i>	-	-	1	-	-	.03
F	Unknown forb-annual (a)	4	-	-	.03	-	-
F	Unknown forb-perennial	-	4	-	-	.01	-
F	<i>Veronica biloba</i> (a)	-	-	3	-	-	.01
Total for Annual Forbs		88	470	450	0.26	2.34	2.65
Total for Perennial Forbs		494	394	409	8.22	9.67	9.60

T y p e	Species	Nested Frequency			Average Cover %		
		'96	'01	'06	'96	'01	'06
	Total for Forbs	582	864	859	8.48	12.01	12.25

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

#### BROWSE TRENDS --

Management unit 01 , Study no: 18

T y p e	Species	Strip Frequency			Average Cover %		
		'96	'01	'06	'96	'01	'06
B	Artemisia nova	1	3	0	.76	.03	-
B	Artemisia tridentata wyomingensis	76	70	60	7.83	6.91	4.90
B	Atriplex confertifolia	23	33	35	.31	1.22	2.46
B	Chrysothamnus nauseosus consimilis	2	1	1	-	.03	.38
B	Chrysothamnus viscidiflorus stenophyllus	86	70	74	7.31	3.35	2.33
B	Grayia spinosa	0	1	0	.30	-	-
B	Opuntia sp.	7	14	15	.15	.06	.09
B	Sarcobatus vermiculatus	2	2	3	.38	.78	1.00
	Total for Browse	197	194	188	17.04	12.40	11.19

#### CANOPY COVER, LINE INTERCEPT --

Management unit 01 , Study no: 18

Species	Percent Cover
	'06
Artemisia tridentata wyomingensis	6.06
Atriplex confertifolia	2.90
Chrysothamnus nauseosus consimilis	.75
Chrysothamnus viscidiflorus stenophyllus	3.65
Opuntia sp.	.15
Sarcobatus vermiculatus	.46

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 01 , Study no: 18

Species	Average leader growth (in)	
	'01	'06
Artemisia tridentata wyomingensis	1.3	0.8

BASIC COVER --

Management unit 01 , Study no: 18

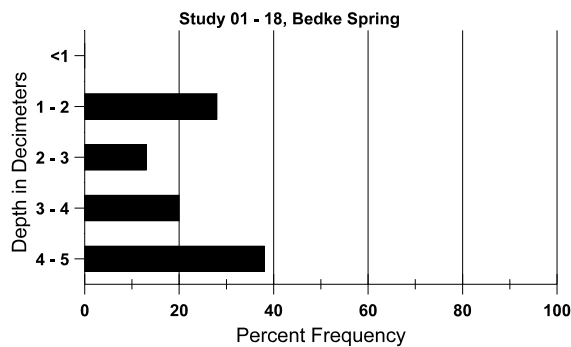
Cover Type	Average Cover %		
	'96	'01	'06
Vegetation	29.98	34.56	38.54
Rock	2.48	.67	.64
Pavement	6.25	10.18	7.13
Litter	28.97	22.69	24.74
Cryptogams	7.75	12.10	7.60
Bare Ground	27.96	31.32	38.42

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 18, Bedke Spring

Effective rooting depth (in)	Temp °F (depth)	PH	Clay loam			%0M	PPM P	PPM K	dS/m
			% sand	% silt	% clay				
18.0	57.2 (16.6)	7.7	36.7	30.0	33.3	2.2	5.4	387.2	0.6

Stoniness Index



PELLET GROUP DATA --

Management unit 01 , Study no: 18

Type	Quadrat Frequency		
	'96	'01	'06
Rabbit	7	2	49
Elk	3	-	-
Deer	6	1	10
Cattle	1	3	3

Days use per acre (ha)	
'01	'06
-	-
-	5 (12)
2 (5)	6 (15)
11 (27)	15 (36)

BROWSE CHARACTERISTICS --

Management unit 01 , Study no: 18

		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>Artemisia nova</b>												
96	<b>40</b>	-	-	20	20	80	100	0	50	-	0	10/26
01	<b>60</b>	-	-	40	20	80	0	0	33	-	0	13/24
06	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
<b>Artemisia tridentata wyomingensis</b>												
96	<b>3360</b>	20	200	2300	860	1040	13	0	26	4	5	22/31
01	<b>2540</b>	40	420	1240	880	1100	5	0	35	13	14	22/28
06	<b>2060</b>	-	160	1060	840	1680	8	0	41	25	25	21/25
<b>Atriplex confertifolia</b>												
96	<b>1160</b>	200	880	280	-	-	2	0	0	-	0	8/10
01	<b>2020</b>	20	780	1200	40	-	0	0	2	-	0	8/15
06	<b>1620</b>	-	140	1280	200	-	0	0	12	6	10	12/22
<b>Chrysothamnus nauseosus consimilis</b>												
96	<b>40</b>	-	20	20	-	-	0	0	-	-	0	21/31
01	<b>20</b>	-	-	20	-	-	0	0	-	-	0	24/49
06	<b>20</b>	-	-	20	-	-	0	0	-	-	0	28/50
<b>Chrysothamnus viscidiflorus stenophyllus</b>												
96	<b>6600</b>	20	220	6220	160	-	.60	0	2	-	.30	11/15
01	<b>3820</b>	340	220	1940	1660	320	0	0	43	14	14	9/13
06	<b>3840</b>	360	200	3400	240	20	9	2	6	.52	.52	9/13
<b>Grayia spinosa</b>												
96	<b>0</b>	-	-	-	-	-	0	0	-	-	0	18/40
01	<b>20</b>	-	20	-	-	-	0	0	-	-	0	15/25
06	<b>0</b>	-	-	-	-	-	0	0	-	-	0	17/40

		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>Opuntia</i> sp.												
96	<b>140</b>	-	40	100	-	-	0	0	0	-	0	5/9
01	<b>300</b>	40	40	260	-	-	0	0	0	-	0	4/7
06	<b>320</b>	20	20	280	20	-	0	0	6	-	6	5/13
<i>Sarcobatus vermiculatus</i>												
96	<b>80</b>	-	80	-	-	-	0	0	-	-	0	26/33
01	<b>60</b>	-	40	20	-	-	0	0	-	-	0	38/57
06	<b>80</b>	-	40	40	-	-	0	0	-	-	0	21/32