

Trend Study 13B-8-05

Study site name: Steamboat Mesa South .

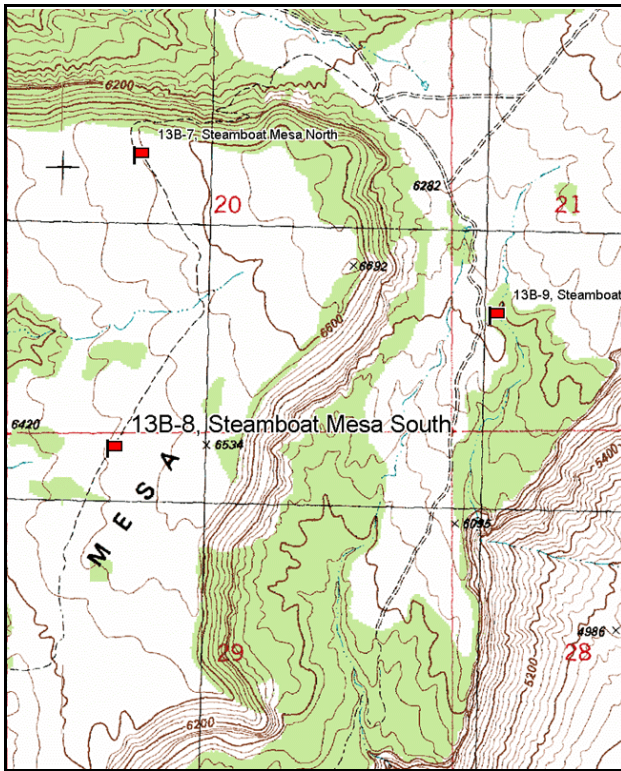
Vegetation type: Wyoming big sagebrush .

Compass bearing: frequency baseline 165 degrees magnetic..

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

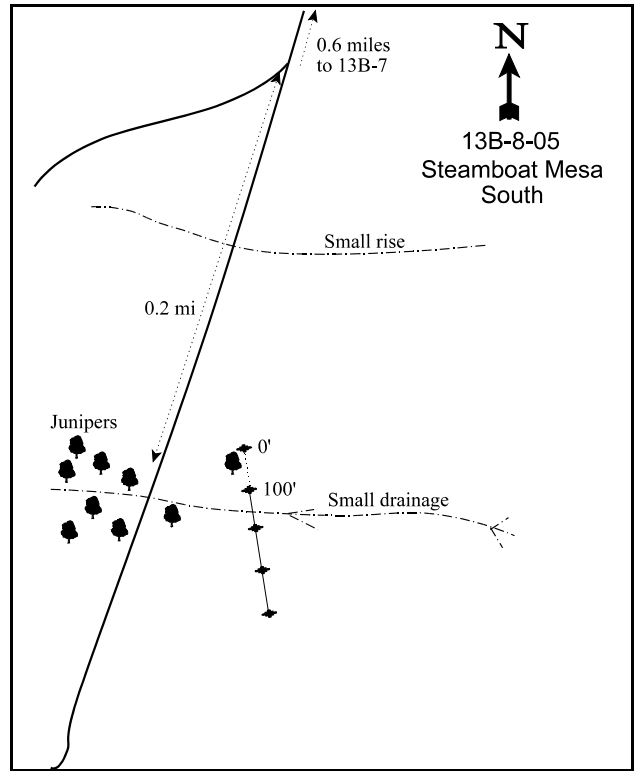
LOCATION DESCRIPTION

Start from site number 13B-7, Steamboat Mesa North. Continue south on the same road for 0.6 miles to a fork. Proceed straight 0.2 miles (halfway to an enclosure) to a large Juniper in a sagebrush-grass flat. The baseline 0-foot stake (tag #7812) is located north of the tree.



Map Name: Steamboat Mesa

Township 23S, Range 26E, Section 29



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4294148 N, 666651 E

## DISCUSSION

### Steamboat Mesa South - Trend Study No. 13B-8

Located approximately 3/4 miles south of study site 13B-7, the Steamboat Mesa South site samples a habitat type once dominated by native vegetation, although not in a completely natural condition. This open rolling site may be an example of a former sagebrush park undergoing a conversion to an annual grass-sagebrush type due to excessive livestock use. The mesa slopes gently to the west at an elevation of 6,500 feet. A large enclosure is located to the south of the study. Two pellet group transects are also located on Steamboat Mesa. The lower elevation transect (6,300 feet) showed an average of 27 deer days use/acre (67 ddu/ha) between 1986 and 1997. The pellet transect located at 6,700 feet, and closer to the this study, averaged 23 deer days use/acre (56 ddu/ha) for the same time period. Pellet group data from 2000 estimated 86 deer days use/acre (212 ddu/ha) and 46 cow days use/acre (114 cdu/ha). Pellet group data from 2005 estimated 13 deer, 2 elk, and 22 cow days use/acre ( 33 ddu/ha, 5 edu/ha, and 56 cdu/ha). All of the cattle and most of the deer use appeared to be from the previous winter and autumn.

The surface soil texture is a sandy clay loam with no rocks or pavement on the surface. Effective rooting depth was measured to be about 13 inches and soil reaction was neutral (pH 6.9). Low amounts of phosphorus (4.9 ppm) and marginal amounts of potassium (67.2 ppm) were measured, where 6 ppm phosphorus and 60 ppm potassium are the levels under which normal plant development and growth may be hindered in wildland soils (Tiedemann and Lopez 2004). Relative bare ground cover increased from 12% in 1995 to 35% in 2000, then decreased to 9% in 2005. Relative litter cover continually decreased from 50% in 1995 to 31% in 2005. However, relative vegetation cover decreased from 36% in 1995 to 23% in 2000, then increased to 61% in 2005. This helps illustrate the point that you cannot depend on annuals to provide consistent litter or vegetation cover from year to year. In 2005, the erosion condition class determined soil movement as stable.

Wyoming big sagebrush, the key browse species, density was estimated at 2,332 plants/acre in 1986, 1,620 plants/acre in 1995, 2,480 plants/acre in 2000, and 1,540 plants/acre in 2005. This difference in density was mainly due to the changing proportions of young individuals within the population. The population appeared vigorous with moderate to heavy use reported in 1986, light use in 1995, and heavy use in 2000 and 2005. Only 2% of the population was decadent until 2005 when it escalated to 21%. The proportion of individuals classified as dying and those with poor vigor had been low until 2005 when dying individuals contributed to 10% of the population and those with poor vigor 23%. Winterfat was also sampled on this site, but was in very low numbers, vigorous, and with no signs of utilization until 2005, when no individuals were sampled. Escape and thermal cover is provided by scattered junipers along washes and tops of ridges. Most of the trees have been highlined.

Cheatgrass was the most dominant species in 1995 and 2005. It was sampled in at least 95% of the quadrats in each of those years. Cheatgrass cover was 15% in 1995 and over 50% in 2005. In 2000 when conditions were much drier, cheatgrass was only sampled in 64% of the quadrats and cover was only 3%. In 2000 the dominant species was needle-and-thread, which had 16% cover and was sampled in 93% of the quadrats. In 2005, needle-and-thread nested frequency was significantly lower, quadrat frequency declined to 48%, and cover was only 2%. Other perennial species include galleta, Indian ricegrass, Sandberg bluegrass. Scarlet globemallow has been the only common perennial forb. It was significantly lowest in 2000, but increased in 2005 to the same level as 1995. Cover was nearly 3% in 2005. Annual forbs have been common with each reading. Woolly plantain was particularly abundant in 2005 with nearly 6% cover.

### 1986 APPARENT TREND ASSESSMENT

The soil appears stable with no signs of erosion on the study site. The vegetation trend appears generally stable in terms of succession, except for the form and vigor of Wyoming big sagebrush. In the past there had been

signs of sagebrush that had died, most likely from overuse and/or prolonged drought. A series of winters without constant snow cover and use by cattle could be very detrimental to the sagebrush population. Currently, the sagebrush appears healthy, but the stand density is relatively low.

#### 1995 TREND ASSESSMENT

The soil is adequately covered by both vegetation and litter. Both adequate ground cover and no signs of erosion indicate a stable soil trend. Grass cover is good, but most comes from undesirable annual species. Cheatgrass is abundant and contributes large quantities of fine fuel and litter. Furthermore, 70% of the total herbaceous understory cover is contributed by annual species. Most forbs have little forage value, but do aid in soil stabilization. Because cheatgrass dominates the site, there is a high probability of losing the sagebrush population with a single wildfire event. The herbaceous understory trend for this site is considered stable at this time. Wyoming big sagebrush shows less utilization than in the past and exhibits characteristics of a stable population. The difference in sagebrush density is likely due to the larger sample size taken in 1995. Seedlings are very common and the young age class is 46% of the population. The winterfat population is also stable with no observable utilization. The browse trend is considered stable. The Desirable Components Index rated this site as very poor with a score of -1 due to low perennial grass cover, low perennial forb cover, no recruitment of shrubs, low browse cover, and relatively high annual grass cover.

#### TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

winter range condition (DC Index) - Very Poor (-1) Lower Potential scale

#### 2000 TREND ASSESSMENT

Percent bare soil has increased sharply since 1995 with it increasing from 15% to 44% with significant decreases in vegetation and litter cover due to inconsistencies of annual grass cover each year. The ratio of bare soil to protective cover has also deteriorated with a large decrease in protective cover. In 1995, annuals contributed to 70% of the vegetation cover, where currently they only make up 13% of the vegetation cover. Another clear example of why annual vegetation and litter cover is not an adequate or dependable source of protective cover for the soil. The trend for soil is down. Grass cover is good, with most of it coming from perennial species. The forbs have little forage value and only make up 4% of the vegetation cover. Cheatgrass does not currently dominate the site, therefore it is not a high fire hazard as it was in 1995. The herbaceous understory trend for this site is considered slightly up because of the increased values for perennial species and the decrease in the abundance of annual species. The browse trend is up. Wyoming big sagebrush shows continued moderate to heavy use. Sagebrush density increased 35% as 1,240 young plants/acre increased the population density. It has a fair amount of seedlings and the young age class makes up 50% of the population. The winterfat population is also stable with no observable utilization. The browse trend is considered stable. The Desirable Components Index rated this site as fair with a score of 33 due to excellent perennial grass cover, low perennial forb cover, good recruitment of shrubs, low browse cover, and low annual grass cover.

#### TREND ASSESSMENT

soil - down (-2)

browse - up (+2)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - Fair (33) Lower Potential scale

## 2005 TREND ASSESSMENT

The soil trend is up. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground increased. This is due to a decrease in the relative cover of bare ground from 35% in 2000 to 9% in 2005, as well as a relative vegetation cover increase from 23% in 2000 to 61% in 2005. Although this increase of vegetation cover increases the stability of the soil, it is only temporary. Of the total vegetation cover, 74% is from cheatgrass alone, which can change from year to year based on precipitation levels. This aside, the nested frequency of perennial forbs increased 139%. The trend for browse is down. The key browse, Wyoming big sagebrush, density decreased 38%. The proportion of young plants declined from 50% of the population to 13% in 2005. Decadence increased from 2% to 21%, while plants classified as dying increased from 2% to 10% of the population. Winterfat, decreased from 100 plants/acre in 2000 to 0 in 2005. The trend for herbaceous understory is down. This trend is due to a drastic increase in cheatgrass and decrease in perennial grasses. From 2000 to 2005, the nested frequency of cheatgrass increased 109% and the total percent cover increased from 3 to 52%. The quadrat frequency of cheatgrass increased from 64% in 2000 to 97% in 2005. This cheatgrass increase correlated with a 52% decrease in the nested frequency of perennial grasses from 2000 to 2005. Although the nested frequency of perennial forbs increased 109%, this increase was minuscule compared to the cheatgrass increase. Not only does the cheatgrass make wild fire danger very high, but it also makes the establishment of young perennials very difficult to impossible. The Desirable Components Index rated this site as very poor with a score of -1 due to low perennial grass cover, moderate perennial forb cover, low recruitment of shrubs, low browse cover, and very high annual grass cover.

### TREND ASSESSMENT

soil - up (+2)

browse - down (-2)

herbaceous understory - down (-2)

winter range condition (DC Index) - Very Poor (-1) Lower Potential scale

### HERBACEOUS TRENDS --

Management unit 13B, Study no: 8

Type	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
G	<i>Agropyron cristatum</i>	-	7	-	2	.01	-	.38
G	<i>Bromus tectorum</i> (a)	-	<sub>b</sub> 341	<sub>a</sub> 181	<sub>c</sub> 379	15.05	3.09	51.76
G	<i>Hilaria jamesii</i>	<sub>a</sub> 17	<sub>b</sub> 52	<sub>b</sub> 52	<sub>a</sub> 18	.79	1.58	.25
G	<i>Oryzopsis hymenoides</i>	6	20	7	14	.77	.21	.60
G	<i>Poa bulbosa</i>	-	-	-	6	-	-	.18
G	<i>Poa fendleriana</i>	<sub>b</sub> 26	<sub>ab</sub> 16	<sub>a</sub> 5	<sub>a</sub> -	.05	.16	.00
G	<i>Poa secunda</i>	<sub>a</sub> -	<sub>c</sub> 117	<sub>b</sub> 54	<sub>b</sub> 53	.65	.52	.78
G	<i>Sitanion hystrix</i>	<sub>b</sub> 11	<sub>a</sub> -	<sub>a</sub> -	<sub>a</sub> -	-	-	-
G	<i>Sporobolus cryptandrus</i>	<sub>a</sub> 7	<sub>a</sub> -	<sub>b</sub> 19	<sub>a</sub> -	-	.81	-
G	<i>Stipa comata</i>	<sub>b</sub> 257	<sub>a</sub> 91	<sub>b</sub> 260	<sub>a</sub> 98	.70	16.47	2.30
G	<i>Vulpia octoflora</i> (a)	-	<sub>b</sub> 231	<sub>a</sub> 6	<sub>a</sub> 25	1.08	.01	.40
Total for Annual Grasses		0	572	187	404	16.14	3.11	52.16
Total for Perennial Grasses		324	303	397	191	2.99	19.77	4.51
Total for Grasses		324	875	584	595	19.14	22.88	56.68

T y p e	Species	Nested Frequency				Average Cover %		
		'86	'95	'00	'05	'95	'00	'05
F	<i>Astragalus mollissimus</i>	a-	b <sup>29</sup>	a-	b <sup>15</sup>	.24	-	.09
F	<i>Calochortus nuttallii</i>	a-	c <sup>59</sup>	a-	b <sup>14</sup>	.14	-	.04
F	<i>Cymopterus</i> sp.	-	6	-	-	.01	-	-
F	<i>Descurainia pinnata</i> (a)	-	-	-	6	-	-	.02
F	<i>Draba nemorosa</i> (a)	-	b <sup>15</sup>	c <sup>51</sup>	a-	.02	.16	-
F	<i>Erodium cicutarium</i> (a)	-	a-	b <sup>16</sup>	a-	-	.03	-
F	<i>Erigeron pumilus</i>	-	a-	b <sup>11</sup>	a-	.00	.02	-
F	<i>Gilia hutchinifolia</i> (a)	-	b <sup>32</sup>	a <sup>2</sup>	a <sup>1</sup>	.08	.00	.00
F	<i>Grindelia squarrosa</i>	-	1	-	-	.00	-	-
F	<i>Hedysarum</i> sp.	-	6	-	-	.18	-	-
F	<i>Lappula occidentalis</i> (a)	-	b <sup>16</sup>	a-	a-	.06	-	-
F	<i>Lactuca serriola</i>	-	b <sup>30</sup>	a-	a <sup>2</sup>	.08	-	.00
F	<i>Lepidium densiflorum</i> (a)	-	b <sup>201</sup>	a-	c <sup>236</sup>	.95	-	2.82
F	<i>Leucelene ericoides</i>	-	9	10	6	.16	.33	.30
F	<i>Machaeranthera grindelioides</i>	a-	b <sup>10</sup>	a-	ab <sup>3</sup>	.03	-	.01
F	<i>Phlox hoodii</i>	-	4	-	-	.03	-	-
F	<i>Phlox longifolia</i>	-	4	-	2	.01	-	.00
F	<i>Plantago patagonica</i> (a)	-	b <sup>232</sup>	a <sup>64</sup>	b <sup>248</sup>	2.34	.22	5.65
F	<i>Polygonum douglasii</i> (a)	-	2	-	-	.00	-	-
F	<i>Ranunculus testiculatus</i> (a)	-	3	-	-	.00	-	-
F	<i>Schoenocrambe linifolia</i>	-	b <sup>35</sup>	a-	a <sup>5</sup>	.08	-	.09
F	<i>Sisymbrium altissimum</i> (a)	-	a <sup>50</sup>	b-	a <sup>58</sup>	.18	-	.59
F	<i>Sphaeralcea coccinea</i>	c <sup>207</sup>	b <sup>108</sup>	a <sup>45</sup>	b <sup>111</sup>	1.09	.34	2.56
F	<i>Tragopogon dubius</i>	c <sup>69</sup>	b <sup>21</sup>	a-	a-	.05	-	-
F	<i>Trifolium</i> sp.	-	2	-	-	.00	-	-
F	Unknown forb-perennial	15	24	-	-	.06	-	-
Total for Annual Forbs		0	551	133	549	3.66	0.41	9.10
Total for Perennial Forbs		291	348	66	158	2.20	0.69	3.11
Total for Forbs		291	899	199	707	5.86	1.11	12.22

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

BROWSE TRENDS --

Management unit 13B, Study no: 8

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	Artemisia tridentata wyomingensis	40	45	40	1.53	2.34	2.50
B	Ceratoides lanata	2	2	0	-	-	.00
B	Juniperus osteosperma	0	0	0	-	-	.00
B	Gutierrezia sarothrae	0	0	1	-	-	-
B	Opuntia sp.	0	1	0	-	-	-
B	Pinus edulis	0	1	1	1.82	.98	-
Total for Browse		42	49	42	3.36	3.32	2.51

CANOPY COVER, LINE INTERCEPT --

Management unit 13B, Study no: 8

Species	Percent Cover	
	'00	'05
Artemisia tridentata wyomingensis	-	2.66
Ceratoides lanata	-	.51
Juniperus osteosperma	3.40	3.79
Pinus edulis	1.39	1.60

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 13B, Study no: 8

Species	Average leader growth (in)
	'05
Artemisia tridentata wyomingensis	2.1

BASIC COVER --

Management unit 13B, Study no: 8

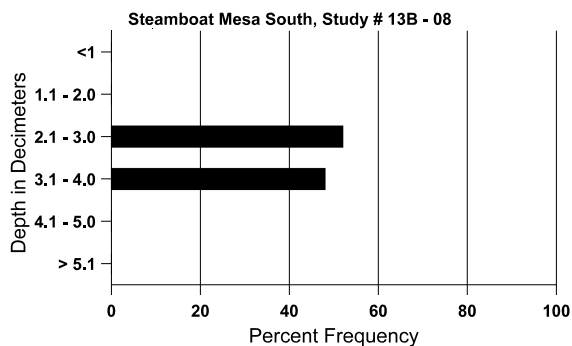
Cover Type	Average Cover %			
	'86	'95	'00	'05
Vegetation	6.00	44.37	29.38	70.27
Rock	0	0	0	0
Pavement	0	0	0	0
Litter	67.00	60.84	51.45	35.38
Cryptogams	0	1.98	.86	.05
Bare Ground	27.00	14.81	43.76	10.03

SOIL ANALYSIS DATA --

Herd Unit 13B, Study # 8, Study Name: Steamboat Mesa South

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
13.0	62.4 (14.6)	6.9	54.6	23.1	25.3	1.4	4.9	67.2	0.5

### Stoniness Index



PELLET GROUP DATA --

Management unit 13B, Study no: 8

Type	Quadrat Frequency			Days use per acre (ha)	
	'95	'00	'05	'00	'05
Rabbit	5	41	2	-	-
Elk	-	-	1	-	2 (5)
Deer	18	33	5	86 (212)	13 (33)
Cattle	21	17	12	46 (113)	23 (56)

BROWSE CHARACTERISTICS --

Management unit 13B, Study no: 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)
<b>Artemisia tridentata wyomingensis</b>												
86	<b>2332</b>	133	1200	1066	66	-	46	37	3	-	0	17/12
95	<b>1620</b>	160	740	840	40	-	27	1	2	2	2	17/25
00	<b>2480</b>	20	1240	1180	60	40	28	44	2	2	2	14/21
05	<b>1540</b>	20	200	1020	320	160	10	75	21	10	23	15/21
<b>Ceratoides lanata</b>												
86	<b>66</b>	-	-	66	-	-	0	100	-	-	0	14/11
95	<b>60</b>	-	40	20	-	-	0	0	-	-	0	11/16
00	<b>100</b>	-	-	100	-	-	0	0	-	-	0	14/15
05	<b>0</b>	-	-	-	-	-	0	0	-	-	0	16/19

		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>Chrysothamnus nauseosus</i>													
86	0	-	-	-	-	-	0	0	-	-	0	-/-	
95	0	-	-	-	-	-	0	0	-	-	0	-/-	
00	0	-	-	-	-	-	0	0	-	-	0	19/28	
05	0	-	-	-	-	-	0	0	-	-	0	-/-	
<i>Gutierrezia sarothrae</i>													
86	0	-	-	-	-	-	0	0	-	-	0	-/-	
95	0	-	-	-	-	-	0	0	-	-	0	-/-	
00	0	-	-	-	-	-	0	0	-	-	0	-/-	
05	20	-	-	20	-	-	0	0	-	-	0	-/-	
<i>Opuntia sp.</i>													
86	0	-	-	-	-	-	0	0	-	-	0	-/-	
95	0	-	-	-	-	-	0	0	-	-	0	-/-	
00	20	-	20	-	-	-	0	0	-	-	0	-/-	
05	0	-	-	-	-	-	0	0	-	-	0	4/15	
<i>Pinus edulis</i>													
86	0	-	-	-	-	-	0	0	-	-	0	-/-	
95	0	-	-	-	-	-	0	0	-	-	0	-/-	
00	20	-	-	20	-	-	0	0	-	-	0	-/-	
05	20	-	-	20	-	-	0	0	-	-	0	-/-	