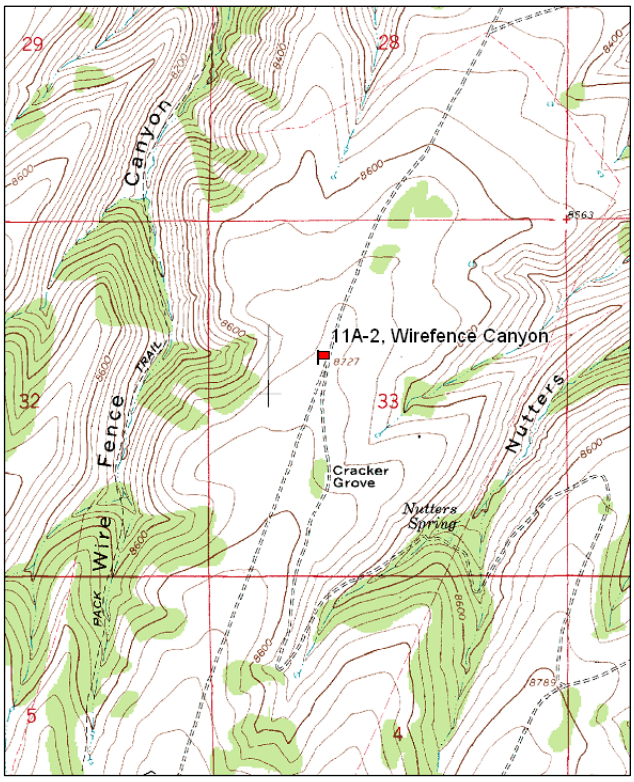
WIREFENCE CANYON - TREND STUDY NO. 11A-2-10

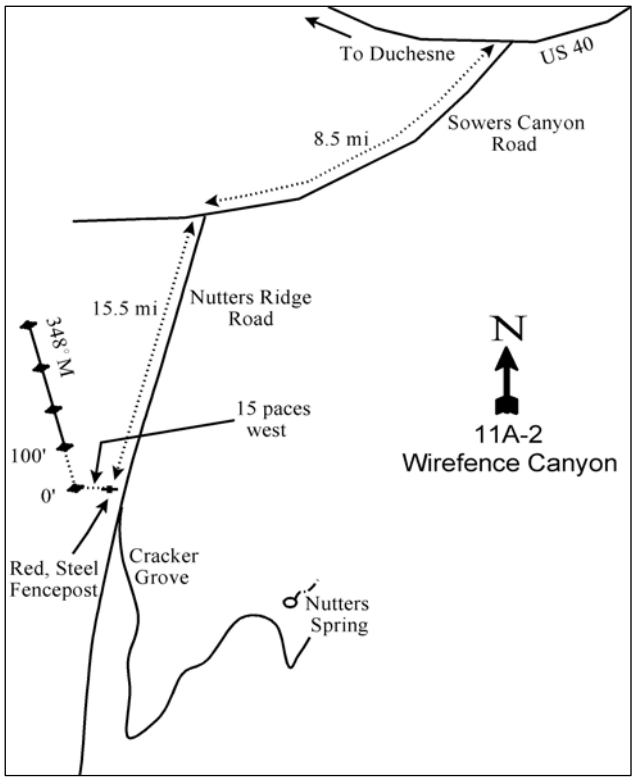
Vegetation Type: Mountain Big Sagebrush
Range Type: Crucial Deer Summer (Fawning habitat), Crucial Elk Summer
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8738 ft. (2664 m)
Aspect: West
Slope: 3%
Transect bearing: 348° magnetic
Belt placement: line 1 (16 & 86ft), line 2 (33ft), line 3 (52ft), line 4 (66ft). Belt 3 and belt 5 rebar @ 2ft.

Directions:
From the junction of Highway U.S. 40 and the Sowers Canyon Road (near Bridgeland), drive south on the Sowers Canyon Road for 8.5 miles to the Nutters Ridge Road. Turn left here by an old ranch and proceed south along Nutters Ridge for 15.5 miles to a narrow "Y" in the road. Six paces west of the fork is a red steel fencepost. The 0-foot baseline stake is 15 paces west of the red fencepost and is marked by browse tag #9145.

Map Name: Anthro Mountain



Diagrammatic Sketch:



Township: 6S Range: 5W Section: 33

GPS: NAD 83, UTM 12S 546461 E 4418780 N

WIREFENCE CANYON - TREND STUDY NO. 11A-2

Site Information

Site Description: The study is located on summer range within a large mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and grass park occupying a flat ridge between the uppermost reaches of Wirefence and Nutters Canyons. This study is located immediately adjacent to an old permanent line-intercept study established in 1977 and is intended to replace it. After decades of season-long grazing by cattle and sheep from 1915 to 1944, a summer rest-rotation grazing system was established in 1972. Grazing in the area is managed by the U.S. Forest service as part of the Anthro Mountain allotment. Escape or thermal cover is lacking and the nearest cover is ½ mile away in Nutters Canyon or within an isolated, but badly depleted, aspen (*Populus tremuloides*) grove approximately the same distance to the southeast. Information provided by the Ashley National Forest indicates that numerous treatments have been done on the Anthro Mountain allotment, including plowing and seeding on this particular study site (a 2,363 acre treatment) in 1958 and 1959. In the fall of 2007 the area was treated with a prescribed fire (WRI Project #841), though the transect appears to have not been burned. Pellet group transect data estimated light use by deer in 2000 and 2010, with moderate use in 2005. Estimated elk use has been light and estimated cattle use has been moderate since 2000. Several sage grouse pellet groups were sampled in 2005 (Table - Pellet Group Data).

Browse: Mountain big sagebrush was the dominant browse species at the outset of the study, but has steadily decreased in cover (Table - Browse Trends) and density since 1995. The mountain big sagebrush population is a mixture of mature, young and decadent plants that has had mostly moderate use, though use was high in 2010. There was an increase in decadence and poor vigor of the big sagebrush population in 2000. Mountain low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *lanceolatus*) is found at a moderate density that has remained relatively constant over the sample years and has a mostly mature age structure with little use. Other browse species found on the site include broom snakeweed (*Gutierrezia sarothrae*), gray horsebrush (*Tetradymia canescens*), snowberry (*Symphoricarpos oreophilus*) and fringed sagebrush (*Artemisia frigida*).

Herbaceous Understory: The herbaceous understory is the key component on this summer range. Grasses are diverse and abundant on the site with the dominant species being smooth brome (*Bromus inermis*). Other prevalent species include mutton bluegrass (*Poa fendleriana*), prairie junegrass (*Koeleria cristata*) and crested wheatgrass (*Agropyron cristatum*). Perennial forbs are diverse and fairly abundant on the site. Looseflower milkvetch (*Astragalus tenellus*) is the most abundant forb. Annual forbs are present, but occur infrequently (Table - Herbaceous Trends).

Soil: The soil texture is loam with neutral reactivity (pH 7.2). Phosphorus may have limited availability for plant growth and development at 5.1 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is moderately high, but good protective ground cover is provided by the herbaceous understory in vegetation and litter cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2010, but was slight in 2005 because of small pedestals surrounding shrubs and perennial grasses, minor surface rock and litter movement, small rills, as well as minor gullies and flow patterns between perennial species.

Trend Assessments

Browse:

- **1982 to 1988 - up (+2):** The density of mountain big sagebrush increased by 38% from 3,132 plants/acre to 4,331 plants/acre, though much of the increase came through a large increase in the recruitment of young plants which now comprise nearly half of the population.
- **1988 to 1995 - stable (0):** Differences in density may be related to the larger sample area used in 1995; therefore, trend was determined using other parameters. Decadence, vigor and recruitment of young plants remained good in the mountain big sagebrush population.

- **1995 to 2000 - down (-2):** Mountain big sagebrush density decreased by 17% from 4,080 plants/acre to 3,380 plants/acre and cover decreased from 8% to 6%. Decadence of big sagebrush increased from 6% to 19%, and poor vigor increased substantially from 4% to 41%.
- **2000 to 2005 - down (-2):** The density of mountain big sagebrush decreased by 21% to 2,680 plants/acre, and cover decreased to 4%. Poor vigor of sagebrush decreased to 13%, but decadence increased to 31%.
- **2005 to 2010 - down (-2):** There was a 19% decrease in the density of mountain big sagebrush to 2,180 plants/acre, and cover decreased to 3%. Decadence of sagebrush decreased to 14%, but poor vigor increased to 27%.

Grass:

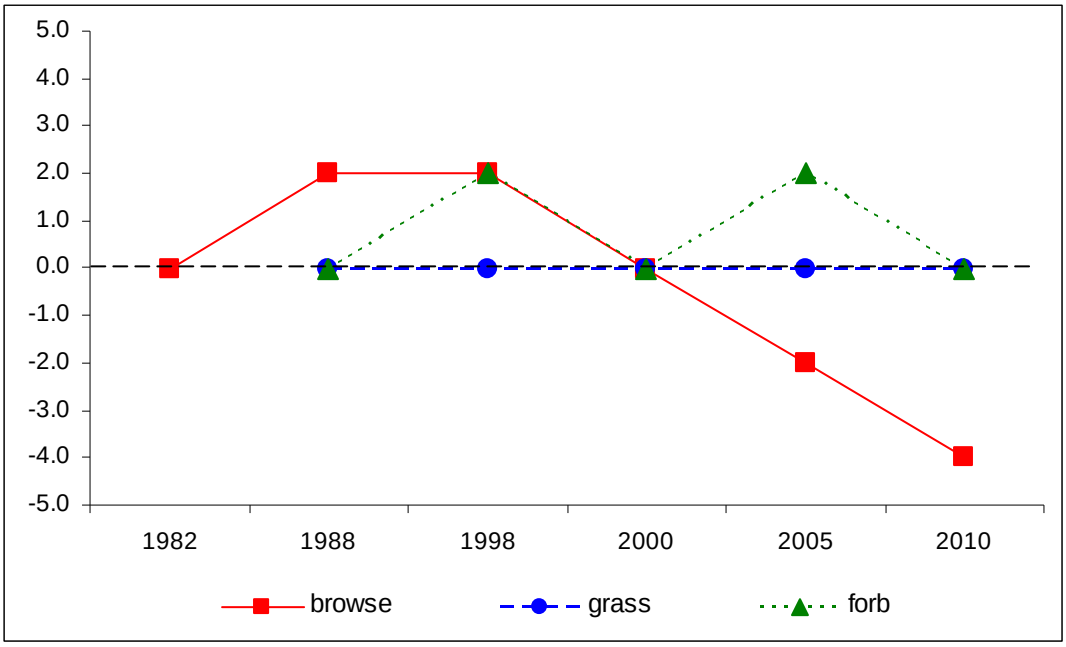
- **1982 to 1988 - no trend (NT):** Only quadrat frequency data for grasses are available from 1982, so no trend was given.
- **1988 to 1995 - stable (0):** There was little change in the sum of nested frequency of perennial grasses.
- **1995 to 2000 - stable (0):** The perennial grass sum of nested frequency changed little, though cover increased from 15% to 24%.
- **2000 to 2005 - stable (0):** The sum of nested frequency of perennial grasses and cover changed little.
- **2005 to 2010 - stable (0):** The sum of nested frequency of perennial grasses decreased slightly to 1988 levels and cover decreased to 19%.

Forb:

- **1982 to 1988 - no trend (NT):** Only quadrat frequency data for forbs are available from 1982, so no trend was given.
- **1988 to 1995 - up (+2):** The sum of nested frequency of perennial forbs increased by 66%.
- **1995 to 2000 - down (-2):** The perennial forb sum of nested frequency decreased by 49% and cover decreased slightly from 10% to 9%.
- **2000 to 2005 - up (+2):** There was a 56% increase in the sum of nested frequency of perennial forbs and cover increased to 11%.
- **2005 to 2010 - down (-2):** The sum of nested frequency decreased by 42% and cover decreased to 6%.

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 11A, Study no: 2



HERBACEOUS TRENDS--
Management unit 11A, Study no: 2

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron cristatum	a16	ab33	ab22	b39	ab29	.97	1.05	1.66	1.13
G	Agropyron intermedium	b41	a3	a8	a8	a18	.01	.16	.09	.13
G	Agropyron spicatum	a-	a-	b13	b14	b14	-	.55	.78	.39
G	Bromus inermis	330	337	334	340	320	9.80	16.74	14.69	13.15
G	Elymus salina	a34	b56	a4	b66	a21	.68	.18	.77	.34
G	Festuca ovina	a-	c45	d72	bc37	ab10	.63	1.30	.43	.22
G	Koeleria cristata	b52	b51	a27	b66	ab50	.73	.73	2.04	1.22
G	Poa fendleriana	c123	a66	bc120	abc83	ab84	1.52	2.95	2.32	1.95
G	Poa secunda	a-	b40	b39	b22	b47	.60	.36	.45	.67
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		596	631	639	675	593	14.96	24.04	23.27	19.23
Total for Grasses		596	631	639	675	593	14.96	24.04	23.27	19.23
F	Agoseris glauca	-	2	-	-	-	.00	-	-	-
F	Allium sp.	-	3	-	2	-	.00	-	.01	-
F	Androsace septentrionalis (a)	-	b32	a7	a8	a5	.06	.01	.07	.01
F	Arabis drummondi	ab4	c20	ab1	bc9	a-	.07	.00	.03	-
F	Aster sp.	a-	b26	a-	a-	a-	.70	-	-	-
F	Astragalus argophyllus	a4	ab23	b33	ab12	ab20	.22	.46	.09	.28
F	Astragalus convallarius	a4	ab12	a4	b17	a2	.05	.03	.16	.00
F	Astragalus detritalis	-	6	-	-	-	.03	-	-	-

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
F	Astragalus tenellus	$_{ab}$132	$_{a}$99	$_{b}$167	$_{a}$132	$_{a}$102	4.39	6.58	4.72	3.67
F	Castilleja flava	$_{b}$19	$_{ab}$12	$_{a}$5	$_{a}$6	$_{a}$-	.14	.04	.09	-
F	Chaenactis douglasii	6	8	-	1	-	.16	-	.00	-
F	Cymopterus longipes	$_{a}$-	$_{d}$122	$_{b}$33	$_{c}$87	$_{b}$13	.77	.22	1.29	.10
F	Descurainia pinnata (a)	-	3	-	2	3	.00	-	.00	.00
F	Erigeron eatonii	$_{abc}$26	$_{bc}$30	$_{a}$7	$_{c}$42	$_{ab}$21	.17	.06	.49	.30
F	Eriogonum alatum	-	-	-	-	3	.00	-	-	.00
F	Eriogonum racemosum	-	-	-	-	3	-	-	-	.01
F	Eriogonum umbellatum	$_{a}$15	$_{b}$65	$_{a}$26	$_{ab}$46	$_{ab}$38	1.56	.78	1.15	.68
F	Gilia sp. (a)	-	-	-	2	-	-	-	.00	-
F	Hedysarum boreale	$_{a}$-	$_{b}$18	$_{a}$4	$_{ab}$15	$_{ab}$4	.25	.00	.22	.15
F	Hymenoxys acaulis	-	1	-	3	3	.00	-	.03	.00
F	Ipomopsis aggregata	8	-	1	2	-	-	.03	.00	-
F	Linum lewisii	$_{ab}$2	$_{a}$-	$_{ab}$3	$_{b}$8	$_{b}$10	.00	.01	.30	.07
F	Lupinus argenteus	6	10	6	1	1	.16	.33	.00	.00
F	Machaeranthera canescens	$_{a}$-	$_{b}$13	$_{ab}$1	$_{ab}$6	$_{b}$6	.27	.15	.19	.24
F	Oxytropis lambertii	$_{c}$40	$_{a}$2	$_{a}$-	$_{b}$7	$_{a}$-	.01	-	.31	-
F	Penstemon caespitosus	$_{c}$48	$_{bc}$48	$_{a}$5	$_{ab}$23	$_{a}$11	.66	.09	.29	.06
F	Penstemon comarrhenus	-	1	-	1	2	.15	-	.15	.00
F	Phlox longifolia	11	21	9	18	15	.09	.04	.15	.06
F	Physaria acutifolia	$_{a}$-	$_{b}$63	$_{a}$7	$_{a}$-	$_{a}$6	.23	.04	-	.01
F	Physaria sp.	$_{c}$40	$_{a}$-	$_{a}$-	$_{b}$26	$_{a}$-	-	-	.33	-
F	Potentilla sp.	3	-	-	-	-	-	-	-	-
F	Schoencrambe linifolia	$_{ab}$5	$_{ab}$7	$_{a}$-	$_{b}$12	$_{b}$12	.02	-	.09	.06
F	Senecio canus	$_{a}$-	$_{ab}$7	$_{a}$2	$_{b}$14	$_{ab}$10	.06	.00	.36	.12
F	Thlaspi arvense (a)	-	1	-	-	-	.00	-	-	-
Total for Annual Forbs		0	36	7	12	8	0.07	0.01	0.08	0.01
Total for Perennial Forbs		373	619	314	490	282	10.24	8.93	10.51	5.88
Total for Forbs		373	655	321	502	290	10.32	8.94	10.60	5.90

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

BROWSE TRENDS--
Management unit 11A, Study no: 2

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Artemisia frigida	2	1	4	2	.00	-	.15	-
B	Artemisia tridentata vaseyana	80	70	49	50	8.18	6.43	4.41	2.45
B	Chrysothamnus viscidiflorus lanceolatus	80	68	83	76	3.20	2.56	2.71	2.70
B	Gutierrezia sarothrae	33	23	45	51	.04	.27	1.04	1.53
B	Symphoricarpos oreophilus	1	0	1	0	-	-	-	-
B	Tetradymia canescens	9	15	16	15	.15	.03	.24	.03
Total for Browse		205	177	198	194	11.58	9.30	8.57	6.72

CANOPY COVER, LINE INTERCEPT--
Management unit 11A, Study no: 2

Species	Percent Cover	
	'05	'10
Artemisia frigida	.08	-
Artemisia tridentata vaseyana	4.66	3.83
Chrysothamnus viscidiflorus lanceolatus	4.11	4.26
Gutierrezia sarothrae	.06	1.00
Tetradymia canescens	.06	.11

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 11A, Study no: 2

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata vaseyana	1.6	1.2

BASIC COVER--
Management unit 11A, Study no: 2

Cover Type	Average Cover %					
	'82	'88	'95	'00	'05	'10
Vegetation	7.50	6.25	36.06	48.48	39.88	37.89
Rock	3.25	3.00	3.17	2.85	3.95	2.37
Pavement	18.00	15.50	3.07	5.52	5.61	5.86
Litter	46.25	51.25	34.34	40.47	23.03	40.18
Cryptogams	.50	0	.15	.15	.04	.38
Bare Ground	24.50	24.00	32.06	37.24	38.72	26.39

SOIL ANALYSIS DATA --
Management unit 11A, Study no: 2, Study Name: Wirefince Canyon

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.7	7.2	43.4	33.0	23.6	4.4	5.1	96.0	0.8

PELLET GROUP DATA--
Management unit 11A, Study no: 2

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	6	10	41	9
Grouse	-	-	1	-
Elk	15	10	22	8
Deer	1	6	19	6
Cattle	1	12	12	13

Days use per acre (ha)		
'00	'05	'10
-	-	-
-	35/acre	-
18 (45)	7 (17)	14 (35)
4 (10)	34 (84)	14 (35)
52 (129)	41 (102)	43 (106)

BROWSE CHARACTERISTICS--
Management unit 11A, Study no: 2

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Artemisia frigida									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**40**	0	100	-	20	50	0	0	4/10
00	**20**	0	100	-	-	0	0	0	3/4
05	**120**	0	100	-	-	0	0	0	12/10
10	**40**	50	50	-	-	0	50	0	3/9
Artemisia tridentata vaseyana									
82	**3132**	21	79	0	-	2	0	4	15/18
88	**4331**	46	46	8	266	32	0	0	14/20
95	**4080**	42	52	6	120	41	9	4	14/26
00	**3380**	11	70	19	40	49	4	41	13/25
05	**2680**	14	54	31	520	43	11	13	10/20
10	**2180**	25	61	14	120	17	43	27	9/20
Chrysothamnus nauseosus									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	27/36
Chrysothamnus viscidiflorus lanceolatus									
82	**3932**	12	88	0	-	3	0	0	8/13
88	**3798**	23	75	2	-	4	0	0	5/4
95	**4880**	11	89	0	20	0	0	0	8/11
00	**3920**	14	85	2	20	0	0	0	7/9
05	**4740**	8	90	2	-	8	0	.84	7/10
10	**4640**	0	98	1	20	0	0	0	8/10
Eriogonum microthecum									
82	**599**	0	100	-	-	0	0	0	2/4
88	**0**	0	0	-	-	0	0	0	-/-
95	**0**	0	0	-	-	0	0	0	-/-
00	**0**	0	0	-	-	0	0	0	-/-
05	**0**	0	0	-	-	0	0	0	-/-
10	**0**	0	0	-	-	0	0	0	-/-

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Gutierrezia sarothrae									
82	**0**	0	0	0	-	0	0	0	-/-
88	**1733**	0	100	0	-	0	0	0	4/4
95	**1580**	9	91	0	60	0	0	0	7/8
00	**760**	0	95	5	-	0	0	5	4/5
05	**2440**	24	76	0	20	0	0	0	5/6
10	**2940**	1	95	3	-	1	0	3	6/9
Symphoricarpos oreophilus									
82	**0**	0	0	-	-	0	0	0	-/-
88	**0**	0	0	-	-	0	0	0	-/-
95	**20**	0	100	-	-	0	0	0	12/15
00	**0**	0	0	-	-	0	0	0	9/20
05	**20**	0	100	-	-	0	0	0	11/16
10	**0**	0	0	-	-	0	0	0	9/18
Tetradymia canescens									
82	**399**	83	17	0	-	83	0	0	10/11
88	**665**	50	10	40	-	0	0	0	9/12
95	**200**	30	70	0	-	30	0	0	7/10
00	**420**	14	86	0	-	10	10	0	6/9
05	**400**	0	100	0	-	50	10	0	7/11
10	**340**	6	94	0	20	12	6	0	7/10