

Trend Study 2-29-06

Study site name: Woodruff Creek .

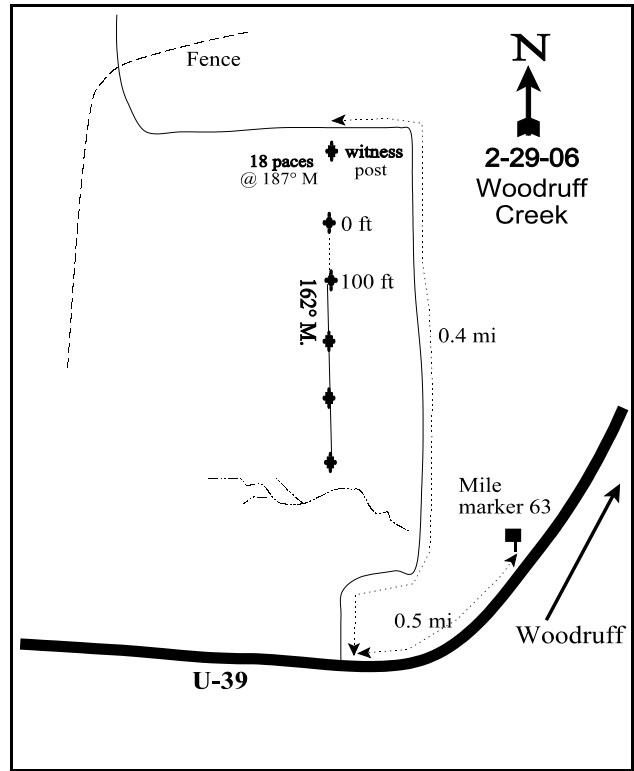
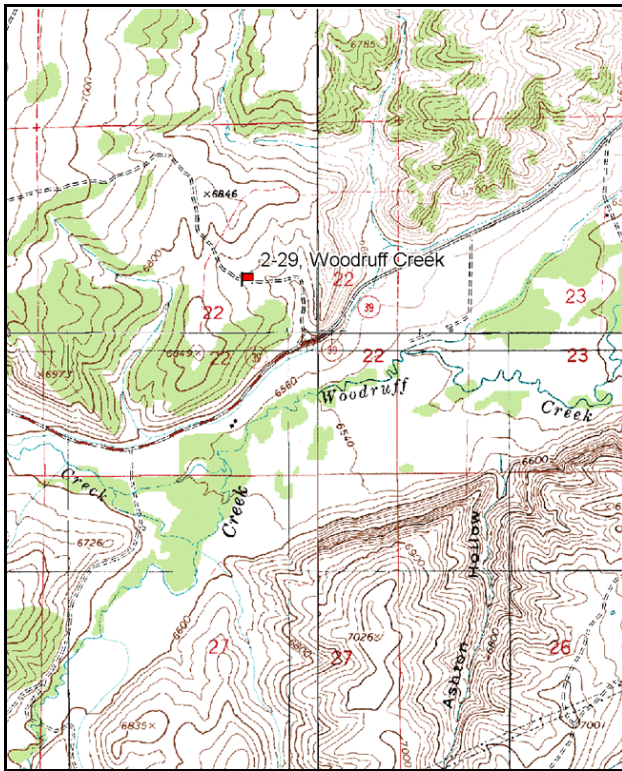
Vegetation type: Big Sagebrush .

Compass bearing: frequency baseline 162 degrees magnetic.

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

LOCATION DESCRIPTION

From the junction of U-39 and U-16 in Woodruff, proceed west on U-39 for 5.05 miles, and turn right onto a dirt road. This road should be 0.05 miles past marker 63. Proceed north on this road stopping after 0.4 miles at a witness post on the left (south). From the witness post, walk 18 paces at 187 degrees magnetic to the 0-foot stake of the baseline marked by browse tag #7989.



Map Name: Birch Creek Reservoirs

Diagrammatic Sketch

Township 9N, Range 6E, Section 22

UTM NAD 27, UTM 12T 4594285 N, 478796 E

## DISCUSSION

### Woodruff Creek - Trend Study No. 2-29

#### Study Information

This study is located north of Woodruff Creek on critical winter range in a Wyoming big sagebrush and scattered juniper woodland (elevation: 6,740 feet, slope: 7-10%, aspect: east). The surrounding habitat was chained and seeded, but the study area was left unchained. The design of the chaining resulted in an extremely large open area, which has little edge and browse cover. Wildlife use may have intensified on the study plot (unchained), because of the lack of browse species in the chained area. Cattle use appeared most abundant in the chained area. A pellet group transect read in 2001 estimated 103 deer and 2 cow days use/acre (255 ddu/ha and 5 cdu/ha). Pellet group data from 2006 was estimated at 88 deer and 4 cow days use/acre (218 ddu/ha and 11 cdu/ha). Three deer carcasses were found near the study in 2006.

#### Soil

Soil is classified in the Cutoff series, a moderately deep, well drained, and moderately permeable soil that formed in residuum and colluvium derived from sandstone and conglomerate (USDA-NRCS 2006). Effective rooting depth was moderately shallow at 12 inches. Soil texture is a clay loam with some gravel in the profile and pavement concentrated on the surface. Rock and pavement combined for an estimated 11% cover in 1996 and 2001 and 15% in 2006. Soil has a neutral soil reaction (7.3 pH). Chemical analysis of the soil indicates a low level of phosphorus (6.2 ppm), which could be a limiting factor as values less than 6 ppm may limit plant growth and development (Tiedemann and Lopez 2004). The ratio of protective cover (vegetation, litter, and cryptogams) to bare ground remained moderate at 2.7:1 in 2006, leaving large unprotected interspaces. Soil pedestalling is evident and sheet erosion is occurring, yet no large gullies have formed due to the gentle terrain. The erosion condition class was determined to be slight in 2001 and moderate in 2006.

#### Browse

Available browse forage comes primarily from Wyoming big sagebrush, which has averaged 5% cover since 1996. Density in 1984 and 1990 both were estimated at 6,465 plants/acre. During the 1996 reading, the baseline was lengthened to increase the sample size. The longer baseline extended into a more dense stand of juniper trees than the original 100 foot baseline, therefore density estimates for 1996 were lower. Density averaged about 2,300 plants/acre in 1996 and 2001, but decreased in 2006 to 1,800 plants/acre. Even with the change in sample size, the population may have declined from 1990 to 1996, due to the large number of dead plants (1,260 plants/acre) sampled in 1996. Utilization was heavy in 1984 and 1990, but decreased to moderate use in 1996 and 2001. In 2006, utilization was mostly light. Sagebrush classified as decadent has been high since 1984 and has ranged between 41% in 1996 to a high of 66% in 2006. Also in 2006, over half (63%) the population was classified as dying (>50% crown death). Young recruitment has been low at 4-7% and does not appear to be adequate to maintain the population. Juniper encroachment may also be limiting available resources for sagebrush.

Juniper average canopy cover was 14% in 1996, 10% in 2001, and 16% in 2006. Point-center quarter data in 1990 was estimated at 182 junipers/acre with a diameter 5.5 inches. Junipers have continually increased from 218 trees/acre with a mean a diameter of 7.1 inches in 2001 to 226 trees/acre in 2006 with a mean diameter of 6.4 inches. Other browse species include serviceberry, stickyleaf low rabbitbrush, snowberry, and gray horsebrush. All occur in small numbers except rabbitbrush, which accounts for about one-third of the browse cover and has a density of nearly 5,000 plants/acre.

#### Herbaceous Understory

The herbaceous understory is diverse but not particularly abundant. Seven perennial grasses combined have produced about 10-12% cover since 1996. The most common species are thickspike wheatgrass, mutton bluegrass, and Sandberg bluegrass. Cheatgrass is present, but has produced less than 1% cover since 1996. Forbs are fairly diverse depending on precipitation and have averaged 3-5% cover since 1996.

### 1990 TREND ASSESSMENT

The Wyoming big sagebrush stand on the Woodruff Creek study has remained stable in density since 1984. However, the relatively small shrubs display heavy hedging and poor vigor. There is a high percentage (57%) of decadent plants. However, this has not changed since 1984. The density of juniper has not increased since 1984. The point-centered quarter method estimate is 182 juniper/acre, mostly young trees. Trend for grasses is up. Perennial grass sum of nested frequency increased by 42%, mostly due to a significant increase in mutton bluegrass. Trend for forbs is down. Perennial forb sum of nested frequency decreased by 37%, mostly due to a significant decreases in wild onion, 2 species of milkvetch, Douglas chaenactis, and lobeleaf groundsel.

browse - stable (0)

grasses - up (+2)

forbs - down (-2)

### 1996 TREND ASSESSMENT

Trend for the key browse species, Wyoming big sagebrush is down and appears to be in a state of decline. Density has dropped 55% since 1990. Some of the change is due to the much larger sample used in 1996, but dead plants, first sampled in 1996, number 1,260 plants/acre. Due to the lack of adequate reproduction, the population has declined since 1990. Utilization has been heavy in the past, although current use is mostly light to moderate. Vigor is poor on 25% of the shrubs with 41% of the population classified as decadent. Sagebrush plants that were classified as dying increased from 8% to 20%. This downward trend will continue as juniper cover increases. Trend for grasses is down. Perennial grass sum of nested frequency decreased by 28% due to a significant decrease in thickspike wheatgrass and Sandberg bluegrass. Trend for forbs is slightly up. A few of the species, lobeleaf groundsel and timber poison milkvetch, that decreased in 1990, increased back to levels similar to 1984. The Desirable Components Index rated this study as fair due to moderate browse cover and good perennial grass cover. High decadence negatively effects the score.

winter range condition (DC Index) - fair (42) Low Potential scale

browse - down (-2)

grasses - down (-2)

forbs - slightly up (+1)

### 2001 TREND ASSESSMENT

Trend for Wyoming big sagebrush is stable yet in poor condition. Utilization is mostly moderate with improved vigor. However, percent decadence is still high at 57%. Average vigor of the decadent age class has improved as only 9% of the population was classified as dying. Annual leader growth is minimal, averaging only 1 inch in 2001. Trend for grasses is stable. Very little change in grasses from 1996. Trend for forbs is also stable and has not changed much from 1996. The Desirable Components Index rated this study as fair due to moderate browse cover and good perennial grass cover. High decadence negatively effects the score.

winter range condition (DC Index) - fair (40) Low Potential scale

browse - stable (0)

grasses - stable (0)

forbs - stable (0)

### 2006 TREND ASSESSMENT

Trend for key browse, Wyoming big sagebrush, is down. Cover remained near 5%, but density of mature and decadent plants decreased from 2,360 plants/acre in 2001 to 1,740 plants/acre in 2006. Sagebrush classified as decadent has always been high, but 66% were decadent in 2006 and 63% of population was classified as dying. Without a substantial increase in young recruitment and a decrease in juniper density, the sagebrush will mostly likely continue to decrease. Trend for grasses is stable. Very little change in cover or nested frequency of perennial grasses occurred and cheatgrass continued to remained a minimal component of the herbaceous understory. Trend for forbs is stable. Very few changes in sum of nested frequency of perennial forbs occurred, only minor changes in a couple of species. The Desirable Components Index rated this study as fair-good due to moderate browse cover, high decadence, and good perennial grass cover.

winter range condition (DC Index) - fair-good (45) Low Potential scale

browse - down (-2)

grasses - stable (0)

forbs - stable (0)

HERBACEOUS TRENDS --  
Management unit 02 , Study no: 29

Type	Species	Nested Frequency					Average Cover %		
		'84	'90	'96	'01	'06	'96	'01	'06
G	<i>Agropyron cristatum</i>	a-	a-	a1	ab12	b22	.03	.51	1.08
G	<i>Agropyron dasystachyum</i>	c195	c201	b101	b142	b124	.54	1.97	2.47
G	<i>Agropyron spicatum</i>	a1	ab7	b24	ab8	ab11	.36	.41	.45
G	<i>Bromus tectorum</i> (a)	-	-	11	6	3	.16	.01	.01
G	<i>Oryzopsis hymenoides</i>	a1	ab20	ab11	b24	ab14	.61	1.22	.74
G	<i>Poa fendleriana</i>	a46	d141	cd133	bc102	ab86	5.24	4.10	3.74
G	<i>Poa pratensis</i>	a-	a-	a1	a-	b23	.03	-	.63
G	<i>Poa secunda</i>	bc123	c161	ab102	abc111	a77	2.53	2.26	2.50
G	<i>Sitanion hystrix</i>	ab22	ab22	b27	a9	ab17	.57	.24	.30
G	<i>Stipa comata</i>	a-	a-	a-	a-	b10	-	-	.12
Total for Annual Grasses		0	0	11	6	3	0.16	0.01	0.01
Total for Perennial Grasses		388	552	400	408	384	9.94	10.73	12.07
Total for Grasses		388	552	411	414	387	10.10	10.75	12.09
F	<i>Achillea millefolium</i>	-	-	1	-	3	.00	-	.03
F	<i>Allium acuminatum</i>	b14	a-	a-	a-	ab7	-	-	.04
F	<i>Alyssum alyssoides</i> (a)	-	-	-	1	-	-	.00	-
F	<i>Antennaria rosea</i>	7	10	3	2	10	.00	.03	.07
F	<i>Arabis holboellii</i>	2	-	4	-	11	.01	-	.04
F	<i>Astragalus beckwithii</i>	ab13	a-	a-	a3	b29	-	.03	.52
F	<i>Astragalus convallarius</i>	b13	a-	b12	c34	b14	.05	.33	.06
F	<i>Asclepias speciosa</i>	a-	a-	b12	a-	a-	.36	-	-
F	<i>Astragalus utahensis</i>	b18	a6	a2	ab12	a1	.00	.12	.03
F	<i>Calochortus nuttallii</i>	1	-	-	-	-	-	-	-
F	<i>Chaenactis douglasii</i>	b34	a2	a6	a7	a5	.01	.02	.10
F	<i>Comandra pallida</i>	35	21	23	24	25	.13	.17	.33
F	<i>Cordylanthus ramosus</i> (a)	-	-	12	20	21	.07	.09	.25
F	<i>Crepis acuminata</i>	3	-	4	3	-	.00	.03	-
F	<i>Cryptantha</i> sp.	26	22	26	32	27	.46	1.08	.50
F	<i>Cymopterus</i> sp.	a-	a-	b10	a-	a-	.02	-	-
F	<i>Descurainia pinnata</i> (a)	-	-	3	-	-	.00	-	-
F	<i>Draba</i> sp. (a)	-	-	-	-	2	-	-	.00
F	<i>Erigeron pumilus</i>	b11	a-	a-	a2	a3	-	.00	.03
F	<i>Eriogonum racemosum</i>	-	-	-	-	1	-	-	.03
F	<i>Eriogonum umbellatum</i>	ab4	a-	ab5	a-	b11	.04	-	.10
F	<i>Halogeton glomeratus</i> (a)	-	-	1	-	-	.00	-	-

Type	Species	Nested Frequency					Average Cover %		
		'84	'90	'96	'01	'06	'96	'01	'06
F	<i>Ipomopsis aggregata</i>	<sub>a</sub> 7	<sub>a</sub> -	<sub>a</sub> 4	<sub>a</sub> -	<sub>b</sub> 18	.01	-	.14
F	<i>Lappula occidentalis</i> (a)	-	-	-	-	2	-	-	.00
F	<i>Lithospermum ruderales</i>	3	-	-	4	-	-	.15	.03
F	<i>Microsteris gracilis</i> (a)	-	-	-	4	-	-	.01	-
F	<i>Penstemon humilis</i>	<sub>b</sub> 86	<sub>b</sub> 85	<sub>a</sub> 46	<sub>a</sub> 53	<sub>a</sub> 43	.58	.40	.31
F	<i>Phlox hoodii</i>	88	103	80	80	72	1.41	.74	2.25
F	<i>Phlox longifolia</i>	62	48	33	58	51	.08	.15	.24
F	<i>Ranunculus testiculatus</i> (a)	-	-	1	-	3	.00	-	.00
F	<i>Senecio multilobatus</i>	<sub>b</sub> 61	<sub>a</sub> 10	<sub>b</sub> 75	<sub>a</sub> 20	<sub>a</sub> 13	.89	.07	.11
Total for Annual Forbs		0	0	17	25	28	0.08	0.11	0.26
Total for Perennial Forbs		488	307	346	334	344	4.11	3.37	5.00
Total for Forbs		488	307	363	359	372	4.19	3.48	5.26

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

#### BROWSE TRENDS --

Management unit 02 , Study no: 29

Type	Species	Strip Frequency			Average Cover %		
		'96	'01	'06	'96	'01	'06
B	<i>Artemisia tridentata wyomingensis</i>	60	60	57	5.53	5.25	4.52
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	77	74	80	4.97	4.13	7.97
B	<i>Juniperus osteosperma</i>	8	8	11	4.42	4.32	3.76
B	<i>Symphoricarpos oreophilus</i>	3	1	1	.15	.30	.06
B	<i>Tetradymia canescens</i>	19	18	18	1.01	.85	1.47
Total for Browse		167	161	167	16.11	14.86	17.79

CANOPY COVER, LINE INTERCEPT --

Management unit 02 , Study no: 29

Species	Percent Cover	
	'01	'06
Artemisia tridentata wyomingensis	-	4.09
Chrysothamnus viscidiflorus viscidiflorus	-	6.61
Juniperus osteosperma	9.80	15.96
Tetradymia canescens	-	.60

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 02 , Study no: 29

Species	Average leader growth (in)	
	'01	'06
Artemisia tridentata wyomingensis	1.0	0.7

POINT-QUARTER TREE DATA --

Management unit 02 , Study no: 29

Species	Trees per Acre		Average diameter (in)	
	'01	'06	'01	'06
Juniperus osteosperma	218	226	7.1	6.4

BASIC COVER --

Management unit 02 , Study no: 29

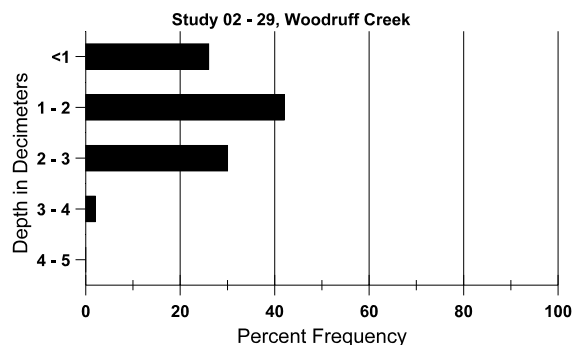
Cover Type	Average Cover %				
	'84	'90	'96	'01	'06
Vegetation	4.75	7.50	30.55	31.23	36.56
Rock	1.75	2.50	1.46	.78	.95
Pavement	10.50	21.75	9.37	9.81	13.93
Litter	47.25	33.50	38.38	42.15	28.74
Cryptogams	3.00	13.75	2.05	3.30	3.23
Bare Ground	32.75	21.00	27.75	31.45	26.09

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 29, Woodruff Creek

Effective rooting depth (in)	Temp °F (depth)	PH	Clay loam			%OM	PPM P	PPM K	dS/m
			%sand	%silt	%clay				
12.2	55.8 (13.7)	7.3	34.6	32.1	33.4	2.5	6.2	25.6	0.6

## Stoniness Index



### PELLET GROUP DATA --

Management unit 02 , Study no: 29

Type	Quadrat Frequency		
	'96	'01	'06
Rabbit	21	15	28
Elk	6	2	6
Deer	38	42	32
Cattle	-	-	2

Days use per acre (ha)	
'01	'06
-	-
-	-
103 (255)	88 (218)
2 (5)	4 (11)

### BROWSE CHARACTERISTICS --

Management unit 02 , Study no: 29

		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>Amelanchier alnifolia</b>												
84	0	-	-	-	-	-	0	0	-	-	0	-/-
90	0	-	-	-	-	-	0	0	-	-	0	-/-
96	0	-	-	-	-	-	0	0	-	-	0	16/24
01	0	-	-	-	-	-	0	0	-	-	0	-/-
06	0	-	-	-	-	-	0	0	-	-	0	20/27
<b>Artemisia tridentata wyomingensis</b>												
84	6465	-	333	2466	3666	-	11	78	57	.92	6	13/16
90	6465	-	266	2533	3666	-	51	41	57	8	28	19/21
96	2260	60	-	1340	920	1260	41	11	41	20	25	16/27
01	2540	100	180	920	1440	1320	57	2	57	9	9	16/25
06	1860	80	120	520	1220	1520	16	1	66	63	68	14/26

		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>Chrysothamnus viscidiflorus viscidiflorus</b>												
84	<b>2999</b>	-	133	2400	466	-	0	0	16	-	2	7/10
90	<b>3599</b>	-	1000	1933	666	-	43	2	19	-	0	7/12
96	<b>4900</b>	-	160	4660	80	20	0	0	2	.81	.81	9/15
01	<b>4720</b>	-	80	4200	440	-	.42	0	9	3	3	9/13
06	<b>5240</b>	40	400	4480	360	-	.38	0	7	5	5	9/15
<b>Juniperus osteosperma</b>												
84	<b>266</b>	66	133	133	-	-	0	25	-	-	0	57/22
90	<b>332</b>	-	266	66	-	-	40	20	-	-	0	89/51
96	<b>160</b>	-	-	160	-	20	25	0	-	-	0	-/-
01	<b>160</b>	-	60	100	-	-	0	0	-	-	0	-/-
06	<b>220</b>	20	60	160	-	-	0	0	-	-	0	51/51
<b>Pinus edulis</b>												
84	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
90	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
96	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
01	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
06	<b>0</b>	40	-	-	-	-	0	0	-	-	0	-/-
<b>Symphoricarpos oreophilus</b>												
84	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
90	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
96	<b>80</b>	-	-	80	-	-	0	0	-	-	25	11/21
01	<b>20</b>	-	-	20	-	-	0	0	-	-	0	10/29
06	<b>20</b>	-	-	20	-	-	0	0	-	-	0	14/30
<b>Tetradymia canescens</b>												
84	<b>133</b>	-	-	133	-	-	50	50	0	-	0	9/16
90	<b>200</b>	-	-	-	200	-	67	33	100	-	0	-/-
96	<b>440</b>	-	-	400	40	20	9	0	9	5	5	12/20
01	<b>400</b>	-	-	320	80	20	0	0	20	-	0	12/21
06	<b>440</b>	40	60	300	80	-	9	0	18	18	23	11/18