

Trend Study 24-7-08

Study site name: Cow Creek.

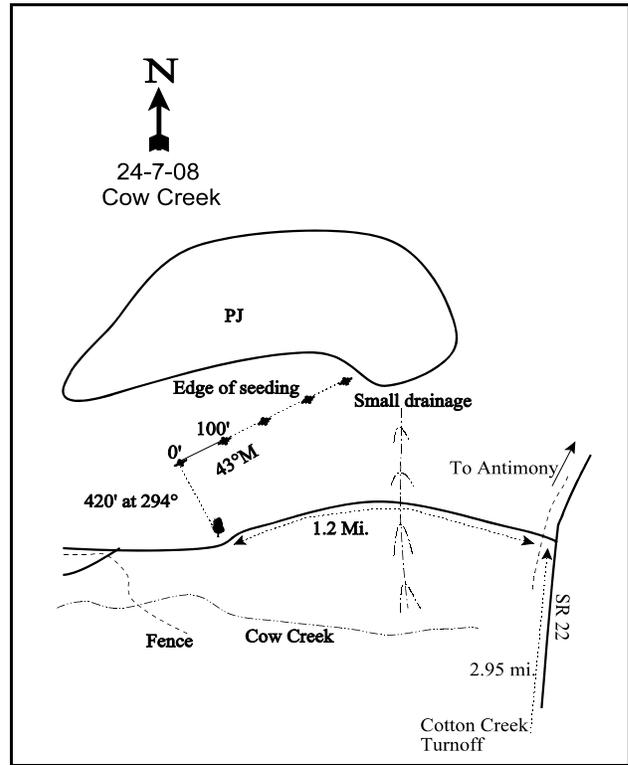
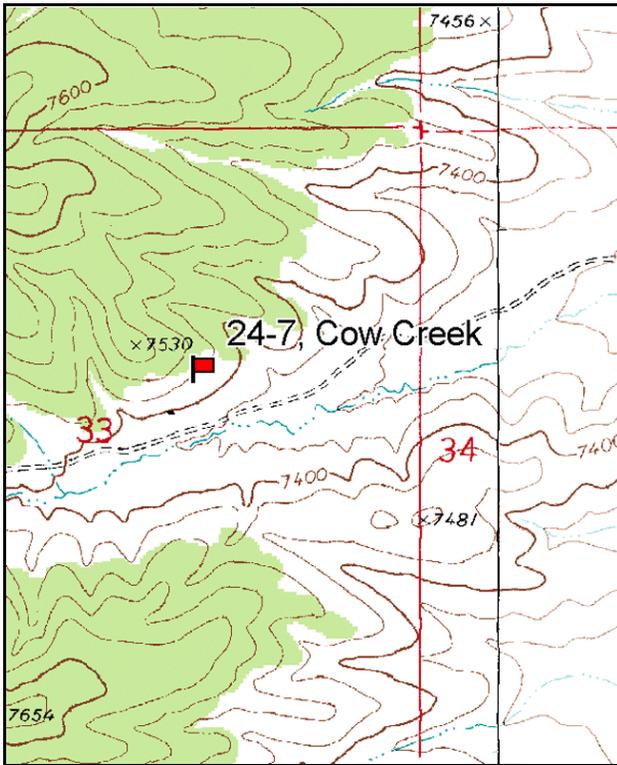
Vegetation type: Chained, Shrubland.

Compass bearing: frequency baseline 43 degrees magnetic.

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

LOCATION DESCRIPTION

From the Cottonwood Creek turnoff of SR22 south of Antimony, proceed north on the highway 2.95 miles to a gate by Cow Creek. Turn west and drive through the seeded pasture up Cow Creek for 1.2 miles to a lone mature juniper right by the road. If you go too far (0.2 more miles) you will come to a fork by a fence. Stop by the lone Juniper and walk up the hill about 140 yards bearing 294 degrees to the start of the baseline and a short fencepost with browse tag #9002. The transect runs east-northeast along the top edge of the seeding.



Map Name: Cow Creek

Diagrammatic Sketch

Township 32S, Range 2W, Section 33

GPS: NAD 83, UTM 12S 411352 E, 4204128 N

DISCUSSION

Cow Creek - Trend Study 24-7

Study Information

This study is located on key elk winter and spring habitat on state trust land at the mouth of Cow Creek [elevation: 7,500 feet (2,286 m), slope: 12%-20%, aspect: southeast]. This is a sagebrush-grass site that was disked and drill seeded prior to study establishment in 1987. Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) occurs on the foothill slopes and basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) is found on the deeper soils in the drainage bottoms. The treatment was more effective on Wyoming big sagebrush than the basin big sagebrush. The basin big sagebrush that was not killed has regrown with vigorous vegetative growth and seed stalk production. Antelope probably use this area year-round. Due to difficulties distinguishing between antelope and deer pellets, these species pellets were all counted as deer. Deer days use (ddu) was estimated to be light to moderate in 1997, 2003, and 2008 (7 ddu/acre:17 ddu/ha, 24 ddu/acre:59 ddu/ha, and 8 ddu/acre:20 ddu/ha, respectively). Elk days use (edu) was estimated to be moderate to heavy in 1997 and 2003 (63 edu/acre:156 edu/ha and 35 edu/acre:86 edu/ha, respectively), and extremely light in 2008 (1 edu/acre:2 edu/ha). Cattle use was light with an estimated 27 days use/acre (67 cdu/ha) in 1997, and only a few cattle pats encountered in 2003 and 2008. Sheep sign was also noted in 1997.

Soil

The soil at the study site is moderately deep and rocky with an estimated effective rooting depth of almost 18 inches. Texture is a sandy loam which is slightly alkaline (pH 7.4). Erosion pavement is present on the surface, as are rocks of various sizes. Litter from the disked sagebrush and the drill rows of seeded grasses serve to slow overland water movement. However, there was a high incidence of pedestalled bunch grasses and small rills in 2003, indicating that a significant amount of soil movement had taken place in the area. Pedestaling had decreased in 2008. The soil is very loose and easily transported during high intensity summer storms. Some erosion was noted in 2003 and the erosion condition rating was determined to be slight. The erosion condition rating was stable in 2008.

Browse

The key shrub species on this site is Wyoming big sagebrush. Density was estimated at nearly 3,500 plants/acre in 1987, 94% of which were mature or decadent plants which were present prior to the discing treatment. Density declined slightly in 1991 but the number of decadent plants increased from 33% to 60%. The population declined to 2,280 plants/acre by 1997 apparently due to a die-off of decadent/dying shrubs sampled in 1991. Vigor improved in 1997 and decadence declined to 34% of the population. By 2003, density declined 16% to 1,920 plants/acre. Over one-third of the population exhibited poor vigor and 59% were classified as decadent. The density declined again in 2008 by 26% to 1,420 plants/acre. Plants showing poor vigor increased to 42% and decadence increased to 69% in 2008. Young recruitment was marginal in 1987 and 1997 and poor in 1991, 2003, and 2008. Utilization was moderate to heavy in 1987, 1991, and 2008, but mostly light to moderate in 1997 and 2003. Annual leader growth of mature Wyoming big sagebrush was good averaging 2 inches in 2003 and 1.3 inches in 2008.

The only other common shrub on the site consists of a widely fluctuating population of broom snakeweed. Snakeweed density has ranged from 220 to 4,133 plants/acre. Pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees are found scattered throughout the site with an increasing population of juniper. Point-quarter data estimated an average of 40 pinyon trees/acre since 1997. Juniper had an increasing population of an estimated 14 juniper trees/acre in 1997, 31 trees/acre in 2003, and 47 trees/acre in 2008. Overhead canopy cover of pinyon was estimated at 5% in 2003 and increasing to 11% by 2008. The basal diameters of juniper and pinyon have stayed relatively constant from 2003 to 2008 with an average of 3.5 and 6 inches, respectively. About 40%-45% of the pinyon pine sampled were in the 1 to 4 foot height class in 2003 and 2008, while another 33%-50% were trees over 12 feet in height. Juniper trees were younger with

57%-67% of the trees sampled in 2003 and 2008 occurring in the 1 to 4 foot height class.

Herbaceous Understory

The herbaceous understory is dominated by grasses. The seeded species, crested wheatgrass (*Agropyron cristatum*), was the most abundant grass species at the onset of the study, but has declined in cover and a warm season native, blue grama (*Bouteloua gracilis*), replaced it as the dominant grass species in 2003. Other native species on the site include bottlebrush squirreltail (*Sitanion hystrix*), needle-and-thread grass (*Stipa comata*), and indian ricegrass (*Oryzopsis hymenoides*). Another seeded species, intermediate wheatgrass (*Agropyron intermedium*), is less abundant and has declined in quadrat frequency from 34% in 1987 to 4% in 1997 and was not found in 2003 or 2008. This site is probably marginal for intermediate wheatgrass since it is east of Mt. Dutton and within a rain shadow. Forbs are very limited with six species producing only 1% cover in 1997 and 2008, and less than 0.5% in 2003. The only common forbs include Newberry milkvetch (*Astragalus newberryi*) and a *Cryptantha* species.

1991 TREND ASSESSMENT

Population density for the key browse species, Wyoming big sagebrush, has gone from 3,466 plants/acre to 3,199 plants/acre, an 8% drop. Broom snakeweed has decreased by 36%. Even with the decrease in broom snakeweed, the trend would still be slightly downward with the increase in the rate of decadency for Wyoming big sagebrush reaching 60%. Sagebrush plants displaying poor vigor have also increased from 6% to 33%. Trend for the grasses is slightly down. The sum of nested frequency decreased for both the seeded species crested wheatgrass and intermediate wheatgrass, significantly so for intermediate wheatgrass. Nested frequency of blue grama increased, but this is a less productive grass. The trend for forbs is stable, but forbs are rare.

browse - slightly down (-1) grass - slightly down (-1) forb - stable (0)

1997 TREND ASSESSMENT

Density differences of browse species may be related to the larger sample area used in 1997, therefore, trend for browse was determined using other parameters. Trend for the key browse species, Wyoming big sagebrush, is slightly up. Vigor of sagebrush improved and decadence has declined from 60% in 1991 to 34%. Recruitment is improved with increased numbers of seedlings and young plants. Trend for grasses and forbs is stable, but forbs are still very limited.

winter range condition (DCI) - fair (41) Low potential scale
browse - slightly up (+1) grass - stable (0) forb - stable (0)

2003 TREND ASSESSMENT

Trend for the key browse species, Wyoming big sagebrush, is down. Sagebrush density has declined 16% since 1997, while plants displaying poor vigor have increased to 32% of the population and decadence has increased to 59%. No seedlings were encountered in 2003, and young plants were rare. Trend for the grasses is stable. Sum of nested frequency of perennial grasses has remained similar to 1997, but the nested frequency of crested wheatgrass did decline significantly and blue grama replaced it as the dominant cover species. Nested frequency of blue grama remained similar to 1997, but bottlebrush squirreltail and needle-and-thread increased slightly. Trend for forbs is stable. Sum of nested frequency of perennial forbs declined, however, forbs are rare and provide little cover.

winter range condition (DCI) - fair (32) Low potential scale
browse - down (-2) grass - stable (0) forb - stable (0)

2008 TREND ASSESSMENT

Trend for the key browse species, Wyoming big sagebrush, is again slightly down. Sagebrush density has

declined by a further 26% to 1,420 plants/acre. Sagebrush plants showing poor vigor has increased to 42% and decadence has increased to 69%. Recruitment remains poor with few seedlings encountered and young plants comprising only 3% of the population. Trend for the grasses is stable. The nested frequency of crested wheatgrass declined significantly, but increased significantly for the native species blue grama, Indian ricegrass, and needle-and-thread grass. Trend for forbs has remained stable, but forbs remain rare.

winter range condition (DCI) - fair (30) Low potential scale

browse - slightly down (-1) grass - stable (0)

forb - stable (0)

HERBACEOUS TRENDS --

Management unit 24 , Study no: 7

Type	Species	Nested Frequency					Average Cover %		
		'87	'91	'97	'03	'08	'97	'03	'08
G	Agropyron cristatum	c207	bc169	c193	b154	a84	6.09	4.76	1.45
G	Agropyron intermedium	b65	a5	a9	a-	a-	.04	-	-
G	Bouteloua gracilis	a90	ab113	bc151	bc150	c186	4.38	6.25	8.40
G	Bromus inermis	5	-	-	-	-	-	-	-
G	Bromus tectorum (a)	-	-	-	-	1	-	-	.00
G	Dactylis glomerata	2	9	-	-	-	-	-	-
G	Oryzopsis hymenoides	a2	ab9	a6	a3	b24	.07	.04	.46
G	Poa fendleriana	-	-	-	16	2	-	.15	.00
G	Poa secunda	-	-	2	-	5	.00	-	.01
G	Sitanion hystrix	b119	b137	a51	a66	a59	.68	.50	.84
G	Stipa comata	a12	a11	a20	a33	b83	.19	.66	1.25
Total for Annual Grasses		0	0	0	0	1	0	0	0.00
Total for Perennial Grasses		502	453	432	422	443	11.48	12.39	12.44
Total for Grasses		502	453	432	422	444	11.48	12.39	12.44
F	Antennaria rosea	-	-	-	3	2	-	.00	.00
F	Astragalus lentiginosus	a-	a-	a-	a-	b12	-	-	.31
F	Astragalus newberryi	b22	b22	b27	a-	b14	.06	-	.10
F	Chenopodium sp. (a)	-	-	3	-	3	.00	-	.00
F	Cryptantha sp.	ab17	bc31	c39	a1	ab10	.59	.00	.07
F	Descurainia pinnata (a)	-	-	a-	b23	b29	-	.08	.14
F	Erigeron pumilus	-	-	-	-	1	-	-	.00
F	Gayophytum ramosissimum(a)	-	-	b21	a-	a3	.26	-	.00
F	Gilia sp. (a)	-	-	a-	b14	a-	-	.05	-
F	Lappula occidentalis (a)	-	-	a-	a5	b38	-	.04	.19
F	Medicago sativa	4	-	-	-	-	-	-	-
F	Sphaeralcea coccinea	-	-	6	7	4	.01	.04	.03
F	Streptanthus cordatus	-	-	2	-	3	.03	-	.03

Type	Species	Nested Frequency					Average Cover %		
		'87	'91	'97	'03	'08	'97	'03	'08
	Total for Annual Forbs	0	0	24	42	73	0.26	0.18	0.34
	Total for Perennial Forbs	43	53	74	11	46	0.70	0.05	0.57
	Total for Forbs	43	53	98	53	119	0.97	0.23	0.91

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

BROWSE TRENDS --

Management unit 24 , Study no: 7

Type	Species	Strip Frequency			Average Cover %		
		'97	'03	'08	'97	'03	'08
B	<i>Artemisia tridentata wyomingensis</i>	64	56	47	6.56	7.15	3.21
B	<i>Gutierrezia sarothrae</i>	8	27	28	.04	.58	.11
B	<i>Juniperus osteosperma</i>	1	0	0	0.0	-	-
B	<i>Opuntia sp.</i>	2	3	0	.03	0.0	-
B	<i>Pediocactus simpsonii</i>	0	0	1	-	-	.00
B	<i>Pinus edulis</i>	3	4	2	6.07	5.25	4.07
	Total for Browse	78	90	78	12.72	13.00	7.40

CANOPY COVER, LINE INTERCEPT --

Management unit 24 , Study no: 7

Species	Percent Cover		
	'97	'03	'08
<i>Artemisia tridentata wyomingensis</i>	-	6.25	10.88
<i>Gutierrezia sarothrae</i>	-	.41	.01
<i>Opuntia sp.</i>	-	.20	-
<i>Pinus edulis</i>	4.80	9.28	10.51

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 24 , Study no: 7

Species	Average leader growth (in)	
	'03	'08
<i>Artemisia tridentata wyomingensis</i>	2.0	1.3

POINT-QUARTER TREE DATA --
Management unit 24 , Study no: 7

Species	Trees per Acre		
	'98	'03	'08
Juniperus osteosperma	14	44	47
Pinus edulis	42	31	33

Average diameter (in)		
'98	'03	'08
-	3.3	3.7
-	6.4	5.4

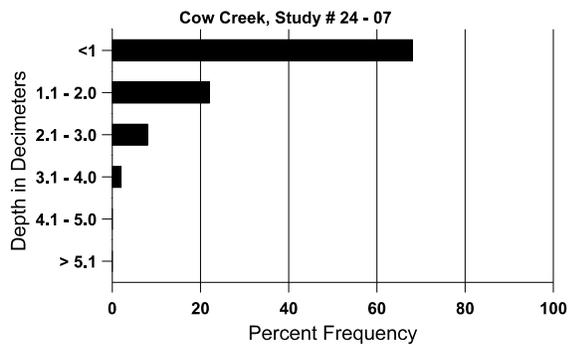
BASIC COVER --
Management unit 24 , Study no: 7

Cover Type	Average Cover %				
	'87	'91	'97	'03	'08
Vegetation	10.00	7.25	26.76	24.88	25.21
Rock	4.25	6.25	3.86	5.69	6.07
Pavement	20.25	35.25	27.72	36.37	36.09
Litter	57.00	39.75	33.72	36.44	32.86
Cryptogams	0	0	0	0	0
Bare Ground	8.50	11.50	9.88	11.88	10.47

SOIL ANALYSIS DATA --
Management unit 24, Study no: 7, Study Name: Cow Creek

Effective rooting depth (in)	Temp °F (depth)	pH	sandy loam			%0M	PPM P	PPM K	dS/m
			%sand	%silt	%clay				
17.8	74.0 (11.2)	7.4	65.0	20.1	14.9	2.7	19.1	54.4	0.5

Stoniness Index



PELLET GROUP DATA --

Management unit 24 , Study no: 7

Type	Quadrat Frequency		
	'97	'03	'08
Rabbit	13	39	97
Elk	31	32	4
Deer	17	6	10
Sheep	-	-	-
Cattle	4	1	2

Days use per acre (ha)		
'97	'03	'08
-	-	-
63 (156)	35 (86)	1 (2)
7 (17)	24 (60)	8 (20)
6 (15)	-	-
27 (67)	1 (2)	1 (2)

BROWSE CHARACTERISTICS --

Management unit 24 , Study no: 7

		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>Artemisia tridentata wyomingensis</i>												
87	3465	133	199	2133	1133	-	15	29	33	1	6	16/17
91	3198	-	66	1199	1933	-	42	21	60	9	33	13/16
97	2280	40	180	1320	780	1100	28	3	34	19	19	21/27
03	1920	-	20	760	1140	1280	35	5	59	32	32	23/30
08	1420	80	40	400	980	1280	37	11	69	31	42	21/31
<i>Gutierrezia sarothrae</i>												
87	4132	1133	933	3199	-	-	0	0	0	-	0	8/6
91	2665	-	333	1666	666	-	8	0	25	2	8	5/6
97	220	-	20	200	-	-	0	0	0	-	0	8/8
03	1800	-	780	1020	-	-	0	0	0	-	0	7/8
08	940	140	200	740	-	60	0	2	0	-	0	6/5
<i>Juniperus osteosperma</i>												
87	66	-	66	-	-	-	0	0	-	-	0	-/-
91	66	-	66	-	-	-	0	0	-	-	0	-/-
97	20	-	20	-	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	-/-
08	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Opuntia sp.</i>												
87	665	-	466	66	133	-	0	0	20	-	0	4/7
91	399	-	133	266	-	-	17	0	0	-	0	3/5
97	40	-	-	40	-	20	0	0	0	-	0	5/10
03	80	-	-	80	-	-	0	0	0	-	0	4/15
08	0	-	-	-	-	-	0	0	0	-	0	5/12

		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)
Pediocactus simpsonii												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
91	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	3/12
08	20	-	-	20	-	-	0	0	-	-	0	-/-
Pinus edulis												
87	66	-	66	-	-	-	0	0	-	-	0	-/-
91	66	-	66	-	-	-	0	0	-	-	0	-/-
97	60	-	20	40	-	-	0	0	-	-	0	-/-
03	80	20	60	20	-	-	0	0	-	-	0	-/-
08	40	20	20	20	-	-	0	0	-	-	0	-/-
Sclerocactus sp.												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
91	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	3/11
03	0	-	-	-	-	-	0	0	-	-	0	-/-
08	0	20	-	-	-	-	0	0	-	-	0	3/11