Trend Study 16B-10-07

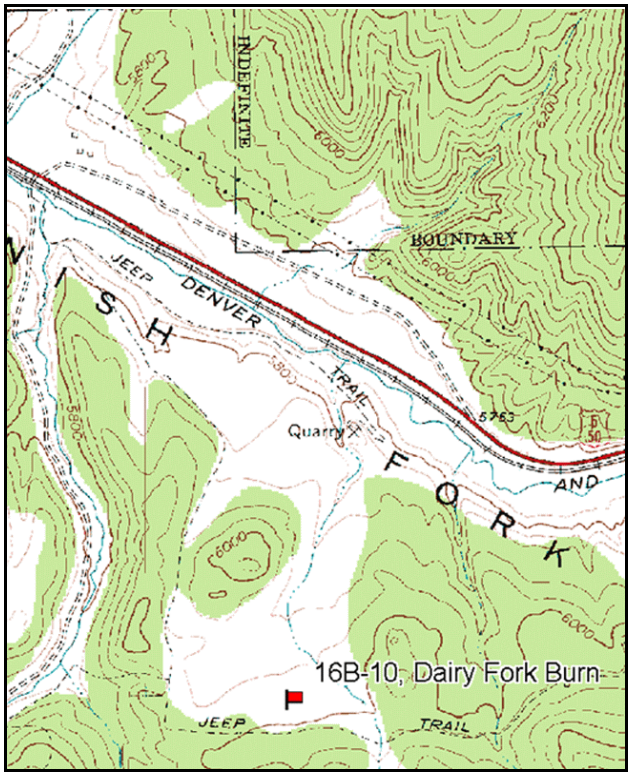
Study site name: Dairy Fork Burn . Vegetation type: Big Sagebrush-Burn .

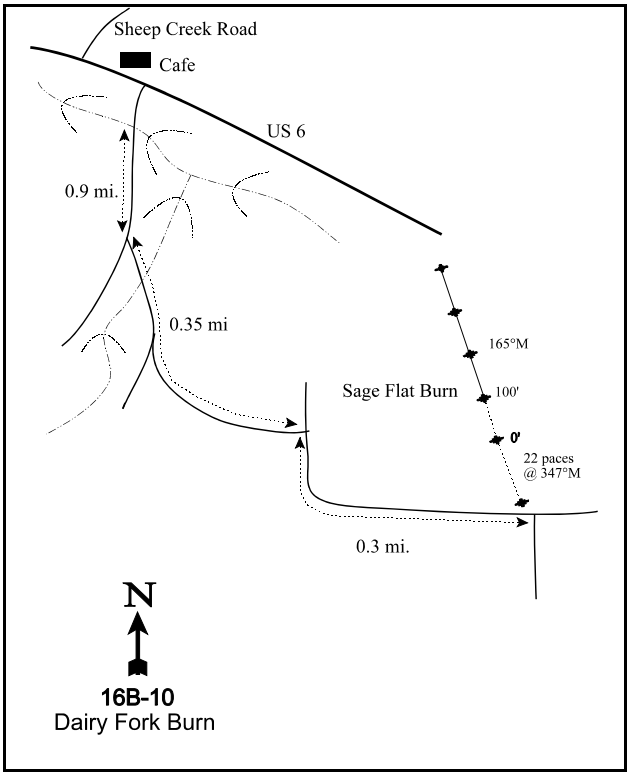
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

Near the Sheep Creek cafe on Highway 6, take Dairy Fork Road on the south side of the highway 0.9 miles to a left hand fork. Take this fork, cross the creek and go 0.35 miles staying east (left) to a sagebrush flat/burn and a 3-way intersection. Turn right (south) and follow the road around upper edge of flat for 0.3 miles to a junction on the right and a witness post on the left. Stop here and walk north into the flat about 22 paces at an azimuth of 347 degrees magnetic to the l00-foot baseline stake.





Map Name: Mill Fork

Diagrammatic Sketch

Township 15S ,Range 5E , Section 7

GPS: NAD 83, UTM 12S 471934 E 4423126 N

DISCUSSION

Dairy Fork Burn - Trend Study No. 16B-10

Study Information

This study was established in 1989 and samples a burned sagebrush flat surrounded by juniper [elevation: 6,000 feet (1,830 m), slope: 3%, aspect: north]. This Division of Wildlife Resources property was burned, treated with a disc-chain, and seeded in 1988. As a result, the basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) population was largely eliminated. A 1978 line-intercept transect is located at the north end of the flat, and the present study was established to monitor recovery of basin big sagebrush. The study is 0.6 miles (1 km) south of Soldier Creek. There has been light deer use and moderate-heavy elk use. Quadrat frequency of deer and elk pellet groups has averaged 12% and 41%, respectively, since 1997. From the pellet group transect data, there were an estimated 5 deer days use/acre (13 ddu/ha) in 2002 and 2 deer days use/acre (5 ddu/ha) in 2007. Elk use was estimated at 116 days use/acre (288 edu/ha) in 2002 and 115 days use/acre (284 edu/ha) in 2007. Domestic sheep had been trailed through the area in 2002, just prior to sampling, and use was estimated at 34 days use/acre (84 sdu/ha). About one-third of the elk pellet groups were from spring.

Soil

The moderately deep soil has a clay texture and reactivity is slightly alkaline (pH 7.4). Bare soil cover was approximately 40% from 1989 to 2002, then decreased to 25% in 2007. Due to the gentle slope, erosion is minimal. Adjacent areas without herbaceous cover appear to have significant soil movement. The erosion condition was classified as be slight in 2002 and was at the upper threshold of stable in 2007. There is a gully paralleling the study that shows some sign of activity, though the gully bottom is vegetated.

Browse

When this study was established in 1989, no density plots were established to estimate sagebrush density because there were no plants to sample. In 1997, sagebrush density was estimated at 300 plants/acre (743 plants/ha), which steadily increased to 520 plants/acre (1,287 plants/ha) in 2007. Sagebrush canopy cover was 5% in 2007. Recruitment from the young age class was high in 1997 at 40% of the population, and decreased to approximately 20% in 2002 and 2007. Decadent plants were first sampled in 2002, with only 13% of the population being classified as such. Decadency remained stable in 2007. The dead sagebrush plants listed in the browse characteristics table in 1997 and 2002 were plants that existed in the original population before the burn treatment. The percentage of plants exhibiting poor vigor was low until 2007, when one-third of the plants were infested by the sagebrush defoliator moth (*Aroga websteri*). Sagebrush annual growth was estimated at nearly 3 inches (7.4 cm) in 2002 and was only 1.6 inches (4 cm) in 2007. Browse use has been light every sample year.

Herbaceous Understory

The herbaceous understory was initially dominated by forbs in 1989, but in subsequent sample years perennial grasses have been more abundant. This transition is partly the result of the larger area sampled beginning in 1997, and partly the result of the establishment of seeded grass species. Perennial grass cover increased from 19% in 1997 to 36% by 2007. The two most abundant grasses are crested wheatgrass (*Agropyron cristatum*) and intermediate wheatgrass (*Agropyron intermedium*). Crested wheatgrass provided 8% cover in 1997, 16% in 2002, and 29% in 2007. Since 2002, crested wheatgrass has accounted for over 60% of the vegetation cover. The decrease in cheatgrass (*Bromus tectorum*) frequency coincides with an increase in crested wheatgrass, suggesting that the crested wheatgrass is out-competing the cheatgrass. Native grasses are present, but at lower frequencies than the seeded grasses.

Since 1989, the sum of nested frequency for forbs has steadily declined due to a significant reduction in the frequency of two weedy species, musk thistle (*Carduus nutans*) and prickly lettuce (*Lactuca serriola*). Perennial forb cover was 3% in 1997, less than 1% in 2002, and 4% in 2007. Musk thistle was the dominant

herbaceous species in the treated area in 1989. However, this undesirable, noxious weed was infested with a weevil and there was little viable seed. Musk thistle has steadily declined, and was not sampled in 2002 or 2007. Some of the decline may be the result of competition with perennial grasses. Drought in 2002 (Utah Climate Summaries 2007) also likely played a role in decreased nested frequency of perennial forbs. Whitetop (*Cardaria draba*), another noxious weed, was sampled in 7% of the quadrats in 2002 and 2007.

1997 TREND ASSESSMENT

The browse trend is up. The density of basin big sagebrush increased from 0 plants/acre to 300 plants/acre (743 plants/ha). Young plants made up 40% of the population, and there were no decadent plants. Plant vigor is normal on nearly all of the sagebrush plants, and browse use was light. The grass trend is up. The sum of nested frequency for perennial grasses increased six-fold, and the increase in nested frequency was statistically significant for 5 of the 8 perennial grasses. The forb trend is slightly down. The sum of nested frequency of perennial forbs decreased by 57%, and most of the decrease was from timber poisonvetch (*Astragalus convallarius*), prickly lettuce, and false yarrow (*Chaenactis douglasii*). However, there was also a significant decline (54%) in nested frequency of musk thistle, and this decline countered the decline in nested frequency of the perennial forbs. Despite the high perennial grass cover, the Desirable Components Index (DCI) score was very poor-poor due to the low browse cover and the presence of a noxious weed.

winter range condition (DCI) - very poor-poor (34) Mid-level potential scale
browse - up (+2) grass - up (+2) forb - slightly down (-1)

2002 TREND ASSESSMENT

The browse trend is slightly up. The density of sagebrush increased 38% to 480 plants/acre (1,188 plants/ha). Young plants make up 21% of the population in spite of drought conditions. Decadency increased to 13% of the population. Vigor remained stable and browse use remained light. The grass trend is slightly down. The sum of nested frequency of perennial grasses decreased by 19%, and most of the decrease was due to a significant decrease in the nested frequency of bottlebrush squirreltail (*Sitanion hystrix*). Other perennial species decreased, but not significantly. However, the nested frequency of crested wheatgrass increased significantly. Bottlebrush squirreltail was the only perennial grass that had not been heavily grazed by domestic sheep. There was also a significant decrease in cheatgrass nested frequency. The forb trend is down. The sum of nested frequency for perennial forbs declined by 81%, including a significant decrease in the nested frequency of timber poisonvetch. The number of perennial forb species sampled decreased from 14 to six. The nested frequency of annual forbs decreased by 86%, and is likely the result of the drought. Musk thistle decreased from a quadrat frequency of 46% to 0%, but a new noxious weed, whitetop, was sampled in 7% of the quadrats. The DCI score decreased to very poor due to the decrease in perennial forb cover.

winter range condition (DCI) - very poor (31) Mid-level potential scale
browse - slightly up (+1) grass - slightly down (-1) forb - down (-2)

2007 TREND ASSESSMENT

The browse trend is stable. Sagebrush density increased 8%. The young and decadent age classes changed little, and the proportion of plants exhibiting poor vigor increased to 35%. This increase was partly caused by the sagebrush defoliator moth (*Aroga websteri*) and to the high number of chlorotic plants. The grass trend is up. The sum of nested frequency for perennial grasses increased by 18%, including a significant increase in the nested frequency of smooth brome (*Bromus inermis*). Perennial grass cover increased from 22% to 36%. Cheatgrass abundance remained low. Crested wheatgrass may be out-competing cheatgrass. The forb trend is up. The sum of nested frequency for perennial forbs increased nearly five-fold. Most of the increase was from a significant increase in the nested frequency of timber poisonvetch. However, the sum of nested frequency also increased for annual forbs, especially bur buttercup (*Ranunculus testiculatus*). Whitetop remained stable. The DCI score improved to poor due to increased perennial forb cover.

winter range condition (DCI) - poor (39) Mid-level potential scale
browse - stable (0) grass - up (+2) forb - up (+2)

HERBACEOUS TRENDS --
Management unit 16B, Study no: 10

Type	Species	Nested Frequency				Average Cover %		
		'89	'97	'02	'07	'97	'02	'07
G	Agropyron cristatum	a11	b209	c285	c287	8.24	15.97	28.93
G	Agropyron intermedium	a1	b108	b85	b109	5.00	4.20	4.12
G	Bromus inermis	a1	bc86	b50	c85	2.21	.58	1.70
G	Bromus tectorum (a)	-	b132	a18	a19	.88	.32	.11
G	Dactylis glomerata	a9	a10	a2	-	.09	.00	-
G	Oryzopsis hymenoides	a1	ab6	b15	ab4	.56	.31	.41
G	Poa fendleriana	1	-	-	-	-	-	-
G	Poa pratensis	a2	b27	-	b35	.53	-	.66
G	Poa secunda	-	a5	-	a1	.12	-	.00
G	Sitanion hystrix	b69	c118	a25	a22	2.71	.90	.49
Total for Annual Grasses		0	132	18	19	0.88	0.31	0.11
Total for Perennial Grasses		95	569	462	543	19.49	21.97	36.34
Total for Grasses		95	701	480	562	20.38	22.29	36.46
F	Achillea millefolium	a3	a4	a5	a3	.63	.03	.63
F	Alyssum alyssoides (a)	-	a6	a6	a15	.01	.03	.04
F	Astragalus cibarius	3	-	-	-	-	-	-
F	Astragalus convallarius	c113	b62	a3	c120	.46	.00	2.35
F	Astragalus tenellus	a9	a5	-	a3	.04	-	.38
F	Cardaria draba	-	-	a16	a14	-	.04	.03
F	Camelina microcarpa (a)	-	42	-	-	.13	-	-
F	Carduus nutans (a)	b230	a106	-	-	3.23	-	-
F	Chaenactis douglasii	b145	a25	a4	-	.05	.01	-
F	Cirsium sp.	-	a3	-	a3	.03	-	.02
F	Comandra pallida	-	b36	-	a3	.56	-	.00
F	Collinsia parviflora (a)	-	a2	-	a5	.00	-	.01
F	Descurainia pinnata (a)	-	2	-	-	.00	-	-
F	Epilobium brachycarpum (a)	-	5	-	-	.01	-	-
F	Grindelia squarrosa	6	-	-	-	-	-	-
F	Iva axillaris	-	-	-	27	-	-	.13
F	Lactuca serriola	b217	a32	-	-	.14	-	-
F	Machaeranthera canescens	5	-	-	-	-	-	-
F	Medicago sativa	-	a1	-	a-	.03	-	.03

Type	Species	Nested Frequency				Average Cover %		
		'89	'97	'02	'07	'97	'02	'07
F	Microsteris gracilis (a)	-	$_{b}$58	$_{a}$27	$_{a}$22	.36	.05	.09
F	Penstemon caespitosus	$_{a}$7	$_{a}$13	$_{a}$14	$_{a}$7	.74	.22	.18
F	Phlox longifolia	-	$_{a}$3	$_{a}$2	$_{a}$7	.00	.00	.01
F	Ranunculus testiculatus (a)	-	$_{a}$4	-	$_{b}$81	.00	-	.70
F	Sanguisorba minor	$_{a}$5	$_{a}$9	-	-	.16	-	-
F	Sisymbrium altissimum (a)	-	5	-	-	.01	-	-
F	Taraxacum officinale	$_{a}$11	$_{a}$8	-	-	.07	-	-
F	Tragopogon dubius	$_{b}$23	$_{a}$8	-	-	.05	-	-
F	Vicia americana	-	$_{a}$24	-	$_{a}$19	.04	-	.43
Total for Annual Forbs		230	230	33	123	3.78	0.08	0.84
Total for Perennial Forbs		547	233	44	206	3.03	0.31	4.23
Total for Forbs		777	463	77	329	6.82	0.39	5.07

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

BROWSE TRENDS --
Management unit 16B, Study no: 10

Type	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	Artemisia tridentata tridentata	13	19	21	.41	1.86	2.24
B	Chrysothamnus nauseosus	0	1	1	-	-	-
B	Juniperus osteosperma	1	0	0	.15	.63	.15
Total for Browse		14	20	22	0.56	2.50	2.39

CANOPY COVER, LINE INTERCEPT --
Management unit 16B, Study no: 10

Species	Percent Cover	
	'02	'07
Artemisia tridentata tridentata	-	4.80
Juniperus osteosperma	-	.21

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 16B, Study no: 10

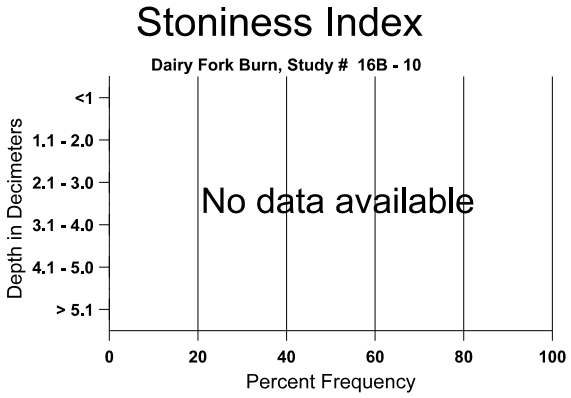
Species	Average leader growth (in)	
	'02	'07
Artemisia tridentata tridentata	2.9	1.6

BASIC COVER --
Management unit 16B, Study no: 10

Cover Type	Average Cover %			
	'89	'97	'02	'07
Vegetation	4.00	32.15	25.91	47.31
Rock	0	.00	.01	.06
Pavement	0	.22	.06	.16
Litter	58.25	24.80	49.02	38.76
Cryptogams	0	.16	.03	.64
Bare Ground	37.75	43.81	41.40	25.25

SOIL ANALYSIS DATA --
Herd Unit 16B, Study no: 10, Dairy Fork Burn

Effective rooting depth (in)	Temp °F (depth)	pH	Clay			%0M	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
13.7	59.0 (13.2)	7.5	25.4	26.8	47.8	2.2	8.0	217.6	.4



PELLET GROUP DATA --
Management unit 16B, Study no: 10

Type	Quadrat Frequency		
	'97	'02	'07
Sheep	-	11	-
Rabbit	12	8	13
Elk	33	46	43
Deer	9	13	14
Cattle	1	-	-

Days use per acre (ha)	
'02	'07
34 (84)	-
-	-
116 (288)	115 (284)
5 (13)	2 (5)
-	-

BROWSE CHARACTERISTICS --
Management unit 16B, Study no: 10

		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)
Artemisia tridentata tridentata												
89	**0**	-	-	-	-	-	0	0	0	-	0	-/-
97	**300**	40	120	180	-	2360	0	0	0	-	7	49/43
02	**480**	-	100	320	60	1280	25	8	13	4	8	33/30
07	**520**	200	120	340	60	640	8	0	12	4	35	37/37
Chrysothamnus nauseosus												
89	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
02	**20**	-	-	20	-	-	0	100	-	-	0	24/27
07	**20**	-	-	20	-	40	0	0	-	-	0	29/35
Chrysothamnus viscidiflorus												
89	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
02	**0**	-	-	-	-	-	0	0	-	-	0	-/-
07	**0**	-	-	-	-	-	0	0	-	-	0	7/7
Juniperus osteosperma												
89	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**20**	-	20	-	-	-	0	0	-	-	0	-/-
02	**0**	-	-	-	-	-	0	0	-	-	0	-/-
07	**0**	-	-	-	-	-	0	0	-	-	0	-/-