

MIDDLE FORK - TREND STUDY NO. 3-17-11

Vegetation Type: Low Sagebrush

Range Type: Crucial Deer Winter, Crucial Elk Winter

NRCS Ecological Site Description: [Mountain Gravelly Loam \(Mountain Big Sagebrush\), R047XA406UT](#)

Land Ownership: DWR

Elevation: 5,900 ft (1,798 m)

Aspect: Southwest

Slope: 20%

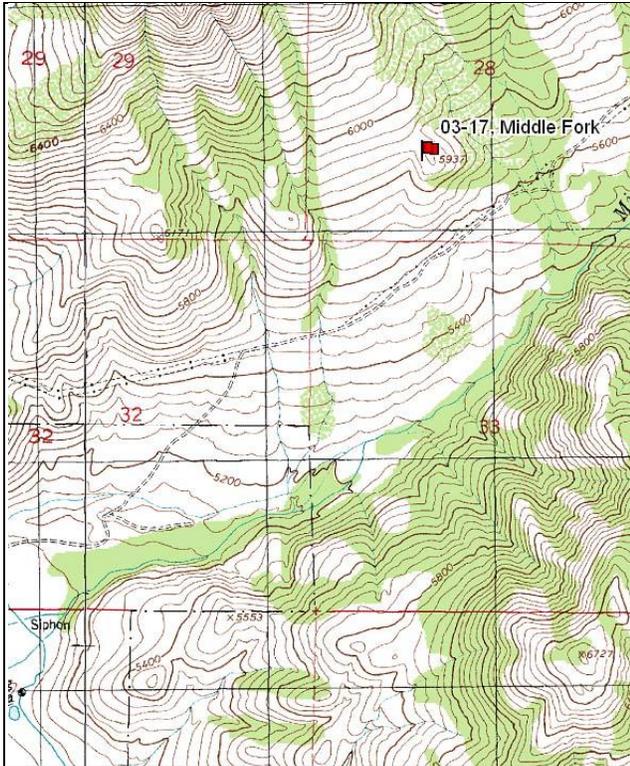
Transect bearing: 165° magnetic

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

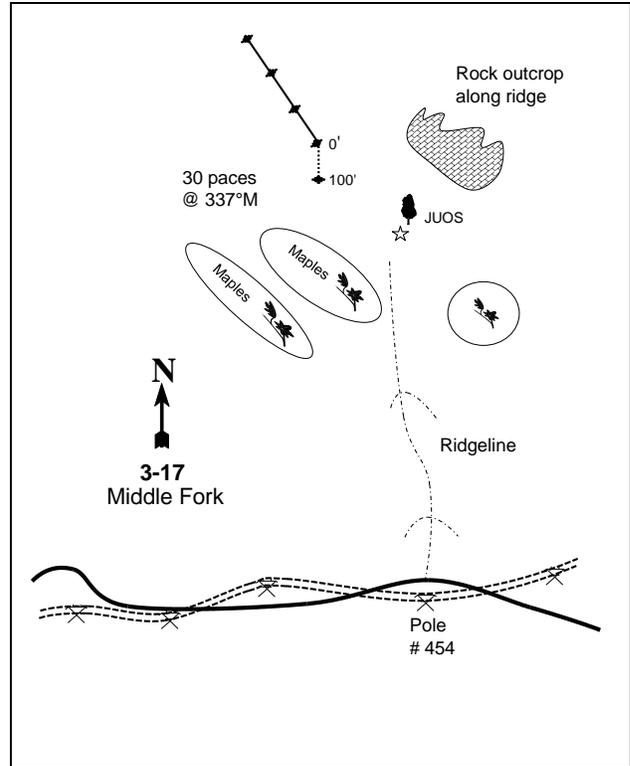
Directions:

From 5500 East and 2200 North in Eden, proceed 0.4 miles to a bend. Continue east another 1.9 miles to where the main road bends to the southeast. Continue straight for 1.9 miles to the state land (middle fork wildlife management area). From the sign, drive 0.1 miles to a three way intersection. Stay left and go through the gate. Continue east 0.05 miles to a fork. Stay to the left side, and continue 0.05 miles to a creek. Cross the creek and continue down a ripped rough road which is now a horse trail for 0.8 miles, going under power lines, to pole #454. Park here and walk up the ridge line beyond the maples to a lone juniper. The 100-foot stake of the frequency baseline is 30 paces away at a bearing of 337 degrees magnetic.

Map Name: Brown's Hole



Diagrammatic Sketch:



Township: 7N Range: 2E Section: 28

GPS: NAD 83, UTM 12S 438630 E 4573507 N

MIDDLE FORK - TREND STUDY NO. 3-17

Site Information

Site Description: The study samples a low sagebrush (*Artemisia arbuscula*) and grass community overlooking the Middle Fork of the Ogden River. The study lies within the Division of Wildlife Resources (DWR) Middle Fork Wildlife Management Area (WMA). Although it was heavily grazed to some extent in the past, there have been no signs of livestock use since 1996. Deer pellet groups were sampled in low abundance in 2001 and 2006, but moderate abundance in 2011. Elk pellet groups have been sampled in low abundance since 2001. A cow elk carcass was found to the south of the site in 2011. Moose and grouse pellet groups have also been noted on the site (Table - Pellet Group Data). A sharp-tail grouse was seen near the site in 2011.

Browse: The most abundant browse species is low sagebrush, which provides nearly all of the browse cover on the site (Table - Browse Trends). The low sagebrush population is comprised of a dense stand of mostly mature plants. Utilization of low sagebrush has been mostly light to moderate since the outset of the study. Decadence was high in the population in 1990, but has been more moderate in other sample years. Recruitment of young plants has fluctuated throughout the sample years, but has been fairly good. Other more valuable species in terms of preference for wildlife are mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), antelope bitterbrush (*Purshia tridentata*), and Utah serviceberry (*Amelanchier utahensis*). However, these species are found in small numbers, and are not abundant enough to be considered key species. These species have been moderately to heavily utilized over the course of the study (Table - Browse Characteristics). High competition from a dense, weedy understory likely makes establishment of seedlings very difficult. An open stand of bigtooth maple (*Acer grandidentatum*) near the site provides fair resting cover, but thermal cover would be limited in the winter.

Herbaceous Understory: Grasses are moderately abundant and diverse, but are dominated by the weedy species bulbous bluegrass (*Poa bulbosa*). Bulbous bluegrass has provided over half of the grass cover since 1996, and nested frequency has increased significantly over the course of the study. The native perennial bluebunch wheatgrass (*Agropyron spicatum*) is fairly abundant, and has maintained a fairly stable nested frequency throughout the study. Other perennial grass species are far less common. The annual grasses cheatgrass (*Bromus tectorum*) and Japanese chess (*B. japonicus*) were common when first included in the sample in 1996, but have decreased since that time and were rare in 2011. Forbs are also fairly abundant and diverse. The composition is fair with pacific aster (*Aster chilensis*), carrotleaf leptotaenia (*Lomatium dissectum*), arrowleaf balsamroot (*Balsamorhiza sagittata*), and mulesears (*Wyethia amplexicaulis*) providing the majority of the forb cover (Table - Herbaceous Trends).

Soil: The soil is in the Durfee series, which occurs on mountain slopes and mountainsides. Parent material consists of colluvium derived from sandstone and quartzite. These soils are classified as deep and well drained (Soil Survey Staff 2011). The soil texture is a clay loam with a slightly acidic soil reaction (pH 6.4) (Table - Soil Analysis Data). There is a large amount of vegetation, litter, rock, pavement, and cryptogam cover, keeping bare ground cover very low (Table - Basic Cover). The soil erosion condition has been classified as stable since 2001.

Trend Assessments

Browse:

- **1984 to 1990 - slightly down (-1):** Density of low sagebrush increased slightly from 6,865 plants/acre to 7,198 plants/acre. However, decadence increased from 10% to 53%, and poor vigor increased from 14% to 20%. Recruitment of young plants decreased from 16% to 1%.
- **1990 to 1996 - slightly up (+1):** Differences in density may be related to the larger sample area used in 1996; therefore, trend was determined using other parameters. Decadence, poor vigor, and recruitment of young low sagebrush returned to 1984 levels at 11%, 11%, and 21%, respectively.

- **1996 to 2001 - up (+2):** The density of low sagebrush increased 29% from 6,620 plants/acre to 8,560 plants/acre, and cover increased 12% to 13%. Decadence remained similar at 13%, poor vigor decreased to 5%, and recruitment of young plants remained similar at 19%.
- **2001 to 2006 - slightly down (-1):** The low sagebrush density decreased 12% to 7,560 plants/acre, but cover increased to 15%. Decadence increased to 21%, and poor vigor increased to 12%. Recruitment of young plants decreased to 6%.
- **2006 to 2011 - slightly down (-1):** The density of low sagebrush decreased 14% to 6,500 plants/acre, and cover decreased to 10%. Decadence remained similar at 17%, and poor vigor at 8%. Recruitment of young plants remained similar at 6%.

Grass:

- **1984 to 1990 - up (+2):** The sum of nested frequency of perennial grasses, excluding bulbous bluegrass, increased 21%, with a significant increase in the nested frequency of Sandberg bluegrass (*Poa secunda*). Though not included in the sample, it was noted that annual brome species were abundant.
- **1990 to 1996 - down (-2):** The sum of nested frequency of perennial grasses, excluding bulbous bluegrass, decreased by 45%. There was a significant decrease in the nested frequency of the desirable species bluebunch wheatgrass and Sandberg bluegrass, and a significant increase in the nested frequency of the weedy species bulbous bluegrass. Bulbous bluegrass became the dominant grass species in both frequency and cover. Annual grasses were included in the sample for the first time in 1996, and occurred at moderate levels.
- **1996 to 2001 - slightly up (+1):** The perennial grass sum of nested frequency, excluding bulbous bluegrass, increased by 39%, and cover increased from 6% to 14%. Most of the increase in frequency was due to a significant increase in the nested frequency of Sandberg bluegrass. The weedy species bulbous bluegrass increased significantly in nested frequency, and cover increased from 9% to 21%. Cheatgrass and Japanese chess decreased significantly, and annual grass cover decreased from 3% to 1%.
- **2001 to 2006 - slightly down (-1):** The sum of nested frequency of perennial grasses, excluding bulbous bluegrass, decreased 15%, and cover decreased to 12%. Most of the decrease was due to a significant decrease in the nested frequency of Sandberg bluegrass. Bulbous bluegrass nested frequency remained similar, but cover decreased to 12%.
- **2006 to 2011 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, excluding bulbous bluegrass, though cover increased slightly to 28%. Bulbous bluegrass nested frequency remained similar, but cover increased to 16%.

Forb:

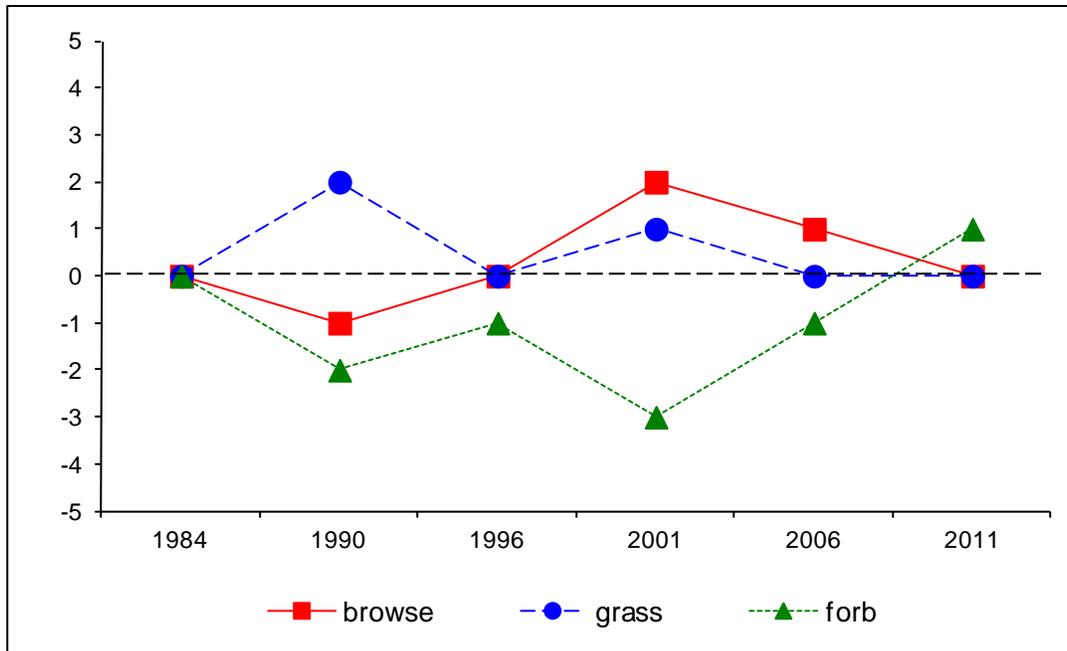
- **1984 to 1990 - down (-2):** The sum of nested frequency of perennial forbs decreased 27%.
- **1990 to 1996 - slightly up (+1):** The perennial forb sum of nested frequency increased 13%.
- **1996 to 2001 - down (-2):** The sum of nested frequency of perennial forbs decreased 28%, though cover increased from 7% to 9%.
- **2001 to 2006 - up (+2):** There was a 42% increase in the sum of nested frequency of perennial forbs, and cover increased to 11%.
- **2006 to 2011 - up (+2):** The sum of nested frequency of perennial forbs increased by 47%, and cover increased to 15%.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
 Management unit 3, study no: 17

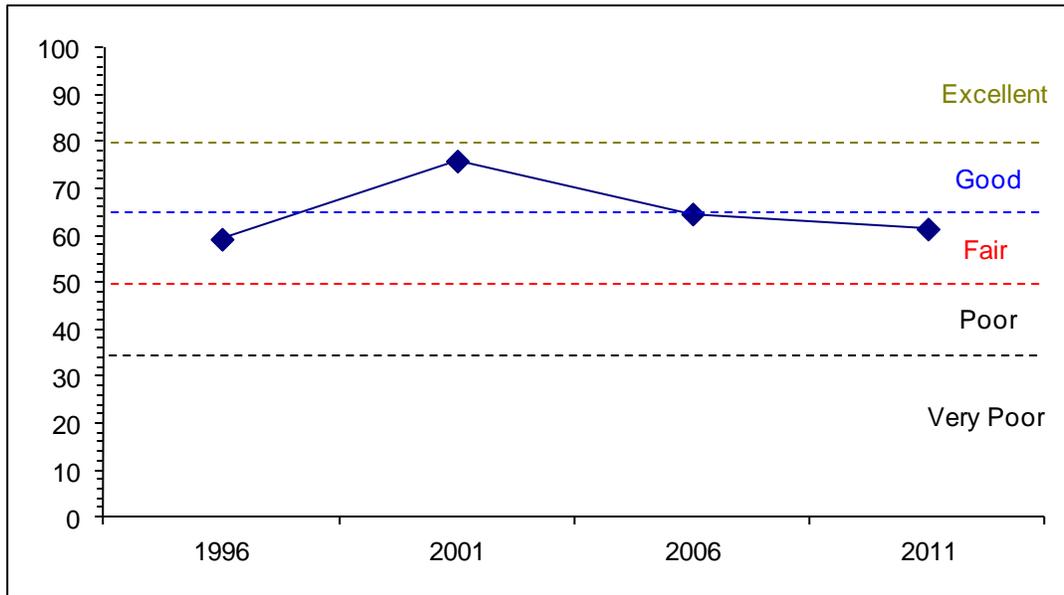
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover (-POBU)	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
96	16.6	12.1	9.9	12.7	-2.0	10.0	0.0	59.2	Fair
01	16.7	11.2	9.7	28.8	-0.6	10.0	0.0	75.9	Good
06	18.3	8.7	3.0	24.7	0.0	10.0	0.0	64.6	Fair-Good
11	14.7	9.9	2.6	24.2	-0.1	10.0	0.0	61.4	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 3 Study no: 17



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--
 Management unit 3, Study no: 17



HERBACEOUS TRENDS--
 Management unit 03, Study no: 17

Type	Species	Nested Frequency					Average Cover %				
		'85	'90	'96	'01	'06	'11	'96	'01	'06	'11
G	Agropyron dasystachyum	a-	a-	a10	a8	b46	a15	.09	.07	1.77	.40
G	Agropyron spicatum	b233	b254	a173	ab216	a181	ab220	4.50	9.06	8.59	6.92
G	Agropyron trachycaulum	-	-	-	6	2	1	-	.13	.03	.00
G	Bromus japonicus (a)	-	-	c211	b42	a5	a3	1.26	.17	.01	.00
G	Bromus tectorum (a)	-	-	c132	b53	a6	ab29	1.42	.60	.02	.07
G	Dactylis glomerata	-	-	-	15	1	-	-	1.55	.00	-
G	Danthonia californica	-	-	-	1	9	9	-	.03	.21	1.16
G	Danthonia unispicata	a-	a-	a-	a-	a9	b28	-	-	.12	2.92
G	Koeleria cristata	-	-	2	-	-	-	.00	-	-	-
G	Melica bulbosa	b42	ab26	ab28	a8	a10	ab20	.20	.07	.20	.15
G	Poa bulbosa	a4	a30	b265	c315	bc291	c308	9.23	20.61	12.34	15.62
G	Poa pratensis	a-	a-	a-	a-	a1	b23	-	.00	.00	.13
G	Poa secunda	b155	c239	a32	b143	a42	a29	.53	3.48	.79	.19
G	Stipa lettermani	a1	a1	c43	a-	bc37	ab12	1.00	-	.58	.21
Total for Annual Grasses		0	0	343	95	11	32	2.69	0.77	0.03	0.07
Total for Perennial Grasses		435	550	553	712	629	665	15.58	35.03	24.67	27.73
Total for Grasses		435	550	896	807	640	697	18.27	35.81	24.70	27.80
F	Achillea millefolium	ab9	a3	b19	ab9	ab8	ab14	.31	.16	.16	.26
F	Agoseris glauca	ab20	b33	ab21	a11	ab34	ab35	.13	.07	.22	.57
F	Allium sp.	b38	a-	a-	a3	a15	c128	-	.00	.07	1.48
F	Ambrosia sp.	-	-	-	-	-	-	-	-	-	.03
F	Arabis sp.	-	-	1	-	1	10	.00	-	.00	.02
F	Artemisia ludoviciana	b71	b45	a5	a11	a20	a21	.06	.33	.65	.84

Type	Species	Nested Frequency						Average Cover %			
		'85	'90	'96	'01	'06	'11	'96	'01	'06	'11
F	<i>Aster chilensis</i>	c69	c70	a21	bc46	ab33	ab36	.92	2.21	1.50	1.32
F	<i>Astragalus beckwithii</i>	-	-	3	-	-	-	.03	-	-	-
F	<i>Balsamorhiza macrophylla</i>	-	-	-	-	1	2	-	-	.15	.38
F	<i>Balsamorhiza sagittata</i>	b18	ab6	a1	a4	ab10	a4	.21	.45	1.66	1.44
F	<i>Borago officinalis</i>	8	-	-	-	-	-	-	-	-	-
F	<i>Calochortus nuttallii</i>	5	2	-	-	-	14	-	-	-	.02
F	<i>Castilleja</i> sp.	-	4	1	2	9	4	.03	.06	.10	.19
F	<i>Cirsium</i> sp.	10	10	5	3	8	1	.04	.03	.30	.00
F	<i>Collinsia parviflora</i> (a)	-	-	1	5	14	4	.00	.02	.03	.01
F	<i>Collomia linearis</i> (a)	-	-	a23	a10	a3	b52	.71	.05	.00	.79
F	<i>Comandra pallida</i>	7	4	7	-	3	9	.18	-	.03	.04
F	<i>Crepis acuminata</i>	3	-	-	-	3	-	-	-	.03	-
F	<i>Descurainia pinnata</i> (a)	-	-	-	3	-	6	-	.00	-	.06
F	<i>Draba</i> sp. (a)	-	-	a41	a45	b93	c134	.12	.14	.21	.80
F	<i>Epilobium brachycarpum</i> (a)	-	-	a-	a-	b30	a8	-	-	.11	.02
F	<i>Erigeron strigosus</i>	-	-	11	5	3	-	.22	.01	.00	-
F	<i>Eriogonum cernuum</i> (a)	-	-	-	-	-	-	-	-	-	-
F	<i>Erodium cicutarium</i> (a)	-	-	a1	bc21	ab7	c41	.00	.34	.01	.23
F	<i>Galium aparine</i> (a)	-	-	ab1	a-	bc15	c20	.00	.00	.08	.30
F	<i>Grindelia squarrosa</i>	-	-	4	-	-	-	.03	-	-	-
F	<i>Hackelia patens</i>	a-	b26	ab7	ab4	ab5	a1	.19	.06	.22	.03
F	<i>Holosteum umbellatum</i> (a)	-	-	14	-	1	3	.16	-	.00	.00
F	<i>Lactuca serriola</i> (a)	-	9	2	1	-	13	.00	.00	-	.16
F	<i>Lappula occidentalis</i> (a)	-	-	-	2	1	-	-	.03	.00	-
F	<i>Lomatium dissectum</i>	a-	a2	b33	b31	b51	b50	.37	1.47	1.52	1.48
F	<i>Lupinus argenteus</i>	1	5	3	4	4	6	.15	.63	.15	.38
F	<i>Machaeranthera</i> spp	a-	a-	b57	a-	a-	a-	.23	-	-	-
F	<i>Madia glomerata</i> (a)	-	-	-	-	13	8	-	-	.10	.76
F	<i>Microsteris gracilis</i> (a)	-	-	-	1	4	5	-	.00	.01	.01
F	<i>Phlox longifolia</i>	-	-	-	1	-	-	-	.00	-	-
F	<i>Polygonum douglasii</i> (a)	-	-	ab14	a-	b26	a8	.03	-	.09	.02
F	<i>Senecio integerrimus</i>	3	3	-	-	-	-	-	-	-	-
F	<i>Taraxacum officinale</i>	-	-	8	12	-	7	.08	.02	-	.16
F	<i>Tragopogon dubius</i> (a)	a4	a11	c169	b81	a20	b95	2.69	1.62	.21	.84
F	Unknown forb-perennial	29	-	-	-	-	-	-	-	-	-
F	<i>Verbascum blattaria</i>	-	-	-	-	2	-	-	-	.03	-
F	<i>Viola</i> sp.	a-	a-	a-	a1	b9	ab2	-	.00	.05	.00
F	<i>Wyethia amplexicaulis</i>	ab14	a10	c44	c35	c40	bc37	3.80	3.68	3.55	6.26
Total for Annual Forbs		4	20	266	169	227	397	3.74	2.23	0.87	4.03
Total for Perennial Forbs		305	223	251	182	259	381	7.02	9.23	10.45	14.95
Total for Forbs		309	243	517	351	486	778	10.77	11.47	11.33	18.98

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

BROWSE TRENDS--

Management unit 03, Study no: 17

Type	Species	Strip Frequency				Average Cover %			
		'96	'01	'06	'11	'96	'01	'06	'11
B	Acer grandidentatum	2	1	1	1	1.25	1.70	1.37	.96
B	Artemisia arbuscula	92	88	92	86	11.80	13.00	14.63	10.32
B	Artemisia tridentata vaseyana	7	1	0	12	1.49	.38	-	1.39
B	Gutierrezia sarothrae	9	17	15	9	.26	.53	.28	.10
B	Purshia tridentata	1	1	1	1	-	-	-	.06
Total for Browse		111	108	109	109	14.81	15.62	16.29	12.84

CANOPY COVER, LINE INTERCEPT--

Management unit 03, Study no: 17

Species	Percent Cover	
	'06	'11
Acer grandidentatum	2.90	6.19
Artemisia arbuscula	19.75	15.41
Artemisia tridentata vaseyana	-	1.48
Gutierrezia sarothrae	.73	.36

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 03, Study no: 17

Species	Average leader growth (in)		
	'01	'06	'11
Artemisia arbuscula	1.4	0.6	0.9

BASIC COVER--

Management unit 03, Study no: 17

Cover Type	Average Cover %					
	'85	'90	'96	'01	'06	'11
Vegetation	9.25	12.00	48.04	56.20	45.90	51.35
Rock	14.50	15.75	19.16	19.40	21.18	22.39
Pavement	2.75	9.50	2.04	2.82	6.87	3.98
Litter	55.50	56.50	57.15	45.01	36.81	35.20
Cryptogams	1.00	.50	.52	1.67	1.75	2.05
Bare Ground	17.00	5.75	.34	2.26	3.52	2.25

SOIL ANALYSIS DATA --

Management unit 03, Study no: 17, Study Name: Middle Fork

Effective rooting depth (in)	pH	Clay-Loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
8.8	6.4	38.6	32.4	29.0	3.6	13.8	105.6	0.4

PELLET GROUP DATA--

Management unit 03, Study no: 17

Type	Quadrat Frequency			
	'96	'01	'06	'11
Rabbit	1	-	1	-
Moose	-	-	1	-
Elk	25	9	12	11
Deer	8	4	14	16
Cattle	-	1	-	2

Days use per acre (ha)		
'01	'06	'11
-	-	-
-	-	-
7 (18)	13 (31)	15 (38)
15 (36)	13 (33)	28 (69)
-	-	-

BROWSE CHARACTERISTICS--

Management unit 03, Study no: 17

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Acer grandidentatum										
85	999	93	7	-	199	0	0	0	14/10	
90	666	100	0	-	-	0	0	0	-/-	
96	40	50	50	-	-	0	0	0	-/-	
01	20	0	100	-	-	0	0	0	-/-	
06	20	0	100	-	-	0	0	0	-/-	
11	20	0	100	-	-	0	0	0	47/71	
Amelanchier utahensis										
85	599	78	0	22	-	44	56	11	-/-	
90	799	67	0	33	-	92	0	8	-/-	
96	0	0	0	0	-	0	0	0	-/-	
01	0	0	0	0	-	0	0	0	-/-	
06	0	0	0	0	-	0	0	0	46/33	
11	0	0	0	0	-	0	0	0	25/48	
Artemisia arbuscula										
85	6865	16	75	10	66	0	0	14	10/14	
90	7198	1	46	53	133	47	6	20	12/18	
96	6620	21	67	11	1260	34	.60	11	13/21	
01	8560	19	68	13	-	14	.46	5	12/26	
06	7560	6	74	21	460	11	1	12	13/24	
11	6500	6	78	17	140	5	21	8	11/25	
Artemisia tridentata vaseyana										
85	532	0	75	25	-	0	0	0	26/19	
90	465	0	57	43	-	14	0	14	29/41	
96	200	10	90	0	-	30	0	0	26/47	
01	120	33	67	0	-	0	0	0	-/-	
06	0	0	0	0	-	0	0	0	-/-	
11	340	0	82	18	-	41	0	6	29/37	

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Gutierrezia sarothrae</i>										
85	133	0	100	0	-	0	0	0	12/9	
90	66	0	100	0	-	0	0	0	9/11	
96	400	50	50	0	920	0	0	0	9/11	
01	760	0	100	0	-	0	0	0	9/25	
06	760	18	79	3	20	0	0	0	9/12	
11	380	0	95	5	-	0	0	0	8/11	
<i>Purshia tridentata</i>										
85	132	0	50	50	-	0	100	0	8/24	
90	332	40	20	40	-	40	0	20	11/31	
96	40	0	100	0	-	100	0	0	20/54	
01	20	0	100	0	-	100	0	0	14/55	
06	20	100	0	0	-	0	0	0	24/40	
11	20	0	100	0	-	100	0	0	22/67	
<i>Quercus gambelii</i>										
85	0	0	0	-	-	0	0	0	-/-	
90	0	0	0	-	-	0	0	0	-/-	
96	0	0	0	-	-	0	0	0	-/-	
01	0	0	0	-	-	0	0	0	-/-	
06	0	0	0	-	-	0	0	0	-/-	
11	0	0	0	-	-	0	0	0	-/-	