Trend Study 16C-7-07

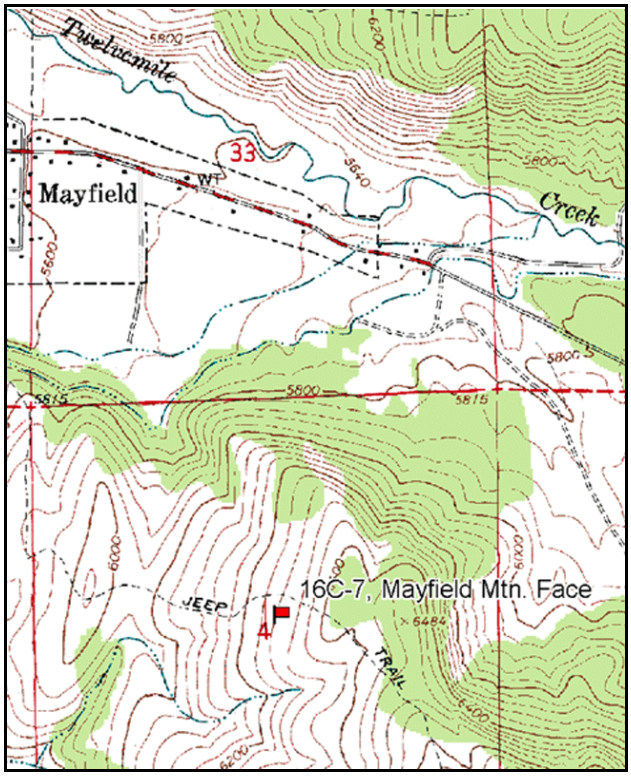
Study site name: Mayfield Mtn. Face . Vegetation type: Chained, Seeded P-J .

Compass bearing: frequency baseline 154 degrees magnetic.

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

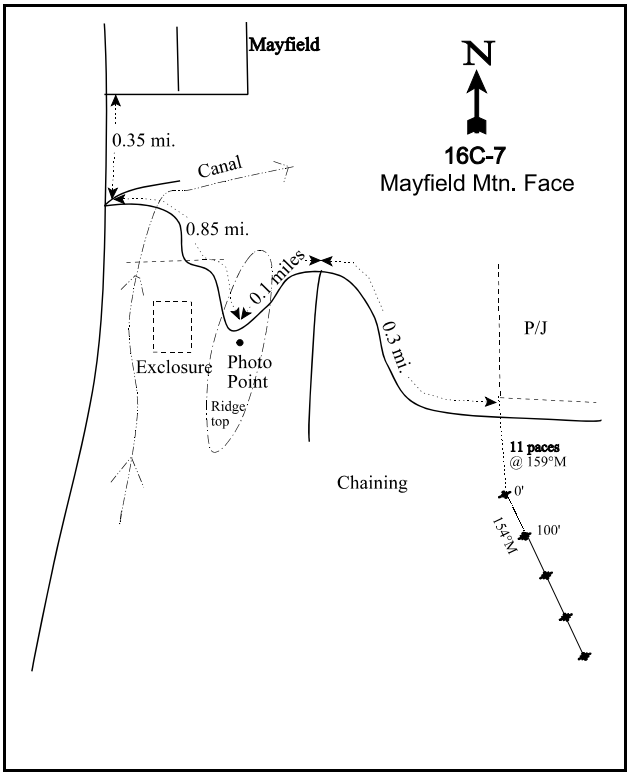
LOCATION DESCRIPTION

From the intersection of the main road and Twelve Mile Canyon Road in Mayfield, go south out of town on the main road for 0.35 miles into Arapien Valley to an intersection. At the intersection, turn east up a steep four-wheel drive road that goes up the hill. Take this road 0.85 miles to an old line-intercept photo point on the ridge top (a canal and fence will be crossed 0.1 miles east of the ridge top and you will come to a fork in the road). Go straight (east) for 0.3 miles to a fence corner on the north side of the road. From the fence corner, walk 11 paces at 159 degrees magnetic to the 0-foot baseline stake.



Map Name: Mayfield

Township 20S , Range 2E ,Section 4



Diagrammatic Sketch

GPS: NAD 83, UTM 12S 439946 E 4328014 N

DISCUSSION

Mayfield Mountain Face - Trend Study No. 16C-7

Study Information

This study is located on a large, 35-year-old chaining and seeding treatment southeast of Mayfield [elevation: 6,300 feet (1,920 m), slope: 15-20%, aspect: west]. The area is critical for wintering deer, but also receives some spring-fall use by big game. Quadrat frequency of deer pellets was 47% in 1997, 43% in 2002, and 41% in 2007. From the pellet group transect deer use was estimated at 56 days use/acre (139 ddu/ha) in 2002 and 179 days use/acre (441 ddu/ha) in 2007. Elk use was estimated at 3 days use/acre (7 edu/ha) in 2002 and 13 days use/acre (31 edu/ha) in 2007. Cattle use was estimated at 4 days use/acre (9 cdu/ha) in 2002 and 17 days use/acre (43 cdu/ha) in 2007.

Soil

The soil is in the Fontreen series that consists of very deep, well-drained, moderately-rapidly permeable soils that formed in alluvium and colluvium from limestone, sandstone, chert, and shale. Fontreen soils are on alluvial fans, hillslopes and mountain slopes. They are strongly calcareous, allowing calcium carbonate precipitates to form a hardened caliche layer (USDA-NRCS 2007). The soil has a clay loam texture and reactivity is neutral to slightly alkaline (pH of 7.3). There is a well-developed hardpan within localized areas about 10 inches (25 cm) below the surface. Relative rock and pavement cover was moderate at 23%-26% in all sample years. Relative bare ground cover was low at 5% in 1997, increased to 20% in 2002 with drought, and decreased slightly to 17% in 2007. Combined relative cover of vegetation and litter was 64% in 1997, decreased to 51% with drought in 2002, and increased slightly to 58% in 2007. Vegetation and litter has been well-distributed, and adequate to prevent serious erosion. The erosion condition was classified as slight in 2002 due to pedestalling around plants. In 2007, the erosion condition was classified as stable.

Browse

Black sagebrush (*Artemisia nova*) is the most common shrub, and preferred browse species. The canopy cover of black sagebrush was 8% in 2002 and 9% in 2007. The density of black sagebrush was 2,540 plants/acre (6,274 plants/ha) in 1997, 2,660 plants/acre (6,570 plants/ha) in 2002, and 2,260 plants/acre (5,582 plants/ha) in 2007. Young plants comprised 13% of the population in 1989, 16% in 1997, 1% in 2002, and 29% in 2007. Decadence decreased from 32% of the population in 1989 to 12%-13% in 1997 and 2002. In 2007, 19% of the population was decadent. Plants classified with poor vigor have accounted for 4%-33% of the population. Utilization on black sagebrush was light-moderate. Annual average leader growth was 0.6 inches (1.6 cm) in 2002 and 0.9 inches (2.4 cm) in 2007. The few mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), antelope bitterbrush (*Purshia tridentata*), and fourwing saltbush (*Atriplex canescens*) that occur have been heavily browsed.

The density of Utah juniper (*Juniperus osteosperma*) since the treatment has remained stable. Juniper canopy cover was 1% in 2002 and 2007. The point-centered quarter data estimate of junipers density was 31 trees/acre (77 trees/ha) in 1997, 32 trees/acre (79 trees/ha) in 2002, and 34 trees/acre (84 trees/ha) in 2007. Average diameter of juniper was estimated 2.5 inches (6.4 cm) at 3 inches (7.6 cm) in 2002, and 4.1 inches (10.4 cm) in 2007. Pinyon pine (*Pinus edulis*) point-centered quarter estimates were 9 trees/acre (22 trees/ha) in 1997, 8 trees/acre (20 trees/ha) in 2002, and 17 trees/acre (42 trees/ha) in 2007. Average diameter of pinyon was estimated at 3.5 inches (8.9 cm) in 1997, and 5.2 inches (13.1 cm) in 2002 and 2007. In 2002, it was noticed that older trees within the adjacent unchained stand had been highlined.

Herbaceous Understory

Perennial grasses are the dominant vegetative component. They provided 19% of the ground cover in 1997, 11% in 2002, and 13% in 2007. Perennial grasses made up 52% of the total vegetative cover in 1997, 41% in 2002, and 32% in 2007. Bluebunch wheatgrass (*Agropyron spicatum*), crested wheatgrass (*Agropyron*

cristatum), and Sandberg bluegrass (*Poa secunda*) are the most abundant species. They provided 87% of the total grass cover in 1997, 99% in 2002, and 68% in 2007. Other less abundant grasses that have been sampled include intermediate wheatgrass (*Agropyron intermedium*), smooth brome (*Bromus inermis*), Russian wildrye (*Elymus junceus*), and cheatgrass (*Bromus tectorum*). Grasses were heavily grazed by cattle prior to sampling in July 2002, and most plants, including the perennial species, were already desiccated. Visually, this site looked poor in 2002 due to drought and heavy use. In 2007, most grasses had moderate-heavy grazing by cattle, but had good vigor and seed production.

Forbs comprised 5% of the ground cover in 1997, 6% in 2002, and 20% in 2007. Perennial forb cover has been less than 1% since 1997. The dominant forb was bur buttercup (*Ranunculus testiculatus*), an allelopathic species that prevents the germination of many native species (Buchanan et al. 1978). It provided 5%-6% of the total ground cover in 1997 and 2002, and 18% in 2007.

1997 TREND ASSESSMENT

The browse trend is slightly down. Black sagebrush density decreased 54%, which was partly attributed to the increased sample area. The recruitment of young increased from 13% to 16% of the population, and decadence declined from 32% to 12%. Plants classified as having poor vigor decreased from 33% to 4% of the population, and browse use was mostly light. The grass trend is stable. The sum of nested frequency of perennial grasses changed little. Crested wheatgrass and intermediate wheatgrass increased significantly in nested frequency, while bluebunch wheatgrass decreased significantly in nested frequency. The forb trend is stable. The sum of nested frequency of perennial forbs decreased 36%. However, the abundance of perennial forbs had already been very low. The Desirable Components Index (DCI) score was good-excellent due to moderate browse cover with low decadence and moderate recruitment, excellent perennial grass cover, low annual grass cover, and low perennial forb cover.

winter range condition (DCI) - good-excellent (64) Low potential scale
browse - slightly down (-1) grass - stable (0) forb - stable (0)

2002 TREND ASSESSMENT

The browse trend is stable. Black sagebrush density increased 5%. The recruitment of young decreased to 1% of the population, and decadence remained low at 13%. Plants showing poor vigor remained at 4% of the population, and browse use was light-moderate. However, heavily browsed plants increased from 0% of the population to 35%. The grass trend is down. The sum of nested frequency of perennial grasses decreased 29%. The nested frequencies of Sandberg bluegrass, intermediate wheatgrass, and smooth brome decreased significantly. The quadrat frequency for cheatgrass decreased from 31% to 3%. The forb trend is stable. The sum of nested frequency of both perennial and annual forbs decreased greatly and only two species were sampled. Bur buttercup decreased significantly in nested frequency, but remained abundant. Project personnel noted that the herbaceous understory looked very poor due to drought conditions and heavy use on the grasses by cattle prior to sampling. The DCI score declined to good due to very low recruitment of young browse, and a decrease in perennial grass cover.

winter range condition (DCI) - good (47) Low potential scale
browse - stable (0) grass - down (-2) forb - stable (0)

2007 TREND ASSESSMENT

The browse trend is slightly down. The density of black sagebrush decreased 15%. The recruitment of young increased to 29% of the population, but decadence increased to 19%. Plants classified as having poor vigor increased to 11% of the population, and browse use remained light-moderate. The grass trend is slightly down. The sum of nested frequency of perennial grasses increased slightly while that for annual grass increased greatly. The nested frequencies of Sandberg bluegrass, intemediate wheatgrass, and Russian wildrye all increased significantly. However, crested wheatgrass significantly decreased. Cheatgrass cover increased

from 0% to 2% and quadrat frequency increased to 35%. The forb trend is stable. The sum of nested frequency for perennial forbs increased slightly. However, perennial forbs remained sparse. Bur buttercup increased significantly in nested frequency, and its average cover increased from 6% to 18%. The DCI remained good.

winter range condition (DCI) - good (62) Low potential scale
browse - slightly down (-1) grass - slightly down (-1) forb - stable (0)

HERBACEOUS TRENDS --
Management unit 16C, Study no: 7

Type	Species	Nested Frequency				Average Cover %		
		'89	'97	'02	'07	'97	'02	'07
G	Agropyron cristatum	ab94	c147	bc127	a78	6.38	4.06	2.90
G	Agropyron intermedium	a7	b36	a5	b36	.89	.03	1.43
G	Agropyron spicatum	b226	a135	a134	a102	6.23	5.69	3.05
G	Bromus inermis	b27	b35	a1	a4	.40	.00	.07
G	Bromus tectorum (a)	-	b31	a3	c99	.40	.00	2.42
G	Elymus junceus	-	ab7	a2	b16	.30	.00	.66
G	Koeleria cristata	-	-	-	3	-	-	.15
G	Oryzopsis hymenoides	a1	a7	-	-	.53	-	-
G	Poa pratensis	-	-	3	-	-	.03	-
G	Poa secunda	b196	b205	a135	b214	4.19	1.18	4.59
G	Vulpia octoflora (a)	-	-	-	3	-	-	.00
Total for Annual Grasses		0	31	3	102	0.40	0.00	2.43
Total for Perennial Grasses		551	572	407	453	18.93	11.02	12.89
Total for Grasses		551	603	410	555	19.34	11.02	15.33
F	Alyssum alyssoides (a)	-	-	-	67	-	-	.90
F	Antennaria rosea	a1	-	-	a3	-	-	.00
F	Arabis sp.	a5	a1	-	-	.00	-	-
F	Astragalus utahensis	a2	a2	-	a9	.03	-	.04
F	Camelina microcarpa (a)	-	a1	-	a6	.00	-	.04
F	Calochortus nuttallii	-	a5	-	a3	.01	-	.01
F	Collinsia parviflora (a)	-	-	-	4	-	-	.01
F	Cryptantha sp.	4	-	-	-	-	-	-
F	Descurainia pinnata (a)	-	a9	-	b35	.02	-	.20
F	Draba sp. (a)	-	-	-	1	-	-	.00
F	Gilia sp. (a)	-	-	-	21	-	-	.14
F	Holosteum umbellatum (a)	-	a1	-	b24	.00	-	.15
F	Lactuca serriola	-	4	-	-	.01	-	-

Type	Species	Nested Frequency				Average Cover %		
		'89	'97	'02	'07	'97	'02	'07
F	Medicago sativa	$_{a}$2	$_{a}$5	-	-	.18	-	-
F	Phlox hoodii	$_{b}$22	$_{a}$6	$_{a}$2	$_{a}$2	.06	.01	.03
F	Ranunculus testiculatus (a)	-	$_{b}$317	$_{a}$255	$_{c}$360	5.05	5.85	18.04
Total for Annual Forbs		0	328	255	518	5.08	5.85	19.50
Total for Perennial Forbs		36	23	2	17	0.30	0.01	0.09
Total for Forbs		36	351	257	535	5.38	5.86	19.59

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

BROWSE TRENDS --
Management unit 16C, Study no: 7

Type	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	Artemisia nova	51	53	47	8.85	8.24	9.00
B	Artemisia tridentata vaseyana	10	9	7	.96	.93	.91
B	Atriplex canescens	0	1	0	-	-	-
B	Chrysothamnus nauseosus albicaulis	0	3	0	-	-	-
B	Chrysothamnus viscidiflorus stenophyllus	21	17	18	1.50	.28	.24
B	Ephedra viridis	0	1	0	-	-	-
B	Gutierrezia sarothrae	19	13	38	.10	.04	1.56
B	Juniperus osteosperma	1	1	2	-	.53	.53
Total for Browse		102	98	112	11.42	10.03	12.24

CANOPY COVER, LINE INTERCEPT --
Management unit 16C, Study no: 7

Species	Percent Cover	
	'02	'07
Artemisia nova	7.78	9.21
Artemisia tridentata vaseyana	.58	1.01
Atriplex confertifolia	.05	-
Chrysothamnus viscidiflorus stenophyllus	.18	1.56
Gutierrezia sarothrae	.03	.80
Juniperus osteosperma	.86	1.26

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 16C, Study no: 7

Species	Average leader growth (in)	
	'02	'07
Artemisia nova	0.6	0.9

POINT-QUARTER TREE DATA --
Management unit 16C, Study no: 7

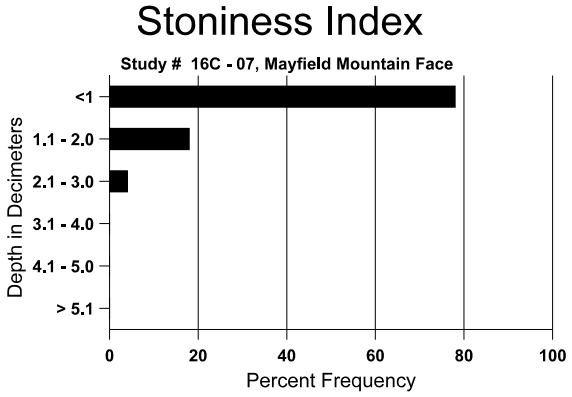
Species	Trees per Acre		Average diameter (in)	
	'02	'07	'02	'07
Juniperus osteosperma	32	36	3.0	4.1
Pinus edulis	8	19	5.2	5.2

BASIC COVER --
Management unit 16C, Study no: 7

Cover Type	Average Cover %			
	'89	'97	'02	'07
Vegetation	10.00	36.70	27.01	50.19
Rock	7.75	11.17	13.73	11.81
Pavement	46.00	12.71	15.39	13.56
Litter	27.25	25.64	29.80	15.96
Cryptogams	0	6.10	2.51	.54
Bare Ground	9.00	5.19	22.09	18.52

SOIL ANALYSIS DATA --
Herd Unit 16C, Study no: 07, Mayfield Mountain Face

Effective rooting depth (in)	Temp °F (depth)	pH	Clay loam			%0M	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
8.7	61.0 (10.2)	7.3	30.0	37.4	32.6	4.9	11.9	144.0	.4



PELLET GROUP DATA --
Management unit 16C, Study no: 7

Type	Quadrat Frequency			
	'89	'97	'02	'07
Rabbit	-	19	10	30
Elk	-	4	2	7
Deer	-	47	43	41
Cattle	-	-	5	5

Days use per acre (ha)	
'02	'07
-	-
3 (7)	13 (31)
56 (139)	179 (441)
4 (9)	17 (43)

BROWSE CHARACTERISTICS --
Management unit 16C, 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)
Artemisia nova												
89	**5466**	266	733	3000	1733	-	40	5	32	-	33	14/16
97	**2540**	80	400	1840	300	140	10	0	12	4	4	15/28
02	**2660**	-	20	2300	340	140	17	35	13	4	4	13/26
07	**2260**	3540	660	1160	440	80	29	28	19	7	11	14/29
Artemisia tridentata vaseyana												
89	**0**	-	-	-	-	-	0	0	0	-	0	-/-
97	**220**	-	20	160	40	-	45	18	18	-	9	18/30
02	**240**	-	-	180	60	20	33	58	25	8	8	15/30
07	**200**	560	20	140	40	40	50	10	20	10	10	18/32
Atriplex canescens												
89	**0**	-	-	-	-	-	0	0	0	-	0	-/-
97	**0**	-	-	-	-	-	0	0	0	-	0	-/-
02	**20**	-	-	-	20	-	100	0	100	100	100	60/80
07	**0**	-	-	-	-	-	0	0	0	-	0	56/83
Chrysothamnus nauseosus albicaulis												
89	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
02	**60**	-	-	60	-	-	0	100	-	-	0	26/37
07	**0**	-	-	-	-	-	0	0	-	-	0	65/71
Chrysothamnus viscidiflorus stenophyllus												
89	**0**	-	-	-	-	-	0	0	0	-	0	-/-
97	**760**	-	40	700	20	-	0	0	3	-	0	11/12
02	**620**	-	-	420	200	20	3	97	32	19	26	7/16
07	**900**	380	280	600	20	-	2	27	2	-	0	10/15

		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)
Ephedra viridis												
89	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
02	**20**	-	-	20	-	-	0	100	-	-	0	-/-
07	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Gutierrezia sarothrae												
89	**600**	-	-	600	-	-	0	0	0	-	0	8/5
97	**960**	120	440	520	-	-	0	0	0	-	0	9/11
02	**540**	-	-	360	180	180	0	4	33	11	11	5/6
07	**1840**	20	60	1760	20	20	0	0	1	-	0	10/12
Juniperus osteosperma												
89	**66**	-	66	-	-	-	0	0	-	-	0	-/-
97	**20**	-	-	20	-	40	0	0	-	-	0	-/-
02	**20**	-	-	20	-	40	0	0	-	-	0	-/-
07	**40**	-	-	40	-	-	0	0	-	-	0	-/-
Purshia tridentata												
89	**0**	-	-	-	-	-	0	0	-	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	-	0	-/-
02	**0**	-	-	-	-	-	0	0	-	-	0	11/19
07	**0**	-	-	-	-	-	0	0	-	-	0	12/29