

ECHO CANYON REST AREA - TREND STUDY NO. 6-2-11

Vegetation Type: Mountain Brush

Range Type: Crucial Deer Winter, Crucial Elk Winter

NRCS Ecological Site Description: [Mountain Loam \(Mountain Big Sagebrush\), R047XA461UT](#)

Land Ownership: DWR

Elevation: 6,000 ft (1,829 m)

Aspect: Northwest

Slope: 32%

Transect bearing: 80° magnetic

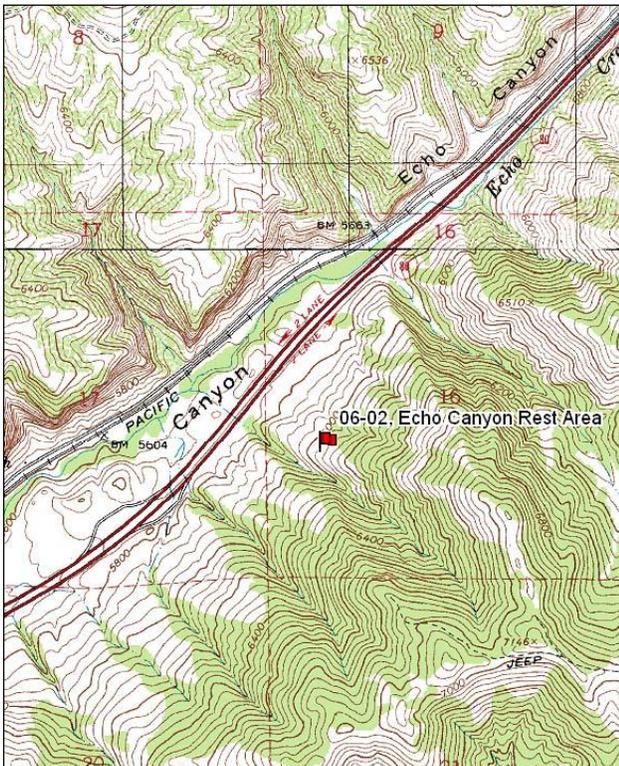
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:

Beginning at Echo Reservoir, travel northeast on Highway I-80 to the rest area (approximately 2 miles). From the rest area, follow the guard-rail on the right side of the freeway until it ends (approximately 100 yards).

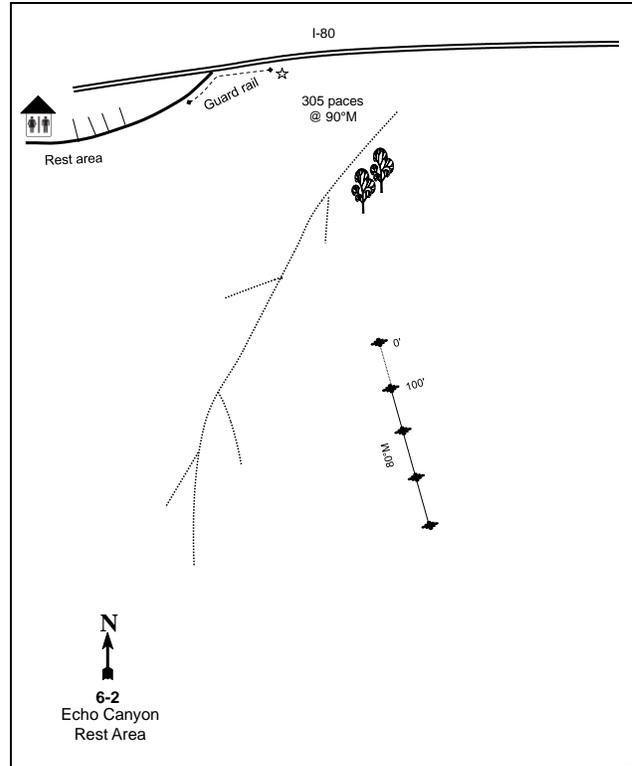
From the end of the guard-rail, proceed on an azimuth of 90 degrees magnetic for approximately 305 paces to a point on the left-hand or north side of the canyon. The 0-foot stake of the baseline consists of a green steel fencepost, 12"-18" high, and is marked with browse tag #7950.

Map Name: Coalville



Township: 3N Range: 5E Section: 16

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 466801 E 4537935 N

ECHO CANYON REST AREA - TREND STUDY NO. 6-2

Site Information

Site Description: The study is located on the hillside east of the Echo Canyon Rest Area on the south side of Interstate 80. This study replaced a line-intercept transect established in 1977 which sampled a similar true mountain mahogany (*Cercocarpus montanus*) community. In 1984, a new study was established slightly up slope from the line-intercept transect, but was on a steep rocky south-facing slope (70%) with very little big game use. The current study was reestablished a second time in 1996, on a ridge that is up slope and to the north of the 1984 study. A wild fire burned the study area in 1999, removing much of the mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and true mountain mahogany that was found on the site. Deer pellet groups were sampled in moderate abundance in 2001 and 2006, but low abundance in 2011. Elk pellet groups were sampled in low abundance in 2001 and 2011, but moderate abundance in 2006. Sign of moose has also been sampled infrequently (Table - Pellet Group Data).

Browse: The browse community has been diverse, both before and after the burn. Prior to the fire, the key browse consisted mostly of mountain big sagebrush, true mountain mahogany, antelope bitterbrush (*Purshia tridentata*), and Saskatoon serviceberry (*Amelanchier alnifolia*). Two other species that are usually not considered key browse, mountain snowberry (*Symphoricarpos oreophilus*) and Gambel oak (*Quercus gambelii*), are also present and display some use. Mountain big sagebrush was the most abundant browse in 1996, providing the majority of the browse cover (Table - Browse Trends). However, the wildfire removed nearly all of the mountain big sagebrush from the site. The small population densities of serviceberry, mahogany, and bitterbrush plants have remained fairly similar prior to, and following the fire. Following the fire in 2001, it was noted that these key browse species were resprouting, primarily mountain mahogany and serviceberry. All three of these preferred browse species have had moderate to heavy utilization since 1996. Much of the mahogany and serviceberry were classified as decadent in 2001, but decadence may have been overestimated because of the burned growth form and many of the resprouting individuals appeared young. Gambel oak density increased following the fire (Table - Browse Characteristics), though cover has remained similar (Table - Browse Trends). Density of snowberry decreased initially following the fire, but has steadily increased since 2001 (Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory is an important component to this winter range. The grass component is diverse and abundant. The perennial species bluebunch wheatgrass (*Agropyron spicatum*) and Sandberg bluegrass (*Poa secunda*) dominate the grass component in cover. The annual grass species cheatgrass (*Bromus tectorum*) is also prevalent, and was particularly abundant in 2001 following the fire. There was a substantial increase in the nested frequency and cover of forb species following the fire. The increase in forbs was primarily due to an increase in the perennial species yarrow (*Achillea millefolium*) and American vetch (*Vicia americana*), as well as several annual species: pale alyssum (*Alyssum alyssoides*), littleflower collinsia (*Collinsia parviflora*), holosteum (*Holosteum umbellatum*), and bur buttercup (*Ranunculus testiculatus*).

Soil: The soil is in the Horrocks-Cutoff complex, which occurs on mountain slopes. Parent material consists of colluvium derived from andesite, quartzite, sandstone, and conglomerate (Soil Survey Staff 2011). The soil texture is a sandy clay loam with a neutral reaction (pH 6.7) (Table - Soil Analysis Data). There is abundant vegetation and litter cover providing good protective ground cover, and keeping bare ground cover low (Table - Basic Cover). The soil erosion condition was classified as slight in 2001, following the fire, but has been stable since 2006.

Trend Assessments

Browse:

- **1996 to 2001 - down (-2):** Following the fire, the density of mountain big sagebrush decreased 97% from 2,440 plants/acre to 80 plants/acre, and cover decreased from 13% to 0%. Density of true mountain mahogany decreased by 29% from 420 plants/acre to 300 plants/acre, and cover decreased from 4% to 1%. Serviceberry and bitterbrush were infrequent prior to the fire, and have remained so. The density of Gambel oak increased over two-fold, but cover has remained similar.
- **2001 to 2006 - stable (0):** The density of serviceberry increased two-fold from 200 plants/acre to 440 plants/acre, but cover remained similar at 1%. Density of mountain big sagebrush increased to 160 plants/acre, but cover remained low. Mahogany density decreased from 300 plants/acre to 180 plants/acre.
- **2006 to 2011 - stable (0):** There was little change in any of the preferred browse species.

Grass:

- **1996 to 2001 - down (-2):** The sum of nested frequency of perennial grasses decreased by 35%, and cover decreased from 21% to 16%. The nested frequency of cheatgrass remained similar, but cover increased from 3% to 8%.
- **2001 to 2006 - up (+2):** The perennial grass sum of nested frequency increased by 38% and cover increased to 22%. The nested frequency of cheatgrass increased significantly, but cover decreased slightly to 5%.
- **2006 to 2011 - up (+2):** There was a 31% increase in the sum of nested frequency of perennial grasses, and cover increased to 26%. Cheatgrass decreased significantly in nested frequency, and cover decreased to 3%.

Forb:

- **1996 to 2001 - up (+2):** The sum of nested frequency of perennial forbs increased more than two-fold, and cover increased from 3% to 17%. Yarrow and American vetch increased significantly in nested frequency. Annual forb sum of nested frequency increased ten-fold, but annual species often increase dramatically following disturbance.
- **2001 to 2006 - down (-2):** The sum of nested frequency of perennial forbs decreased 34%, and cover decreased to 5%. The sum of nested frequency of annual forbs remained high.
- **2006 to 2011 - up (+2):** The sum of nested frequency of perennial forbs increased 54%, and cover increased to 14%.

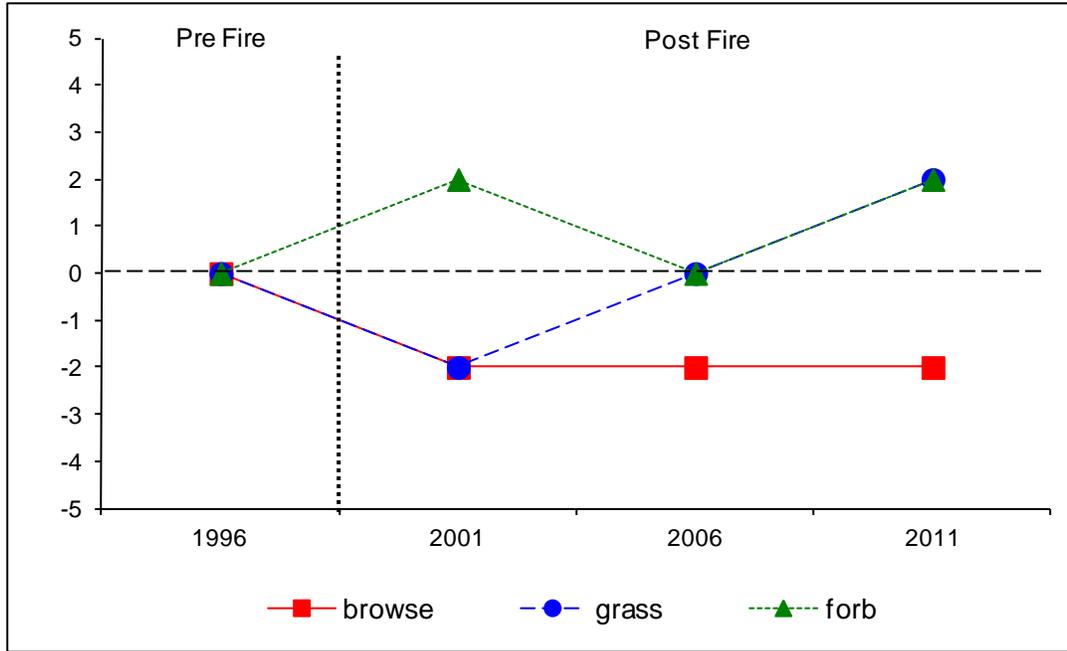
DEER DESIRABLE COMPONENTS INDEX - HIGH POTENTIAL SCALE --

Management unit 6, study no: 2

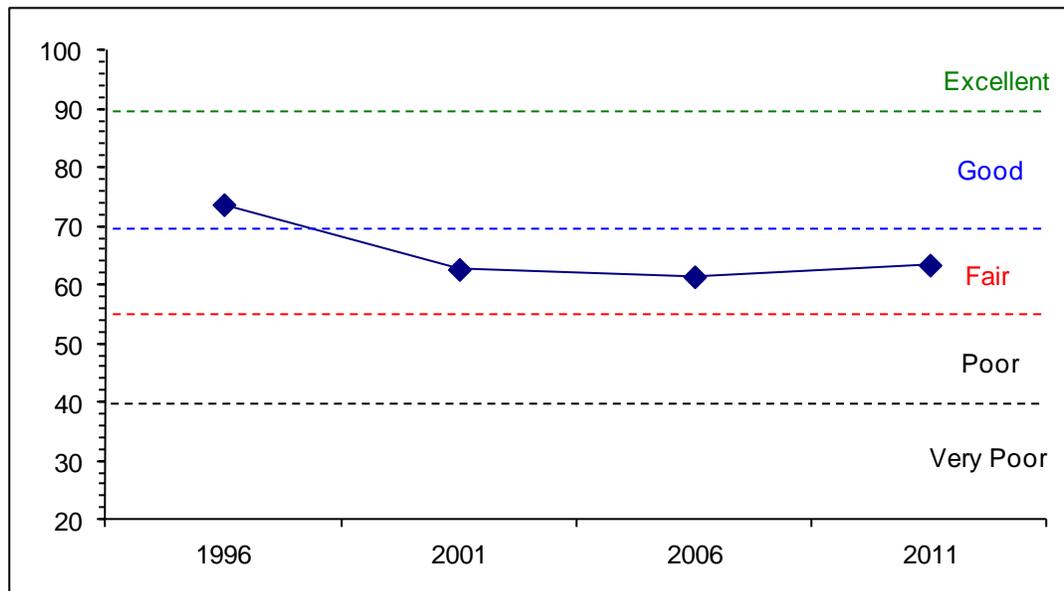
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover (-POBU)	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
96	25.7	7.4	6.9	30.0	-2.5	6.2	0.0	73.7	Good
01	6.5	7.1	15.0	30.0	-6.0	10.0	0.0	62.7	Fair
06	7.8	12.9	4.6	30.0	-3.7	9.9	0.0	61.4	Fair
11	6.7	13.1	5.9	30.0	-2.3	10.0	0.0	63.4	Fair

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 6, Study no: 2



DEER DESIRABLE COMPONENTS INDEX TREND, HIGH POTENTIAL--
 Management unit 6, Study no: 2



HERBACEOUS TRENDS--
Management unit 06, Study no: 2

Type	Species	Nested Frequency				Average Cover %			
		'96	'01	'06	'11	'96	'01	'06	'11
G	Agropyron spicatum	b155	a96	b160	c211	6.88	6.83	11.74	14.04
G	Bromus brizaeformis (a)	-	-	1	-	-	-	.00	-
G	Bromus carinatus	-	2	2	-	-	.15	.03	-
G	Bromus japonicus (a)	-	-	1	6	-	-	.00	.01
G	Bromus tectorum (a)	a142	a189	b268	a192	3.30	7.93	4.98	3.07
G	Carex sp.	-	-	1	-	-	.00	.03	-
G	Festuca myuros (a)	-	2	-	2	-	.00	-	.01
G	Festuca ovina	4	-	-	4	.03	-	-	.03
G	Koeleria cristata	3	1	2	-	.03	.00	.03	-
G	Oryzopsis hymenoides	-	-	1	2	.00	-	.15	.00
G	Poa bulbosa	a-	a-	a4	b16	-	-	.01	.25
G	Poa fendleriana	a6	ab14	b27	b26	.18	.57	1.11	.67
G	Poa secunda	b270	a171	a193	b256	13.49	8.03	8.32	10.74
G	Sitanion hystrix	-	-	3	-	-	-	.03	-
Total for Annual Grasses		142	191	270	200	3.30	7.94	4.99	3.09
Total for Perennial Grasses		438	284	393	515	20.62	15.60	21.48	25.75
Total for Grasses		580	475	663	715	23.93	23.54	26.47	28.85
F	Achillea millefolium	b105	c150	a43	a66	1.82	10.21	1.58	3.18
F	Agoseris glauca	a-	a2	b18	ab12	-	.00	.04	.12
F	Allium sp.	a4	b85	b61	c121	.03	.51	.49	.60
F	Alyssum alyssoides (a)	a23	b90	c174	d253	.11	3.04	.83	5.53
F	Ambrosia psilostachya	-	1	1	-	-	.15	.15	-
F	Antennaria rosea	1	1	3	5	.03	.03	.15	.30
F	Arabis sp.	1	7	2	-	.00	.04	.01	-
F	Aster sp.	3	-	4	1	.03	.03	.06	.00
F	Astragalus cibarius	a-	b12	ab6	ab8	-	.37	.18	.18
F	Astragalus convallarius	3	6	1	-	.03	.16	.00	-
F	Calochortus nuttallii	a-	ab3	b17	b13	-	.01	.06	.05
F	Castilleja linariaefolia	3	1	-	-	.03	.03	-	-
F	Cirsium undulatum	13	33	12	21	.11	.79	.23	.34
F	Collinsia parviflora (a)	a12	c168	b100	b91	.03	3.34	.40	.74
F	Collomia linearis (a)	1	7	10	3	.00	.02	.02	.01
F	Comandra pallida	3	-	-	-	.00	-	-	-
F	Crepis acuminata	3	8	14	16	.00	.10	.10	.16
F	Cryptantha sp.	-	-	-	6	-	-	-	.01
F	Descurainia pinnata (a)	a-	b37	a1	a3	-	.21	.00	.03
F	Draba verna (a)	a-	b57	b39	b44	-	.20	.15	.16
F	Epilobium brachycarpum (a)	a-	c89	d104	b13	-	.46	.89	.17
F	Erigeron pumilus	b26	b24	a6	ab10	.65	.32	.04	.12
F	Erodium cicutarium (a)	-	-	4	3	-	-	.03	.01
F	Gayophytum ramosissimum(a)	a3	a3	a2	b15	.00	.00	.01	.03
F	Hackelia patens	3	-	-	6	.03	.15	.03	.15
F	Hedysarum boreale	-	-	2	-	-	-	.00	-

Type	Species	Nested Frequency				Average Cover %			
		'96	'01	'06	'11	'96	'01	'06	'11
F	<i>Helianthella uniflora</i>	-	-	-	6	-	.00	-	.16
F	<i>Holosteum umbellatum</i> (a)	_a 6	_b 81	_b 74	_c 170	.01	1.18	.27	2.65
F	<i>Hydrophyllum</i> sp.	-	-	-	6	-	-	-	.07
F	<i>Lactuca serriola</i> (a)	-	1	-	6	-	.00	-	.01
F	<i>Lappula occidentalis</i> (a)	_a -	_a -	_a -	_b 43	-	-	-	2.59
F	<i>Lithophragma</i> sp.	-	-	-	12	-	-	-	.07
F	<i>Lomatium triternatum</i>	_a -	_a 4	_a 12	_b 35	-	.01	.10	.19
F	<i>Microsteris gracilis</i> (a)	_a -	_b 14	_c 55	_c 45	-	.08	.78	.12
F	<i>Orogenia linearifolia</i>	-	-	-	2	-	-	-	.01
F	<i>Penstemon</i> sp.	1	-	3	-	.00	-	.00	-
F	<i>Phlox longifolia</i>	6	3	-	-	.02	.03	-	-
F	<i>Polygonum douglasii</i> (a)	_a 6	_a 2	_b 38	_a -	.01	.00	.11	-
F	<i>Ranunculus testiculatus</i> (a)	_a 9	_b 71	_c 120	_b 78	.02	1.31	1.19	.71
F	<i>Schoenrambe linifolia</i>	_a -	_b 20	_a 4	_a 4	-	.53	.04	.01
F	<i>Senecio integerrimus</i>	-	2	-	2	-	.00	-	.01
F	<i>Sisymbrium altissimum</i> (a)	_a -	_b 13	_a -	_a -	-	.22	-	-
F	<i>Smilacina</i> sp.	-	-	-	2	-	-	-	.18
F	<i>Sphaeralcea coccinea</i>	-	-	1	-	-	-	.15	-
F	<i>Tragopogon dubius</i> (a)	_a -	_a -	_a 3	_b 18	-	-	.03	.06
F	<i>Verbascum thapsus</i>	_a -	_b 16	_a 1	_a -	-	.11	.03	-
F	<i>Vicia americana</i>	_a 35	_{bc} 120	_b 116	_c 149	.28	2.97	1.40	7.97
F	<i>Zigadenus paniculatus</i>	-	1	2	3	-	.03	.03	.01
Total for Annual Forbs		60	633	724	785	0.21	10.13	4.75	12.85
Total for Perennial Forbs		210	499	329	506	3.11	16.63	4.92	13.93
Total for Forbs		270	1132	1053	1291	3.33	26.77	9.68	26.79

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

BROWSE TRENDS--

Management unit 06, Study no: 2

Type	Species	Strip Frequency				Average Cover %			
		'96	'01	'06	'11	'96	'01	'06	'11
B	<i>Amelanchier alnifolia</i>	6	10	10	11	.07	.63	.93	.76
B	<i>Artemisia tridentata vaseyana</i>	75	3	7	7	12.75	-	.38	.21
B	<i>Cercocarpus montanus</i>	18	11	8	9	3.73	.97	.71	.39
B	<i>Chrysothamnus nauseosus albicaulis</i>	0	2	1	1	-	-	.15	.15
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	55	52	56	54	3.87	5.69	6.55	6.53
B	<i>Gutierrezia sarothrae</i>	4	3	7	5	.06	.18	-	.06
B	<i>Opuntia</i> sp.	1	1	1	0	-	-	-	-
B	<i>Purshia tridentata</i>	2	2	2	2	1.00	1.25	1.70	1.70
B	<i>Quercus gambelii</i>	6	9	9	8	2.57	2.22	2.13	2.00
B	<i>Symphoricarpos oreophilus</i>	32	32	33	38	4.96	4.35	5.69	6.66
Total for Browse		199	125	134	135	29.04	15.31	18.27	18.47

CANOPY COVER, LINE INTERCEPT--

Management unit 06, Study no: 2

Species	Percent Cover	
	'06	'11
Amelanchier alnifolia	.36	1.13
Artemisia tridentata vaseyana	.33	.75
Cercocarpus montanus	1.13	.93
Chrysothamnus nauseosus albicaulis	.23	.16
Chrysothamnus viscidiflorus viscidiflorus	11.14	6.83
Gutierrezia sarothrae	.10	.10
Purshia tridentata	1.14	1.89
Quercus gambelii	4.23	2.38
Symphoricarpos oreophilus	9.61	10.25

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 06, Study no: 2

Species	Average leader growth (in)		
	'01	'06	'11
Amelanchier alnifolia	1.8	3.5	0.4
Artemisia tridentata vaseyana	-	3.6	0.8
Cercocarpus montanus	2.4	3.3	0.7

BASIC COVER--

Management unit 06, Study no: 2

Cover Type	Average Cover %			
	'96	'01	'06	'11
Vegetation	51.15	61.48	50.06	62.47
Rock	1.75	2.42	3.21	1.78
Pavement	2.69	3.64	5.06	3.42
Litter	55.56	36.42	38.07	34.81
Cryptogams	6.57	1.93	2.82	5.84
Bare Ground	7.26	14.42	16.09	10.08

SOIL ANALYSIS DATA --

Management unit 06, Study no: 2, Study Name: Echo Canyon Rest Area

Effective rooting depth (in)	pH	Clay-Loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
14.9	6.7	44.7	22.0	33.3	2.9	14.4	92.8	0.4

PELLET GROUP DATA--

Management unit 06, Study no: 2

Type	Quadrat Frequency				Days use per acre (ha)		
	'96	'01	'06	'11	'01	'06	'11
Rabbit	3	4	28	-	-	-	-
Moose	1	-	-	-	-	1 (1)	-
Elk	6	-	18	26	7 (18)	36 (89)	15 (36)
Deer	38	12	28	19	26 (64)	27 (68)	7 (17)

BROWSE CHARACTERISTICS--

Management unit 06, Study no: 2

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Amelanchier alnifolia</i>									
96	120	50	50	0	20	0	67	17	34/36
01	200	40	30	30	-	10	0	0	24/31
06	440	36	59	5	120	9	36	0	24/33
11	360	44	50	6	-	72	17	0	24/36
<i>Artemisia tridentata vaseyana</i>									
96	2440	5	56	39	-	61	26	37	22/37
01	80	100	0	0	-	0	0	0	21/35
06	160	13	88	0	-	25	13	0	21/23
11	160	0	75	25	-	75	0	0	20/26
<i>Cercocarpus montanus</i>									
96	420	14	86	0	-	52	33	0	49/47
01	300	13	33	53	-	0	0	0	25/31
06	180	0	56	44	-	11	89	33	23/27
11	260	0	100	0	-	38	38	0	23/35
<i>Chrysothamnus nauseosus albicaulis</i>									
96	0	0	0	0	-	0	0	0	-/-
01	40	100	0	0	-	0	0	0	-/-
06	20	0	100	0	-	0	0	0	21/34
11	20	0	0	100	-	100	0	0	19/33
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
96	2400	3	94	3	-	0	0	4	15/21
01	2320	8	92	0	-	0	0	0	14/22
06	2460	9	80	11	60	0	0	2	17/27
11	2720	8	85	7	-	0	0	0	15/26
<i>Gutierrezia sarothrae</i>									
96	120	0	100	0	-	0	0	0	7/8
01	80	25	75	0	-	0	0	0	8/16
06	160	13	75	13	-	0	0	0	8/12
11	120	0	100	0	-	0	0	0	6/10
<i>Opuntia sp.</i>									
96	40	0	100	-	-	0	0	0	6/26
01	20	0	100	-	-	0	0	0	4/9
06	20	0	100	-	-	0	0	0	6/12
11	0	0	0	-	-	0	0	0	4/12
<i>Purshia tridentata</i>									
96	60	0	100	0	-	0	33	0	34/64
01	40	0	50	50	-	0	0	0	12/37
06	40	0	100	0	-	0	100	0	16/51
11	40	0	100	0	-	0	100	0	18/73

		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>Quercus gambelii</i>										
96	760	61	34	5	80	8	0	0	16/29	
01	2040	100	0	0	-	0	0	0	33/18	
06	2880	8	89	3	-	0	0	0	36/27	
11	1620	14	83	4	-	0	0	4	21/12	
<i>Symphoricarpos oreophilus</i>										
96	1280	27	72	2	-	34	13	5	22/43	
01	680	9	88	3	-	0	0	0	20/47	
06	1240	11	89	0	-	3	0	0	22/46	
11	1520	17	83	0	-	11	1	0	25/48	
<i>Tetradymia canescens</i>										
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	12/21	