

FOOTHILL DRIVE - TREND STUDY NO. 7-3-11

Vegetation Type: Mountain Big Sagebrush

Range Type: Crucial Deer Winter, Crucial Elk Winter

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

Land Ownership: Private

Elevation: 6,800 ft (2,073 m)

Aspect: Southeast

Slope: 30%

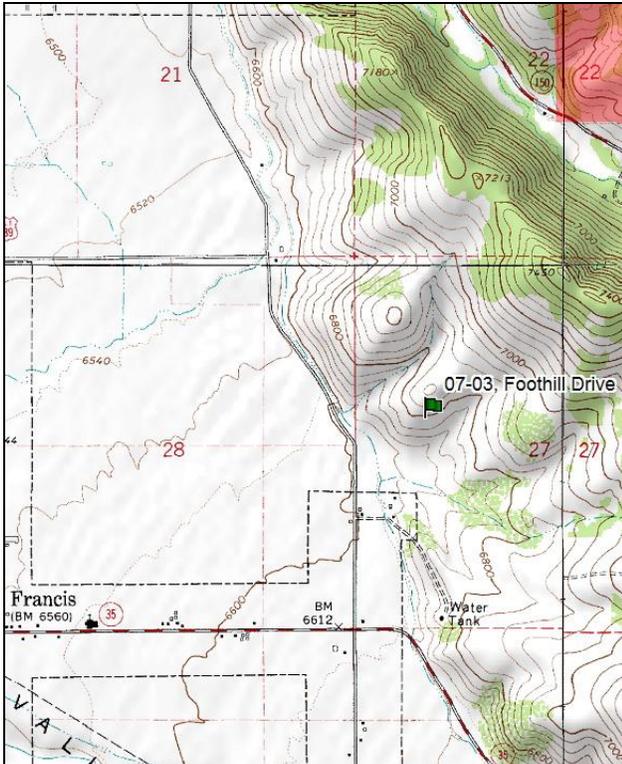
Transect bearing: 168° magnetic

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

Directions:

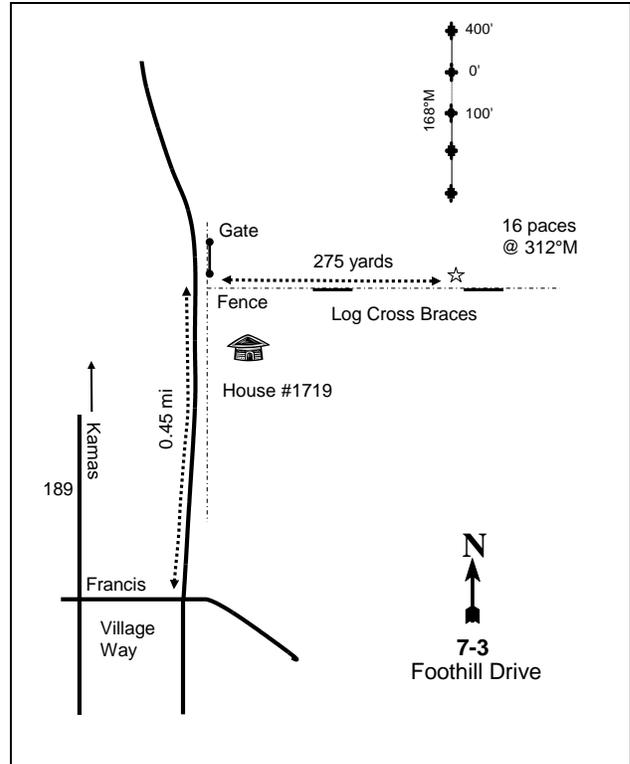
At the junction of Hwy 189 and Village Way in Francis, proceed east for 1.0 mile. Turn left (north) onto Foothill Drive, and proceed 0.45 miles to house #1719 on the right. Park here and walk east along the east-west running fence, just north of the house, for approximately 275 yards to the second large log cross-brace on the fence. Walk 16 paces at 312 degrees magnetic to the 300-foot baseline stake. Three hundred feet to the north at a bearing of 348 degrees magnetic is the 0-foot baseline stake. The 0-foot stake is marked by browse tag #7958. The first 300 feet of the baseline runs 168 degrees magnetic. Line 4 runs off the 0-foot baseline stake at a bearing of 348 degrees magnetic.

Map Name: Francis



Township: 2S Range: 6E Section: 27

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 478191 E 4496482 N

FOOTHILL DRIVE - TREND STUDY NO. 7-3

Site Information

Site Description: The study is located in the foothills east of Francis on privately owned, crucial deer winter range. This study samples an open mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and grass foothill that is surrounded by adjacent ridges dominated by Gambel oakbrush (*Quercus gambelii*). Elk, cattle, and horse pellet groups have been sampled in low abundance since 2001. Deer pellet groups were sampled in high abundance in 2001 and 2006, but moderate abundance in 2011 (Table - Pellet Group Data). The field crew observed the remains of seven winter-killed deer in 1984 and one winter-killed deer in 2006.

Browse: Mountain big sagebrush is the dominant browse species and provides the majority of the browse cover on the site (Table - Browse Trends). The sagebrush on the site consists of a moderately dense population that has had a mixture of light, moderate, and heavy use throughout the sample years. Decadence and poor vigor were high within the sagebrush population at the outset of the study, but have since decreased to lower levels. The average plant size of mature sagebrush has increased with each reading since 1996. Recruitment of young sagebrush plants has been moderate to low, with decreasing recruitment since 2001. Other preferred browse species on the site that are much less common include Saskatoon serviceberry (*Amelanchier alnifolia*), dwarf rabbitbrush (*Chrysothamnus depressus*), and Woods rose (*Rosa woodsii*). The few isolated serviceberry plants on the site display moderate to heavy use. Most of the other browse consists of low value increasers including broom snakeweed (*Gutierrezia sarothrae*), Oregon grape (*Mahonia repens*), and prickly pear cactus (*Opuntia* sp.) (Table - Browse Characteristics).

Herbaceous Understory: The grass component is dominated by the annual brome species cheatgrass (*Bromus tectorum*) and Japanese chess (*B. japonicus*). Cheatgrass provides the majority of the herbaceous cover and has provided from 22% to 43% of the total vegetation on the site since 1996. Perennial grass species are rare on the site. Perennial forbs have shown a general decrease on the site since 1990. Louisiana sage (*Artemisia ludoviciana*), hairy goldaster (*Heterotheca villosa*), and showy goldeneye (*Viguiera multiflora*) have been the most abundant perennial forbs. Annual forb species have dominated the site since 2006. The most abundant annual forb species include storksbill (*Erodium cicutarium*) and willowweed (*Epilobium brachycarpum*) (Table - Herbaceous Trends).

Soil: The site is part of the Horrocks-Cutoff soil complex, likely as part of the Horrocks component. These soils are found on mountain slopes with parent material consisting of colluviums derived from conglomerate, sandstone, and andesite (Soil Survey Staff 2011). Soils are a clay loam in texture with a slightly acidic soil reaction (pH 6.4) (Table - Soil Analysis Data). Bare ground cover is very low, with good vegetation and litter cover coupled with a high amount of surface rock cover. The soil erosion condition has been classified as stable since 2001.

Trend Assessments

Browse:

- **1984 to 1990 - up (+2):** Mountain big sagebrush density increased by 18% from 1,632 plants/acre to 1,931 plants/acre. Decadence of sagebrush decreased from 90% to 45%, and poor vigor decreased from 33% to 7%. In addition to a large number of seedlings sampled, recruitment of young sagebrush plants increased from 0% to 10% of the population.
- **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 of sagebrush decreased to 20%, and poor vigor decreased to 0%. Recruitment of young sagebrush plants remained similar at 10% of the population.

- **1996 to 2001 - stable (0):** The density of sagebrush remained the same at 1,180 plants/acre, though cover increased slightly from 6% to 7%. Decadence, poor vigor, and recruitment of young plants remained similar within the sagebrush population.
- **2001 to 2006 - slightly down (-1):** Sagebrush density decreased by 15% to 1,000 plants/acre, though cover increased slightly to 9%. Recruitment of young sagebrush plants decreased from 10% to 6% of the population.
- **2006 to 2011 - slightly down (-1):** Density of sagebrush decreased slightly by 8% to 920 plants/acre, and cover decreased to 8%. Decadence of sagebrush increased from 10% to 24% and poor vigor increased from 6% to 26%. Recruitment of young sagebrush plants decreased to just 2% of the population.

Grass:

- **1984 to 1990 - down (-2):** The sum of nested frequency of perennial grasses decreased 26%. There was a significant decrease in the nested frequency of Kentucky bluegrass (*Poa pratensis*).
- **1990 to 1996 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased 11%.
- **1996 to 2001 - slightly up (+1):** There was a 19% increase in the sum of nested frequency of perennial grasses, though cover remained similar. Cheatgrass cover and frequency remained similar, and remained the dominant grass species on the site.
- **2001 to 2006 - down (-2):** The sum of nested frequency of perennial grasses decreased by 64%, and cover decreased from 3% to less than 1%. Cheatgrass increased significantly in nested frequency, and cover increased from 10% to 16%.
- **2006 to 2011 - slightly up (+1):** The sum of nested frequency of perennial grasses increased 45%, but did not return to 2001 levels. Cover of perennial grasses increased to 2%. The nested frequency of cheatgrass remained high, and cover increased slightly to 19%.

Forb:

- **1984 to 1990 - up (+2):** The perennial forb sum of nested frequency increased over two-fold. There was a significant increase in the nested frequency of thistle (*Cirsium undulatum*), low fleabane (*Erigeron pumilus*), and showy goldeneye.
- **1990 to 1996 - stable (0):** There was no change in the sum of nested frequency of perennial forbs.
- **1996 to 2001 - down (-2):** The sum of nested frequency of perennial forbs decreased by 26%, though cover increased slightly from 9% to 11%. Most of the decrease in nested frequency was due to a significant decrease in showy goldeneye. Most of the increase in cover was due to a significant increase in the nested frequency of Louisiana sage, with a subsequent increase in cover.
- **2001 to 2006 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 12%, and cover decreased to 3%. There was a significant decrease in the nested frequency of Louisiana sage and hairy goldaster, but there was a significant increase in the nested frequency of showy goldeneye.
- **2006 to 2011 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 11%, but cover increased slightly to 5%.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --

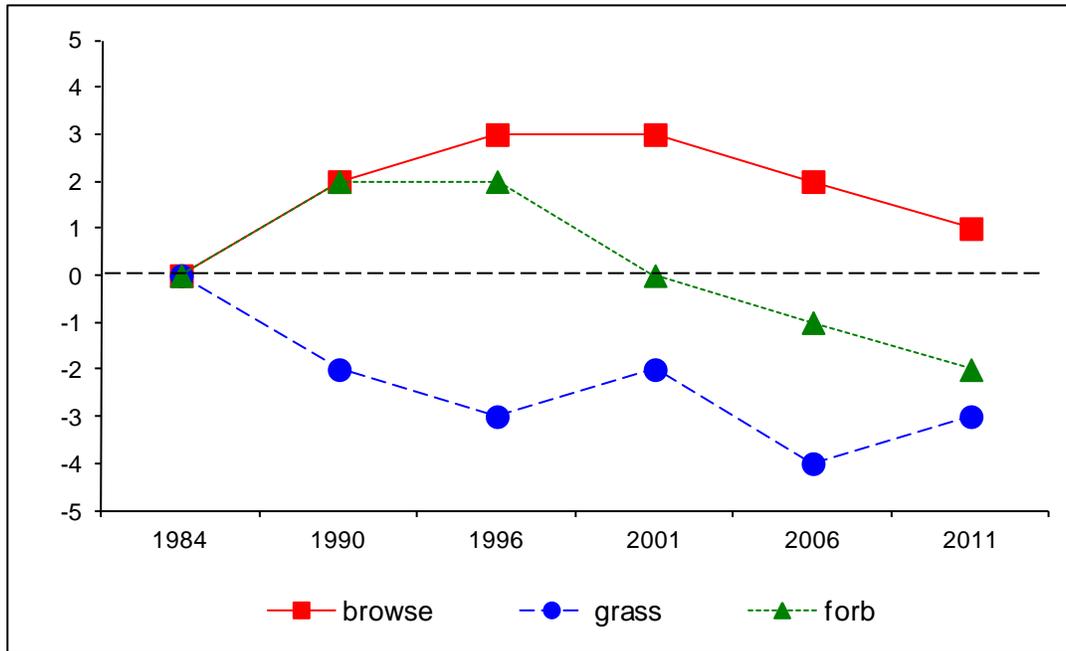
Management unit 7, study no: 3

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	8.2	9.7	6.5	5.2	-9.4	10.0	0.0	30.3	Very Poor
01	10.4	10.4	4.5	6.0	-8.4	10.0	0.0	32.8	Very Poor
06	12.2	12.3	3.8	1.5	-12.5	6.5	0.0	23.8	Very Poor
11	12.8	9.0	0.8	4.2	-16.9	10.0	0.0	20.0	Very Poor

Trend Summary

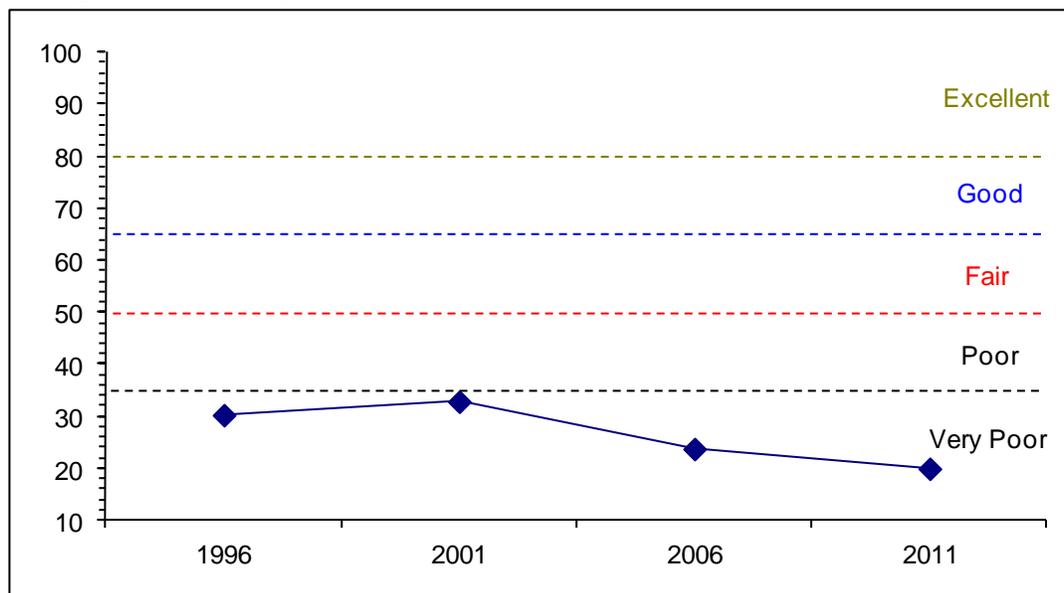
CUMULATIVE RANGE TREND ASSESSMENT--

Management unit 7 Study no: 3



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--

Management unit 7, Study no: 3



HERBACEOUS TRENDS--
Management unit 07, Study no: 3

Type	Species	Nested Frequency						Average Cover %			
		'84	'90	'96	'01	'06	'11	'96	'01	'06	'11
G	Agropyron spicatum	14	17	19	15	9	15	.30	.41	.04	.63
G	Bromus japonicus (a)	-	-	b150	b123	a52	b145	2.35	1.10	.24	3.60
G	Bromus tectorum (a)	-	-	ab298	a292	bc337	c345	10.20	10.08	16.37	18.86
G	Poa bulbosa	-	-	-	-	1	-	-	-	.00	-
G	Poa fendleriana	-	-	-	-	1	-	-	-	.03	-
G	Poa pratensis	c138	b91	ab54	b100	a32	a46	1.06	2.16	.40	.89
G	Poa secunda	c48	ab41	ab59	c42	ab13	bc20	1.25	.43	.25	.58
G	Sitanion hystrix	-	-	-	-	-	-	-	-	.00	-
Total for Annual Grasses		0	0	448	415	389	490	12.55	11.19	16.61	22.47
Total for Perennial Grasses		200	149	132	157	56	81	2.61	3.00	0.73	2.10
Total for Grasses		200	149	580	572	445	571	15.17	14.20	17.34	24.57
F	Agoseris glauca	-	-	-	-	2	-	-	-	.00	-
F	Allium sp.	-	-	-	2	5	3	-	.00	.01	.01
F	Alyssum alyssoides (a)	-	-	b38	a8	b58	c105	.16	.07	.32	1.22
F	Antennaria rosea	-	3	-	-	-	-	-	-	-	-
F	Arabis sp.	-	-	-	5	4	-	-	.01	.01	-
F	Artemisia ludoviciana	a10	ab28	ab36	c67	ab32	bc45	2.03	3.72	.33	1.90
F	Aster sp.	5	-	3	-	10	3	.03	-	.21	.38
F	Astragalus sp.	9	-	-	2	3	-	-	.00	.00	-
F	Calochortus nuttallii	-	-	-	-	-	3	-	-	-	.00
F	Camelina microcarpa (a)	-	-	-	-	1	9	-	-	.00	.03
F	Carduus nutans (a)	-	-	a-	a-	a5	b18	-	-	.12	1.35
F	Cirsium undulatum	c51	d94	bc47	ab16	a5	ab23	1.09	1.32	.04	.71
F	Collinsia parviflora (a)	-	-	a-	b7	b13	c40	-	.02	.07	.60
F	Collomia linearis (a)	-	-	-	3	-	4	-	.00	-	.06
F	Comandra pallida	3	-	-	-	3	3	-	-	.03	.03
F	Crepis acuminata	1	-	-	-	-	-	-	-	-	-
F	Cryptantha sp.	10	3	1	2	-	-	.00	.00	-	-
F	Descurainia pinnata (a)	-	-	-	2	1	7	-	.00	.00	.06
F	Draba sp. (a)	-	-	2	-	8	7	.00	-	.01	.07
F	Epilobium brachycarpum (a)	-	-	b164	a81	b169	c247	2.44	.41	1.31	8.71
F	Erigeron pumilus	a-	c37	b11	a-	a-	a-	.40	-	-	-
F	Eriogonum racemosum	ab9	a6	ab9	ab16	ab13	b17	.13	.60	.15	.51
F	Eriogonum umbellatum	-	-	-	-	3	3	-	-	.03	.00
F	Erodium cicutarium (a)	b18	a-	b20	d220	d225	c173	.27	7.85	4.25	2.39
F	Galium aparine (a)	-	-	-	-	-	4	-	-	-	.41
F	Grindelia squarrosa	-	-	-	3	-	-	-	.00	-	-
F	Heterotheca villosa	a-	b15	b31	c55	b28	b30	1.60	4.15	.95	1.06
F	Holosteum umbellatum (a)	-	-	a59	a41	b146	b154	.44	.11	.59	.98
F	Lactuca serriola (a)	a-	a7	a22	a1	a7	b47	.07	.00	.01	.39
F	Lithophragma sp.	-	-	-	-	-	3	-	-	-	.00
F	Lithospermum ruderale	-	-	-	-	-	8	-	-	-	.21
F	Lupinus argenteus	b15	b12	a-	a-	a-	a-	.00	-	-	-

Type	Species	Nested Frequency						Average Cover %			
		'84	'90	'96	'01	'06	'11	'96	'01	'06	'11
F	<i>Machaeranthera canescens</i>	2	-	-	-	-	-	-	-	-	-
F	<i>Marrubium vulgare</i>	-	-	-	-	-	-	-	.03	-	-
F	<i>Microsteris gracilis</i> (a)	-	-	-	-	3	6	-	-	.00	.01
F	<i>Phlox longifolia</i>	-	-	-	1	1	-	-	.00	.00	-
F	<i>Polygonum douglasii</i> (a)	-	-	_b 17	_{ab} 8	_a 2	_a 4	.04	.07	.00	.01
F	<i>Potentilla gracilis</i>	-	-	2	2	1	-	.00	.00	.03	-
F	<i>Ranunculus testiculatus</i> (a)	-	-	-	3	12	10	-	.00	.08	.04
F	<i>Sphaeralcea grossulariifolia</i>	-	-	1	-	-	-	.00	-	-	-
F	<i>Tragopogon dubius</i> (a)	3	2	11	9	2	15	.05	.04	.00	.28
F	<i>Verbascum thapsus</i>	-	-	5	-	1	-	.33	-	.03	-
F	<i>Viguiera multiflora</i>	_a 3	_b 63	_c 115	_a 21	_b 59	_a 11	3.50	.73	1.36	.17
Total for Annual Forbs		21	9	333	383	652	850	3.50	8.61	6.80	16.64
Total for Perennial Forbs		118	261	261	192	170	152	9.14	10.61	3.22	5.02
Total for Forbs		139	270	594	575	822	1002	12.64	19.23	10.03	21.66

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

BROWSE TRENDS--

Management unit 07, Study no: 3

Type	Species	Strip Frequency				Average Cover %			
		'96	'01	'06	'11	'96	'01	'06	'11
B	<i>Amelanchier alnifolia</i>	1	2	1	2	.15	.06	.15	.15
B	<i>Artemisia tridentata vaseyana</i>	42	39	38	38	5.77	7.40	8.64	8.44
B	<i>Chrysothamnus depressus</i>	3	2	1	0	.03	-	-	-
B	<i>Gutierrezia sarothrae</i>	52	55	3	5	2.41	1.66	-	.09
B	<i>Mahonia repens</i>	28	29	32	32	.42	1.12	1.07	2.50
B	<i>Opuntia</i> sp.	13	17	14	17	.21	.45	.21	.53
B	<i>Rosa woodsii</i>	6	7	7	7	.59	.81	.93	1.58
B	<i>Symphoricarpos oreophilus</i>	0	0	0	0	-	-	-	.15
Total for Browse		145	151	96	101	9.60	11.51	11.00	13.46

CANOPY COVER, LINE INTERCEPT--

Management unit 07, Study no: 3

Species	Percent Cover	
	'06	'11
<i>Amelanchier alnifolia</i>	-	.30
<i>Artemisia tridentata vaseyana</i>	10.13	12.78
<i>Mahonia repens</i>	.96	2.88
<i>Opuntia</i> sp.	.25	.33
<i>Rosa woodsii</i>	1.00	2.38

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 07, Study no: 3

Species	Average leader growth (in)		
	'01	'06	'11
Amelanchier alnifolia	-	3.5	7.1
Artemisia tridentata vaseyana	2.3	1.7	3.9

BASIC COVER--

Management unit 07, Study no: 3

Cover Type	Average Cover %					
	'84	'90	'96	'01	'06	'11
Vegetation	3.00	5.50	40.96	47.83	34.70	60.93
Rock	29.00	34.25	32.87	37.01	44.18	38.12
Pavement	1.00	2.50	1.21	3.64	4.41	2.08
Litter	52.50	50.50	41.41	30.40	22.21	23.02
Cryptogams	.75	.75	.31	0	.01	0
Bare Ground	13.75	6.50	1.34	4.97	6.54	2.26

SOIL ANALYSIS DATA --

Management unit 07, Study no: 3, Study Name: Foothill Drive

Effective rooting depth (in)	pH	Clay-Loam			%OM	PPM P	PPM K	ds/m
		% sand	% silt	% clay				
9.0	6.4	42.2	29.1	28.7	5.0	27.4	243.2	0.6

PELLET GROUP DATA--

Management unit 07, Study no: 3

Type	Quadrat Frequency				Days use per acre (ha)		
	'96	'01	'06	'11	'01	'06	'11
Rabbit	-	7	1	1	-	-	-
Horse	-	-	2	-	1 (1)	7 (17)	-
Elk	-	-	1	1	2 (5)	-	3 (7)
Deer	23	11	22	2	56 (139)	68 (169)	32 (79)
Cattle	7	-	6	-	7 (16)	9 (23)	4 (9)

BROWSE CHARACTERISTICS--

Management unit 07, Study no: 3

		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>Amelanchier alnifolia</i>										
84	33	0	0	100	-	0	100	0	-/-	
90	33	100	0	0	-	100	0	0	-/-	
96	20	0	100	0	-	100	0	0	19/29	
01	40	0	100	0	-	50	50	0	30/37	
06	20	0	100	0	-	100	0	0	22/31	
11	40	0	100	0	-	50	50	0	29/35	
<i>Artemisia tridentata vaseyana</i>										
84	1632	0	10	90	99	16	84	33	15/13	
90	1931	10	45	45	833	50	7	7	27/28	
96	1180	10	69	20	-	32	2	0	18/34	
01	1180	10	73	17	-	5	2	8	21/38	
06	1000	6	84	10	180	35	29	6	25/43	
11	920	2	74	24	-	28	26	26	27/48	
<i>Chrysothamnus depressus</i>										
84	0	0	0	-	-	0	0	0	-/-	
90	0	0	0	-	-	0	0	0	-/-	
96	80	0	100	-	-	25	0	0	9/18	
01	40	0	100	-	-	0	0	0	-/-	
06	20	0	100	-	-	0	100	0	6/11	
11	0	0	0	-	-	0	0	0	-/-	
<i>Gutierrezia sarothrae</i>										
84	1099	0	100	0	-	0	0	0	9/12	
90	10599	35	65	0	-	0	0	0	9/13	
96	4360	4	96	0	-	0	0	0	9/12	
01	2680	0	97	3	-	0	0	.74	9/12	
06	60	33	67	0	-	67	0	0	6/6	
11	100	0	100	0	-	0	0	0	7/7	
<i>Mahonia repens</i>										
84	933	100	0	-	-	0	0	0	-/-	
90	1266	89	11	-	33	0	0	0	4/3	
96	3260	11	89	-	-	0	0	0	5/8	
01	7000	0	100	-	-	0	0	0	3/4	
06	6740	5	95	-	-	0	0	0	3/4	
11	11800	14	86	-	-	.16	0	0	4/12	

		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>Opuntia</i> sp.										
84	365	27	73	0	-	0	0	0	4/6	
90	166	0	80	20	66	0	0	20	4/9	
96	400	10	85	5	-	0	0	0	5/11	
01	620	6	90	3	-	0	0	0	5/12	
06	540	19	67	15	20	0	0	4	5/18	
11	480	0	96	4	-	0	0	4	5/18	
<i>Rosa woodsii</i>										
84	0	0	0	0	-	0	0	0	-/-	
90	0	0	0	0	-	0	0	0	-/-	
96	1060	47	53	0	-	0	0	0	16/18	
01	1400	0	99	1	-	69	26	1	8/7	
06	1960	23	77	0	-	0	0	0	7/8	
11	1680	0	100	0	-	0	0	0	16/19	
<i>Symphoricarpos oreophilus</i>										
84	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	15/29	
11	0	0	0	-	-	0	0	0	24/32	