

ELDER HOLLOW - TREND STUDY NO. 7-10-11

Vegetation Type: Mountain Brush

Range Type: Crucial Deer Winter, Crucial Elk Winter

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

Land Ownership: Private

Elevation: 7,000 ft (2,134 m)

Aspect: Southwest

Slope: 25-35%

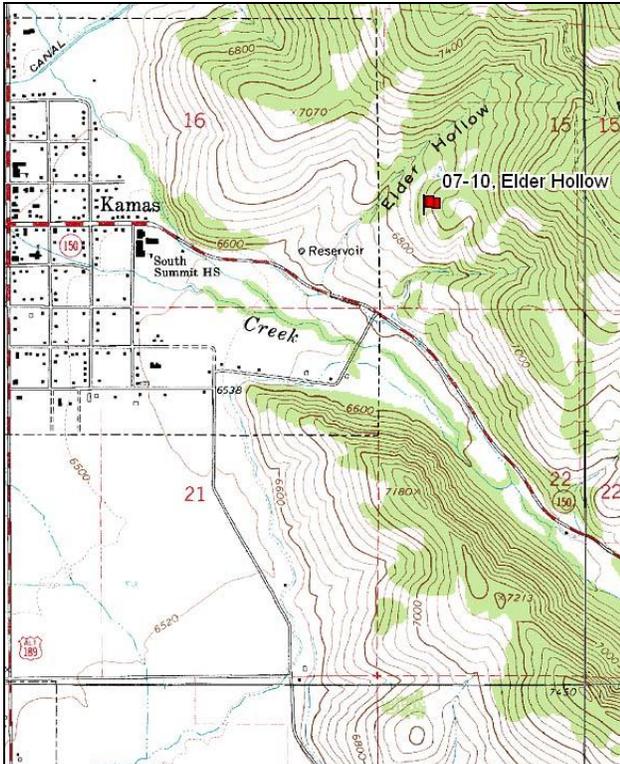
Transect bearing: 169° magnetic

Belt placement: line 1 (11ft), line 2 (59ft), line 3 (71ft), line 4 (95ft), line 5 (34 ft)

Directions:

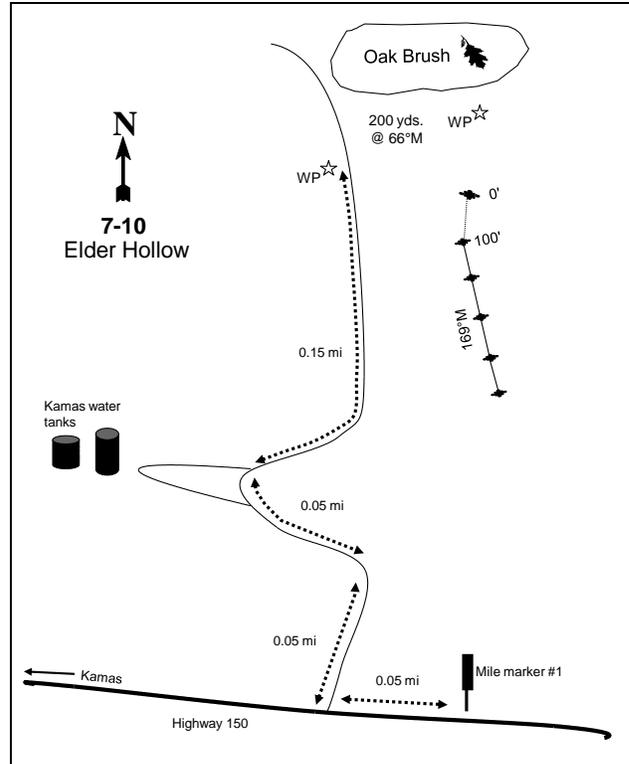
Westbound on Highway 150 (Mirror Lake Highway) from mile marker 1, proceed 0.05 miles to a locked gate on the right. Contact the Wildlife Biologist in the area to obtain a key. The site can also be reached by walking. Proceed through the gate, turn left, travel 0.05 miles, turn right, travel 0.05 miles, bear right, and travel 0.15 miles to green steel stake on the left. The post is in dense sagebrush 3 feet from the road. From the post, walk 200 yards at 66 degrees magnetic to a witness post. The 0-foot stake is just a couple of paces south of the witness post. The baseline doglegs down through the same vegetation type. Line 1 runs 169 degrees magnetic. Line 2 runs 151 degrees magnetic. Line 3 runs 149 degrees magnetic. Lines 4 and 5 run 146 degrees magnetic.

Map Name: Kamas



Township: 2S Range: 6E Section: 15

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 478092 E 4499214 N

## ELDER HOLLOW - TREND STUDY NO. 7-10

### Site Information

Site Description: This study replaces the Kamas Water Tank trend study established in 1984, which sampled crucial deer winter range located immediately east of Kamas. This new study is on privately owned land in the foothills east of Kamas that has been intensively grazed by sheep, cattle, and horses for many years. The study is in a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and grass community that also contains a diverse mix of other shrub species. Deer pellet groups were sampled in high abundance in 2001 and 2006, but pellet groups were moderate in abundance in 2011. Sampled elk and cattle sign has been minimal since 2001 (Table - Pellet Group Data).

Browse: The site supports several preferred browse species. These include mountain big sagebrush, Saskatoon serviceberry (*Amelanchier alnifolia*), and antelope bitterbrush (*Purshia tridentata*). The key species is mountain big sagebrush which makes up the majority of the browse cover, but cover of sagebrush has steadily decreased since 1996 (Table - Browse Trends). The sagebrush on the site is comprised of a moderately dense population, with mixed light, moderate, and heavy utilization. Decadence and poor vigor of sagebrush are moderately high. Recruitment of young sagebrush plants has been mostly poor, but increased and was considered good in 2011. Damage from the sagebrush defoliator moth (*Aroga websteri*) was noted in 2006. Serviceberry is a moderately dense, healthy population of heavily utilized plants. The few scattered bitterbrush plants are heavily browsed, but display low decadence and good vigor. Mature bitterbrush plants have a low-growing, spreading growth form. Density of bitterbrush increased markedly in 2006. Mountain snowberry (*Symphoricarpos oreophilus*) is prevalent on the site, and has displayed mostly light use through the sample years. Other browse species are diverse, but none are abundant (Table - Browse Characteristics).

Herbaceous Understory: A variety of perennial grasses occur on the site, but none are particularly abundant. The only common species include Kentucky bluegrass (*Poa pratensis*) and Sandberg bluegrass (*P. secunda*). The annual species cheatgrass (*Bromus tectorum*) is common and provides the majority of the grass cover. Forbs are diverse on the site, but most occur rarely. The most common perennial forb species include wavyleaf thistle (*Cirsium undulatum*), redroot eriogonum (*Eriogonum racemosum*), silvery lupine (*Lupinus argenteus*), and low penstemon (*Penstemon humilus*). Annual forbs are also common, and have steadily increased in cover since 1996. Annual forbs like pale alyssum (*Alyssum alyssoides*), storksbill (*Erodium cicutarium*), and bur buttercup (*Ranunculus testiculatus*) dominate bare areas in the shrub interspaces. Storksbill has steadily increased over the course of the study, and pale alyssum increased substantially 2011 (Table - Herbaceous Trends).

Soil: Soil on the site is part of the Yeates Hollow-Henefer complex, likely as part of the Yeates Hollow component. These soils are found on mountain slopes, and parent material consists of colluviums derived from conglomerate, sandstone, and quartzite (Soil Survey Staff 2011). Soil texture is a sandy clay loam with a neutral soil reaction (pH 7.0) (Table - Soil Analysis Data). Rock is common on the surface and throughout the soil profile. Protective ground cover of vegetation and litter is abundant (Table - Basic Cover), but interspaces between shrubs show signs of localized erosion. Terracing along the slope and soil pedestalling on the uphill side of shrubs is common. The soil erosion condition was classified as slight in 2001, but conditions improved and were classified as stable in 2006 and 2011.

### Trend Assessments

#### Browse:

- **1996 to 2001 - slightly down (-1):** The density of mountain big sagebrush decreased 16% from 2,540 plants/acre to 2,140 plants/acre, and cover decreased from 22% to 19%. Decadence of sagebrush increased from 20% to 38%, and poor vigor increased from 3% to 11%.

- **2001 to 2006 - down (-2):** Mountain big sagebrush density decreased 29% to 1,520 plants/acre, and cover decreased to 11%. Decadence of sagebrush remained similar at 37%, but poor vigor increased to 39%. The density of bitterbrush increased substantially from 60 plants/acre to 220 plants/acre, though cover remained similar.
- **2006 to 2011 - stable (0):** Density of mountain big sagebrush increased 11% to 1,680 plants/acre. The increase is primarily due to a large increase in the recruitment of young plants from 5% to 21% of the population. Prior to 2011, recruitment of young sagebrush plants was poor. Despite the increase in young plants, the density of mature sagebrush plants remained similar, and cover decreased slightly to 10%. Decadence of sagebrush remained similar at 33%, but poor vigor decreased to 12%.

Grass:

- **1996 to 2001 - stable (0):** There was little change in the sum of nested frequency of perennial grasses. There was a significant decrease in the nested frequency of Kentucky bluegrass.
- **2001 to 2006 - down (-2):** The sum of nested frequency of perennial grasses remained similar. However, cheatgrass increased significantly in nested frequency, and cover increased from 4% to 11%.
- **2006 to 2011 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 20%, and cover remained similar at 6%. Much of the increase in perennial grasses was due to a significant increase in the nested frequency of the weedy, exotic species bulbous bluegrass (*Poa bulbosa*). Cheatgrass remained similar in nested frequency, but cover decreased slightly to 8%.

Forb:

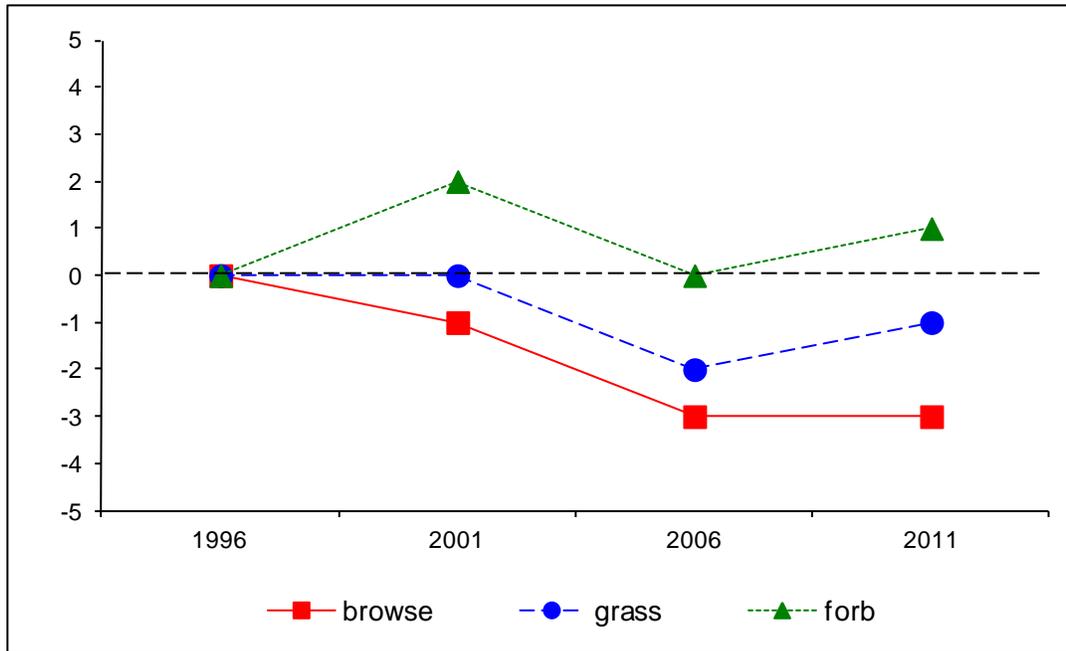
- **1996 to 2001 - up (+2):** The sum of nested frequency of perennial forbs increased by 25%, and cover increased from 3% to 6%.
- **2001 to 2006 - down (-2):** There was a 35% decrease in the sum of nested frequency of perennial forbs, and cover decreased to 5%. Silvery lupine decreased significantly in nested frequency, and wavyleaf thistle and low penstemon have decreased significantly since 1996. The weedy annual forb storksbill increased significantly in nested frequency.
- **2006 to 2011 - slightly up (+1):** The sum of nested frequency of perennial forbs increased by 33%, but cover remained similar at 5%. Annual forb sum of nested frequency also increased markedly, with an increase in cover from 7% to 14%. There was a significant increase in the nested frequency of pale alyssum and storksbill.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --  
Management unit 7, study no: 10

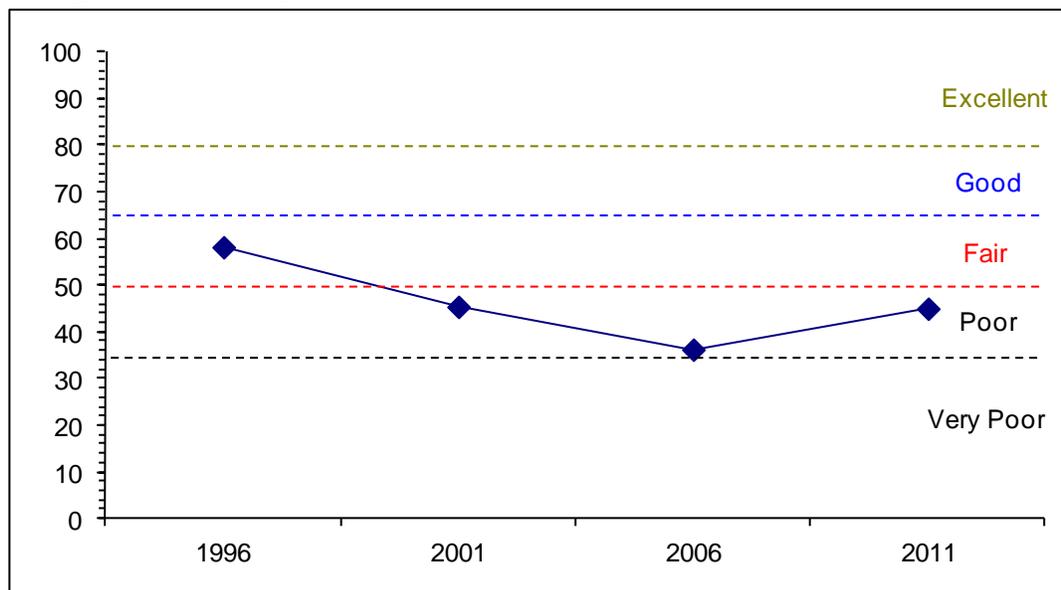
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover (-POBU)	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
96	30.0	9.5	3.0	12.2	-2.9	6.3	0.0	<b>58.2</b>	Fair
01	26.8	4.9	1.2	7.4	-3.0	10.0	-2.0	<b>45.4</b>	Poor
06	16.2	5.5	2.6	10.6	-7.8	9.1	0.0	<b>36.2</b>	Very Poor-Poor
11	16.0	7.0	8.4	10.5	-5.9	9.0	0.0	<b>45.0</b>	Poor

## Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--  
 Management unit 7 Study no: 10



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--  
 Management unit 7, Study no: 10



HERBACEOUS TRENDS--  
Management unit 07, Study no: 10

Type	Species	Nested Frequency				Average Cover %			
		'96	'01	'06	'11	'96	'01	'06	'11
G	Agropyron cristatum	a16	ab25	b43	b34	.28	.47	1.37	1.07
G	Agropyron spicatum	a6	a11	b25	a1	.03	.13	1.07	.00
G	Bromus carinatus	10	2	-	10	.08	.01	-	.04
G	Bromus tectorum (a)	a303	a277	b388	b378	3.80	3.95	10.46	7.48
G	Carex sp.	17	17	15	9	.36	.28	.25	.30
G	Festuca myuros (a)	-	-	-	4	-	-	-	.38
G	Oryzopsis hymenoides	-	3	3	-	.00	.01	.03	-
G	Poa bulbosa	a-	a-	a11	b33	-	-	.39	.41
G	Poa fendleriana	4	1	4	4	.06	.00	.18	.06
G	Poa pratensis	c125	b65	a33	ab53	4.13	.64	.33	.80
G	Poa secunda	a50	a74	ab69	b108	.90	1.96	1.87	2.84
G	Sitanion hystrix	13	25	12	11	.25	.14	.13	.10
G	Stipa comata	-	8	6	1	-	.06	.04	.00
Total for Annual Grasses		303	277	388	382	3.80	3.95	10.46	7.86
Total for Perennial Grasses		241	231	221	264	6.12	3.72	5.70	5.66
Total for Grasses		544	508	609	646	9.93	7.68	16.16	13.52
F	Agoseris glauca	a2	ab13	ab11	b23	.00	.05	.08	.13
F	Alyssum alyssoides (a)	a272	a316	a318	b363	1.76	2.36	3.42	8.06
F	Arabis perennans	6	1	-	-	.01	.00	-	-
F	Artemisia ludoviciana	14	26	18	26	.22	.58	.40	.46
F	Astragalus convallarius	1	8	7	4	.00	.21	.12	.15
F	Astragalus sp.	-	-	1	9	-	.00	.01	.04
F	Astragalus utahensis	1	-	-	2	.00	-	-	.00
F	Calochortus nuttallii	6	10	1	8	.01	.02	.00	.02
F	Camelina microcarpa (a)	-	6	-	-	-	.02	-	-
F	Chaenactis douglasii	5	-	-	-	.03	-	-	-
F	Cirsium undulatum	b35	ab32	a9	ab14	.56	.91	.69	.85
F	Collinsia parviflora (a)	a8	c138	a14	b58	.04	.53	.02	.20
F	Collomia linearis (a)	-	14	9	12	-	.05	.02	.04
F	Comandra pallida	7	9	7	13	.06	.09	.06	.05
F	Crepis acuminata	-	-	4	3	-	-	.03	.03
F	Cynoglossum officinale	-	4	-	-	-	.03	-	-
F	Draba sp. (a)	24	5	1	7	.03	.04	.00	.01
F	Epilobium brachycarpum (a)	a10	a10	a3	b46	.02	.03	.00	.36
F	Eriogonum racemosum	29	21	18	17	.21	.54	.46	.14
F	Eriogonum umbellatum	a-	a1	ab2	b16	-	.03	.06	.23
F	Erodium cicutarium (a)	a1	b38	c86	d221	.00	.89	2.17	4.75
F	Galium aparine (a)	-	-	-	4	-	-	-	.03
F	Gayophytum ramosissimum(a)	-	-	5	3	-	-	.04	.01
F	Hackelia patens	-	-	4	2	-	-	.03	.15
F	Heterotheca villosa	a1	a5	ab13	b21	.03	.40	.48	.73
F	Holosteum umbellatum (a)	a1	b20	ab8	a3	.00	.09	.01	.00
F	Lactuca serriola (a)	-	1	-	1	-	.00	-	.00

Type	Species	Nested Frequency				Average Cover %			
		'96	'01	'06	'11	'96	'01	'06	'11
F	Lithophragma sp.	-	-	-	3	-	-	-	.01
F	Lithospermum ruderales	a-	a-	b11	a-	.15	-	.33	-
F	Lomatium sp.	-	1	-	-	-	.00	-	-
F	Lomatium triternatum	-	-	-	8	-	-	-	.07
F	Lupinus argenteus	a13	b45	a17	a6	.75	2.53	.60	.66
F	Microsteris gracilis (a)	a-	b29	a6	ab22	-	.06	.02	.05
F	Oenothera pallida	3	7	4	-	.00	.06	.03	.00
F	Penstemon humilis	b42	ab29	a17	a18	.87	.48	.73	.48
F	Penstemon sp.	2	4	2	-	.00	.03	.15	-
F	Phlox longifolia	-	3	-	-	-	.01	-	-
F	Polygonum douglasii (a)	8	-	4	-	.01	-	.01	-
F	Ranunculus testiculatus (a)	a60	b211	b217	a95	.20	2.04	1.33	.26
F	Sisymbrium altissimum (a)	-	-	-	1	-	-	-	.03
F	Taraxacum officinale	-	5	2	3	-	.01	.03	.15
F	Tragopogon dubius (a)	14	7	-	3	.08	.06	-	.04
F	Viguiera multiflora	b20	a6	a4	a-	.16	.06	.18	-
F	Zigadenus paniculatus	3	7	2	8	.01	.10	.06	.09
Total for Annual Forbs		398	795	671	839	2.16	6.22	7.07	13.88
Total for Perennial Forbs		190	237	154	204	3.13	6.19	4.57	4.49
Total for Forbs		588	1032	825	1043	5.30	12.41	11.65	18.38

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

#### BROWSE TRENDS--

Management unit 07, Study no: 10

Type	Species	Strip Frequency				Average Cover %			
		'96	'01	'06	'11	'96	'01	'06	'11
B	Amelanchier alnifolia	20	31	21	21	1.53	1.84	1.36	.90
B	Artemisia tridentata vaseyana	74	73	56	54	21.76	18.50	10.86	9.89
B	Chrysothamnus depressus	3	3	3	8	-	-	-	.21
B	Chrysothamnus nauseosus albicaulis	1	3	0	1	-	.06	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	5	10	7	10	.53	.19	.62	.06
B	Eriogonum heracleoides	1	1	0	3	-	.00	-	.03
B	Gutierrezia sarothrae	38	42	28	30	1.24	1.41	.25	1.41
B	Mahonia repens	4	2	1	0	-	-	-	-
B	Opuntia sp.	17	13	16	14	.54	.16	.27	.30
B	Prunus virginiana	1	0	0	0	-	-	-	-
B	Purshia tridentata	4	3	6	9	.56	.53	.41	1.32
B	Symphoricarpos oreophilus	38	46	48	44	3.80	6.99	4.78	5.48
B	Tetradymia canescens	14	14	15	15	.21	.46	.62	.19
Total for Browse		220	241	201	209	30.20	30.17	19.19	19.82

CANOPY COVER, LINE INTERCEPT--

Management unit 07, Study no: 10

Species	Percent Cover	
	'06	'11
Amelanchier alnifolia	2.61	5.30
Artemisia tridentata vaseyana	12.56	10.89
Chrysothamnus depressus	.18	.30
Chrysothamnus nauseosus albicaulis	.35	.28
Chrysothamnus viscidiflorus viscidiflorus	.55	.68
Gutierrezia sarothrae	.36	.61
Opuntia sp.	.16	.15
Purshia tridentata	.76	.96
Symphoricarpos oreophilus	7.81	8.28
Tetradymia canescens	.85	.91

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 07, Study no: 10

Species	Average leader growth (in)		
	'01	'06	'11
Amelanchier alnifolia	2.3	2.5	4.0
Artemisia tridentata vaseyana	1.4	1.7	1.8

BASIC COVER--

Management unit 07, Study no: 10

Cover Type	Average Cover %			
	'96	'01	'06	'11
Vegetation	41.93	46.54	43.02	49.08
Rock	22.34	19.41	21.83	22.85
Pavement	4.72	4.82	4.77	3.70
Litter	43.82	38.67	29.56	24.18
Cryptogams	.26	.32	.30	.37
Bare Ground	6.30	13.25	13.17	9.12

SOIL ANALYSIS DATA --

Management unit 07, Study no: 10, Study Name: Elder Hollow

Effective rooting depth (in)	pH	Sandy-Clay-Loam			%OM	PPM P	PPM K	ds/m
		% sand	% silt	% clay				
14.1	7.0	48.2	27.1	24.7	3.7	16.6	198.4	0.6

PELLET GROUP DATA--

Management unit 07, Study no: 10

Type	Quadrat Frequency			
	'96	'01	'06	'11
Rabbit	1	4	10	1
Elk	27	3	-	2
Deer	45	39	56	14
Cattle	-	-	1	1

Days use per acre (ha)		
'01	'06	'11
-	-	-
8 (20)	9 (22)	1 (2)
102 (253)	133 (327)	34 (84)
6 (14)	3 (7)	5 (13)

BROWSE CHARACTERISTICS--

Management unit 07, Study no: 10

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	520	8	92	-	-	35	54	0	22/29
01	840	7	93	-	-	45	33	2	23/30
06	460	9	91	-	-	9	87	0	27/31
11	500	0	100	-	-	28	68	0	30/38
<i>Artemisia tridentata vaseyana</i>									
96	2540	6	74	20	-	50	28	3	20/44
01	2140	2	60	38	-	50	17	11	22/39
06	1520	5	58	37	20	37	24	39	22/40
11	1680	21	45	33	20	33	7	12	24/42
<i>Chrysothamnus depressus</i>									
96	100	0	100	0	-	0	0	0	7/17
01	100	0	100	0	-	40	0	0	5/16
06	60	0	100	0	-	0	0	0	7/18
11	220	0	91	9	-	0	9	9	7/13
<i>Chrysothamnus nauseosus albicaulis</i>									
96	20	0	100	-	-	0	0	0	-/-
01	60	33	67	-	-	0	0	0	50/53
06	0	0	0	-	-	0	0	0	-/-
11	20	0	100	-	-	0	0	0	55/81
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
96	160	25	75	0	-	0	0	0	11/19
01	340	0	100	0	-	18	18	0	8/75
06	260	0	92	8	-	31	0	0	11/21
11	380	11	84	5	-	0	0	0	9/16
<i>Eriogonum heracleoides</i>									
96	20	0	100	-	-	0	0	0	-/-
01	20	0	100	-	-	0	0	0	8/15
06	0	0	0	-	-	0	0	0	-/-
11	100	0	100	-	-	100	0	0	8/5
<i>Gutierrezia sarothrae</i>									
96	4100	17	83	0	40	0	0	0	8/12
01	3100	4	96	0	-	0	0	0	7/8
06	1140	12	86	2	40	5	0	2	7/8
11	1180	44	56	0	-	0	0	0	8/11
<i>Mahonia repens</i>									
96	100	0	100	-	-	0	0	0	4/4
01	180	0	100	-	-	0	0	0	2/3
06	40	0	100	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	4/6

		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.										
96	<b>560</b>	4	93	4	-	0	0	7	4/12	
01	<b>340</b>	18	82	0	-	0	0	0	4/8	
06	<b>400</b>	20	70	10	-	0	0	10	4/14	
11	<b>340</b>	12	88	0	-	6	0	0	4/15	
<i>Prunus virginiana</i>										
96	<b>20</b>	0	100	-	-	0	0	0	-/-	
01	<b>0</b>	0	0	-	-	0	0	0	-/-	
06	<b>0</b>	0	0	-	-	0	0	0	-/-	
11	<b>0</b>	0	0	-	-	0	0	0	-/-	
<i>Purshia tridentata</i>										
96	<b>80</b>	0	100	-	-	0	100	0	10/51	
01	<b>60</b>	0	100	-	-	33	67	0	9/50	
06	<b>220</b>	0	100	-	-	18	73	0	9/32	
11	<b>300</b>	0	100	-	-	47	33	0	14/44	
<i>Symphoricarpos oreophilus</i>										
96	<b>1260</b>	17	81	2	20	10	0	2	21/30	
01	<b>1200</b>	12	87	2	20	7	2	0	22/33	
06	<b>1600</b>	9	89	3	20	9	1	0	24/35	
11	<b>1380</b>	6	94	0	-	30	0	0	23/38	
<i>Tetradymia canescens</i>										
96	<b>480</b>	25	67	8	-	0	0	4	8/18	
01	<b>440</b>	5	91	5	-	14	0	0	9/14	
06	<b>480</b>	8	79	13	-	8	0	4	11/21	
11	<b>460</b>	4	91	4	-	17	0	4	11/19	