

EAST CANYON RESERVOIR - TREND STUDY NO. 5-3-11

Vegetation Type: Mountain Big Sagebrush

Range Type: Crucial Deer Winter

NRCS Ecological Site Description: [Mountain Loam \(Mountain Big Sagebrush\), R047XA430UT](#)

Land Ownership: State Parks & Recreation

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

Aspect: Southeast

Slope: 20%

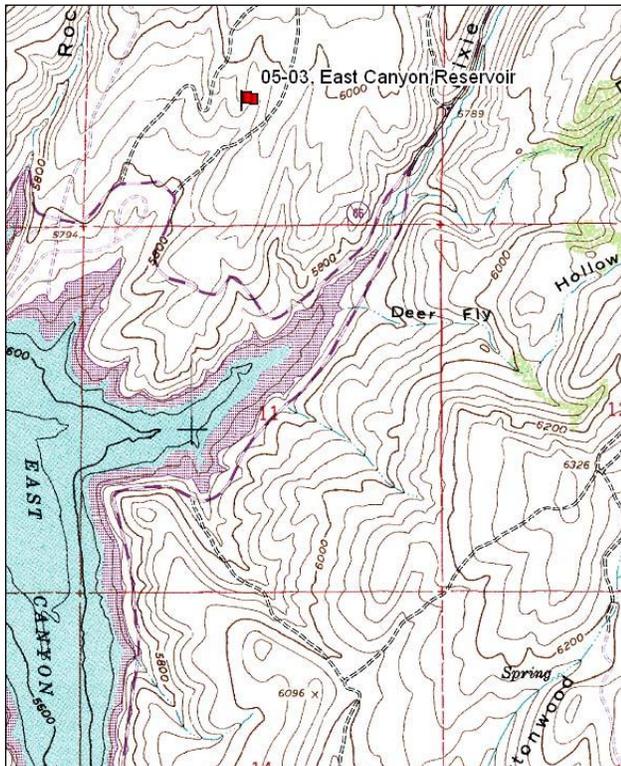
Transect bearing: 186° magnetic

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

Directions:

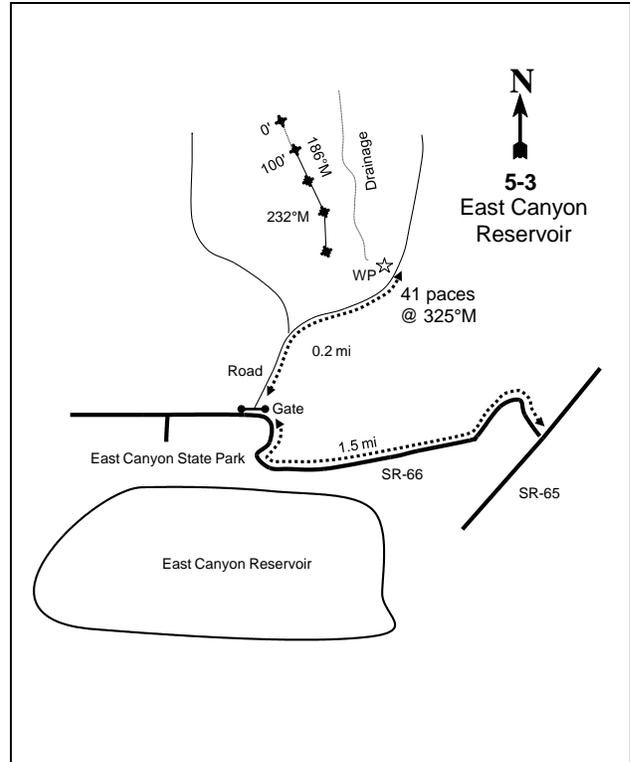
Begin to note mileage at the junction of U-65 and U-66. Proceed towards Porterville on U-66 1.15 miles to a gate on the right. There should be a picnic/campground area on left side of road. Proceed through gate on foot (gate locked), travel 0.2 miles to the witness post on the left hand side of the road. From the witness post the 400-foot baseline stake is 41 paces at 325 degrees magnetic. The 0-foot baseline stake is 400 feet to the northwest. The 0-foot stake of the baseline is marked by browse tab #7968. The baseline runs 186 degrees. The baseline doglegs at the 300-foot baseline stake and runs 232 degrees magnetic.

Map Name: East Canyon Reservoir



Township: 2N Range: 3E Section: 2

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 451058 E 4531058 N

## EAST CANYON RESERVOIR - TREND STUDY NO. 5-3

### Site Information

Site Description: This study is located immediately north of East Canyon Reservoir. The vegetation is comprised of a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and grass community with a substantial amount of antelope bitterbrush (*Purshia tridentata*). Deer pellet groups were noted to be abundant in 1996. Three winter-killed deer were noted in 1990 and deer shed antlers were also noted in 2006. Deer pellet groups were sampled in high abundance in 2001, but moderate abundance in 2006 and 2011. Elk pellet groups were moderate in abundance and low in abundance in 2006 and 2011, respectively. Sheep pellet groups were sampled in low abundance in 2001; in addition, a flock of sheep were seen on site one week prior to the 2001 reading. Cattle pats were sampled in low abundance in 2006. Grouse pellets have also been encountered within the pellet group transect (Table - Pellet Group Data).

Browse: Mountain big sagebrush and antelope bitterbrush are the preferred browse species. The sagebrush population is mostly mature plants, and moderately dense. The sagebrush population has been moderately to lightly hedged over the duration of the study. Decadence was very high in 1984, 1990, and 2006, but more moderate in the other sample years. Poor vigor was very high in 2006, but has been moderate to low in the other sample years. In 2006, nearly half of the sagebrush population was infested by the sagebrush defoliator moth (*Aroga websteri*). This explains the high decadence and poor vigor in that year. The infested plants were frequently observed within the decadent age class. Recruitment of young, mountain big sagebrush plants have been mostly poor, but with good recruitment in 1996 and 2011 (Table - Browse Characteristics). The poor recruitment could be due to dense cheatgrass (*Bromus tectorum*) and bulbous bluegrass (*Poa bulbosa*) cover (Table - Herbaceous Trends).

Antelope bitterbrush has a sparse population. Due to low density and high preference by big game, use has been heavy during all sampling periods. The bitterbrush population displays good vigor, but experiences heavy hedging. Recruitment of young bitterbrush plants to the population has been very poor over the sample years except in the 1990 sample year when recruitment was good. Other browse species occurring on site are Oregon grape (*Mahonia repens*), prickly pear cactus (*Opuntia* sp.), white rubber rabbitbrush (*Chrysothamnus nauseosus* ssp. *albicaulis*), stickyleaf low rabbitbrush (*C. viscidiflorus* ssp. *viscidiflorus*), Saskatoon serviceberry (*Amelachier alnifolia*), and Woods rose (*Rosa woodsii*) (Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory is abundant and diverse. However, the composition is dominated by the weedy species bulbous bluegrass, cheatgrass, and Japanese chess (*Bromus japonicus*). The nested frequency for bulbous bluegrass has increased, while the annual grass species cheatgrass and Japanese chess decreased in nested frequencies and cover values over the course of the study. Other perennial grass species include Great Basin wildrye (*Elymus cinereus*), Sandberg bluegrass (*Poa secunda*), Kentucky bluegrass (*P. pratensis*), and intermediate wheatgrass (*Agropyron intermedium*). The forb community is very diverse, but with few species commonly occurring. Many species are small annuals that add very little to the herbaceous cover. Forb composition includes few desirable species, but species with the most abundant production include western yarrow (*Achillea millefolium*), Louisiana sagebrush (*Artemisia ludoviciana*), and wavyleaf thistle (*Cirsium undulatum*) (Table - Herbaceous Trends).

Soil: The soil is part of the Manila component, which is found on mountainsides. The parent material consists of slope alluvium and/or colluviums derived from sandstone and quartzite (Soil Survey Staff 2011). The soil texture is a loam with a slightly acidic soil reaction (pH 6.3) (Table - Soil Analysis Data). Bare ground cover is minimal, while protective ground cover is provided by relatively high amounts of vegetation and litter (Table - Basic Cover). The soil erosion condition has been classified as stable since 2001.

## Trend Assessments

### Browse:

- **1984 to 1990 - slightly down (-1):** The density for mountain big sagebrush decreased 13% from 1,998 plants/acre to 1,732 plants/acre. Decadence within the sagebrush population remained high, and decreased from 68% to 65%. The sagebrush population increased in poor vigor from 3% to 15%. Recruitment of young sagebrush increased from 3% to 4% of the overall population. The density for antelope bitterbrush increased 33% from 199 plants/acre to 264 plants/acre. Due to bitterbrush having a sparse population, any change within the population likely does not affect trend.
- **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 within the sagebrush population decreased to 21%, but is still considered to be moderately high. The sagebrush population decreased in poor vigor to 8%. Recruitment of young sagebrush increased to 15% of the overall population. The antelope bitterbrush population decreased in decadence to 0%. Poor vigor was not observed within the bitterbrush population.
- **1996 to 2001 - slightly down (-1):** The density for mountain big sagebrush decreased 17% from 1,900 plants/acre to 1,580 plants/acre. Decadence within the sagebrush population increased slightly to 23%. Poor vigor within the sagebrush population decreased to 6%. Recruitment of young sagebrush decreased to 6% of the overall population. The density for antelope bitterbrush decreased 17% from 120 plants/acre to 100 plants/acre. Decadence within the bitterbrush population increased to 20%. Poor vigor was not observed within the population.
- **2001 to 2006 - down (-2):** The density for mountain big sagebrush decreased 34% to 1,040 plants/acre. Decadence within the sagebrush population increased to 53%. The sagebrush population increased in poor vigor to 46%. Young sagebrush recruitment decreased to 2% of the overall population. Antelope bitterbrush decreased in density by 20% to 80 plants/acre. Decadence and poor vigor within the bitterbrush population increased to 25%. Recruitment of young bitterbrush was not observed.
- **2006 to 2011 - stable (0):** The density for mountain big sagebrush increased 6% to 1,100 plants/acre. Decadence within the sagebrush population decreased to 16%. The sagebrush population decreased in poor vigor to 24%. Young sagebrush recruitment increased to 13% of the overall population. The density for antelope bitterbrush increased over two-fold. Decadence and poor vigor within the bitterbrush population decreased to 10%. Recruitment of young bitterbrush was not observed.

### Grass:

- **1984 to 1990 - slightly up (+1):** The sum of nested frequency for perennial grasses, excluding bulbous bluegrass, increased 80%. The perennial species Sandberg bluegrass increased significantly in nested frequency. The weedy perennial bulbous bluegrass was sampled for the first time in 1990.
- **1990 to 1996 - stable (0):** The sum of nested frequency for perennial grasses, excluding bulbous bluegrass, increased 36%. However, the weedy species bulbous bluegrass increased significantly in nested frequency and provided a large proportion of the grass cover. Annual species were included in the sample for the first time in 1996, and cheatgrass was the most frequently occurring grass species.
- **1996 to 2001 - slightly down (-1):** The sum of nested frequency for perennial grasses, excluding bulbous bluegrass, increased 33%. However, the weedy species bulbous bluegrass increased significantly in nested frequency, and increased in cover from 8% to 27%. The weedy annual species cheatgrass had a significant decrease in nested frequency, and decreased in cover from 8% to 4%.
- **2001 to 2006 - stable (0):** The sum of nested frequency for perennial grasses, excluding bulbous bluegrass, remained similar. Bulbous bluegrass and annual grass nested frequency and cover also remained similar.
- **2006 to 2011 - stable (0):** The sum of nested frequency for perennial grasses, excluding bulbous bluegrass, remained similar, though cover increased from 8% to 18%. Bulbous bluegrass and annual grass nested frequency and cover also remained similar.

Forb:

- **1984 to 1990 - slightly up (+1):** The sum of nested frequency for perennial forbs increased 12%. The increase in the sum of nested frequency is not due to any one specific species, and is likely due to small, accumulative increases in nested frequency across the perennial forb community.
- **1990 to 1996 - up (+2):** The sum of nested frequency for perennial forbs increased 59%. Western yarrow, Pacific aster (*Aster chilensis*), and low fleabane (*Erigeron pumilus*) increased significantly in nested frequency, and had covers of 1%, 3%, and 4%, respectively.
- **1996 to 2001 - down (-2):** The sum of nested frequency for perennial forbs decreased 46%. Wavyleaf thistle, low fleabane, and wayside gromwell (*Lithospermum ruderale*) decreased significantly in nested frequency.
- **2001 to 2006 - down (-2):** The sum of nested frequency for perennial forbs decreased 38%. Pacific aster and wavyleaf thistle decreased significantly in nested frequency. Pacific aster decreased in cover from 1% to less than 1%
- **2006 to 2011 - up (+2):** The sum of nested frequency for perennial forbs increased 34%. The increase in the sum of nested frequency is not due to any one specific species, and is likely due to small, accumulative increases in nested frequency across the perennial forb community; however, western yarrow increased in cover from 1% to 3%.

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

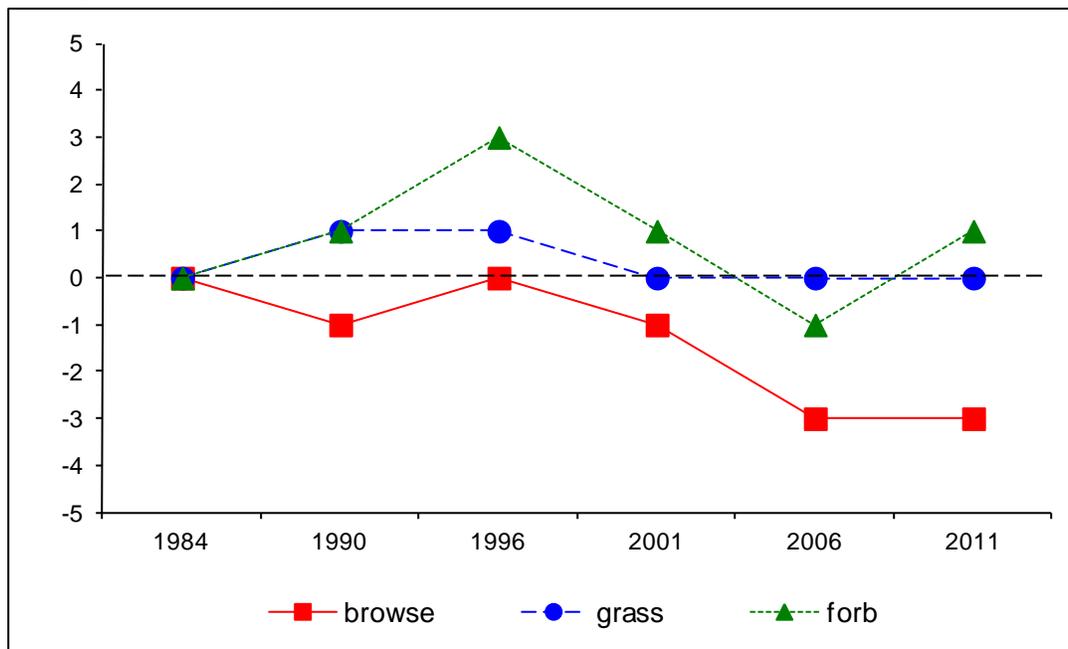
Management unit 5, study no: 3

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	21.6	9.6	6.4	10.9	-6.6	10.0	0.0	<b>51.8</b>	Poor-Fair
01	25.6	8.2	2.7	15.8	-3.2	5.7	0.0	<b>54.7</b>	Fair
06	18.7	-1.1	0.9	15.7	-1.9	8.4	0.0	<b>40.7</b>	Poor
11	19.0	10.3	6.2	30.0	-2.9	10.0	0.0	<b>72.6</b>	Good

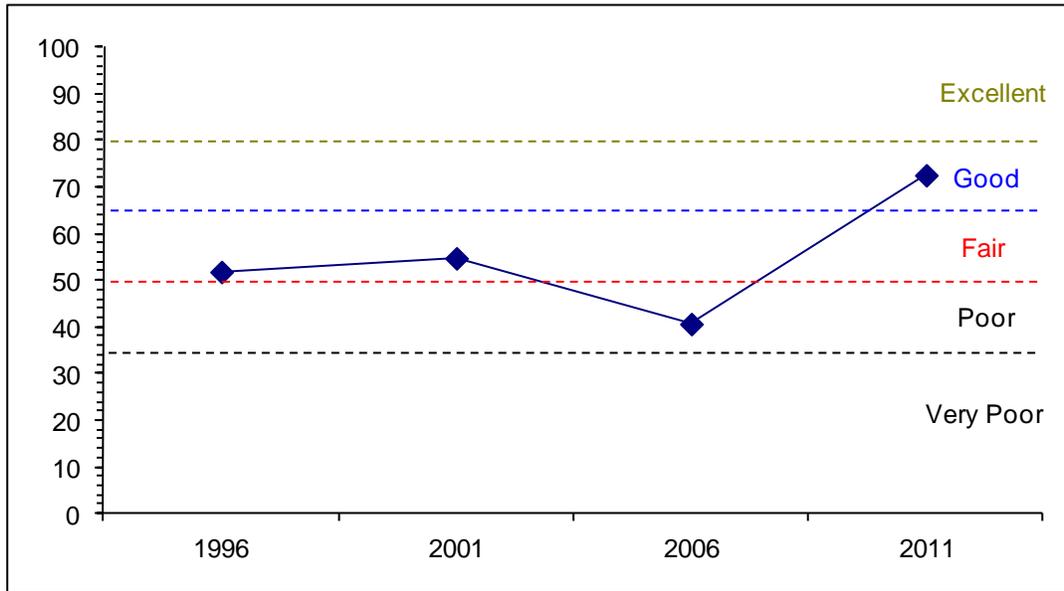
**Trend Summary**

CUMULATIVE RANGE TREND ASSESSMENT--

Management unit 5 Study no: 3



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--  
 Management unit 5, Study no: 3



HERBACEOUS TRENDS--  
 Management unit 05, Study no: 3

Type	Species	Nested Frequency						Average Cover %			
		'84	'90	'96	'01	'06	'11	'96	'01	'06	'11
G	Agropyron intermedium	a7	a10	a9	ab22	bc33	b53	.18	.91	2.11	5.23
G	Agropyron smithii	-	-	-	4	2	2	-	.53	.03	.15
G	Agropyron spicatum	a3	a18	b48	ab21	ab24	a16	2.04	.34	1.75	.51
G	Bromus japonicus (a)	-	-	41	62	45	37	.39	.32	.26	.31
G	Bromus tectorum (a)	-	-	b283	a135	a177	a153	7.92	3.98	2.29	3.55
G	Carex sp.	-	-	3	7	7	-	.03	.03	.06	-
G	Elymus cinereus	-	-	29	24	24	27	2.53	3.04	2.55	3.92
G	Poa bulbosa	a-	b41	c149	d267	d292	d251	7.90	26.96	28.90	23.59
G	Poa pratensis	ab19	a3	a6	b50	ab19	a15	.04	2.20	.36	.70
G	Poa secunda	a21	bc59	ab27	abc34	c56	abc61	.58	.79	.96	7.84
G	Vulpia octoflora (a)	-	-	6	1	-	-	.53	.00	-	-
Total for Annual Grasses		0	0	330	198	222	190	8.84	4.31	2.56	3.87
Total for Perennial Grasses		50	131	271	429	457	425	13.33	34.84	36.75	41.97
Total for Grasses		50	131	601	627	679	615	22.17	39.16	39.32	45.84
F	Achillea millefolium	a26	ab35	c62	bc53	a24	ab40	1.19	.86	1.14	3.37
F	Agoseris glauca	-	-	-	1	3	-	-	.00	.00	-
F	Allium sp.	-	-	1	3	1	4	.00	.00	.00	.01
F	Alyssum alyssoides (a)	-	-	4	7	12	8	.01	.04	.03	.06
F	Arabis sp.	-	-	4	-	-	-	.03	-	-	-
F	Artemisia ludoviciana	b51	b45	a17	ab26	ab26	ab35	.51	.73	1.97	2.95
F	Aster chilensis	a38	a36	b89	b89	a10	a11	3.00	.69	.07	.54
F	Aster sp.	-	-	-	-	-	6	-	-	-	.18
F	Astragalus sp.	5	-	12	-	6	3	.52	-	.01	.06

Type	Species	Nested Frequency						Average Cover %			
		'84	'90	'96	'01	'06	'11	'96	'01	'06	'11
F	Cirsium sp.	-	-	-	-	-	7	-	-	-	.36
F	Cirsium undulatum	abc17	bc27	c41	ab9	a7	abc18	1.10	.10	.07	1.37
F	Collinsia parviflora (a)	-	-	a3	ab21	b39	c73	.00	.08	.08	.71
F	Collomia linearis (a)	-	-	a12	ab30	a14	b46	.03	.10	.04	.21
F	Cruciferae	-	4	-	-	-	-	-	-	-	-
F	Descurainia pinnata (a)	-	-	a-	a6	a3	b39	-	.04	.00	.95
F	Draba sp. (a)	-	-	a-	b54	b84	c141	-	.15	.17	4.61
F	Epilobium brachycarpum (a)	-	-	a-	a8	b57	c160	-	.01	.17	1.80
F	Erigeron pumilus	c54	bc51	d125	a2	ab22	bc35	3.91	.00	.25	.76
F	Erodium cicutarium (a)	-	-	a22	a33	b55	ab41	.16	.80	.27	.78
F	Gayophytum ramosissimum(a)	-	-	b43	a-	a-	c83	.15	-	-	3.19
F	Haplopappus acaulis	-	-	1	-	-	-	.00	-	-	-
F	Hedysarum boreale	-	-	2	1	-	-	.15	.00	.03	-
F	Holosteum umbellatum (a)	-	-	a9	b78	b93	b81	.02	.31	.43	1.06
F	Lactuca serriola (a)	a-	a1	a1	a-	a4	b34	.00	-	.01	.48
F	Lappula occidentalis (a)	-	-	a6	a-	a18	b119	.03	-	.06	1.50
F	Lithophragma sp.	-	-	-	-	-	3	-	-	-	.01
F	Lithospermum ruderales	c24	c31	bc16	a1	a2	ab6	1.06	.00	.03	.21
F	Lomatium sp.	-	-	2	4	1	-	.00	.01	.00	-
F	Lupinus argenteus	a-	a-	ab11	b22	ab8	a3	.10	.35	.02	.38
F	Machaeranthera canescens	-	-	-	-	1	-	-	-	.00	-
F	Microsteris gracilis (a)	-	-	-	2	1	1	-	.00	.00	.00
F	Oenothera caespitosa	3	2	3	2	-	-	.15	.00	-	-
F	Phlox longifolia	-	-	-	-	-	3	-	-	-	.00
F	Polygonum douglasii (a)	-	-	b35	a14	ab27	ab16	.08	.03	.06	.07
F	Ranunculus testiculatus (a)	-	-	-	3	3	-	-	.00	.00	-
F	Sisymbrium altissimum (a)	-	-	-	-	-	1	-	-	-	.00
F	Sphaeralcea grossulariifolia	-	-	-	-	-	-	-	-	.00	-
F	Sphaeralcea munroana	16	13	15	9	7	6	.55	.05	.26	.44
F	Taraxacum officinale	-	-	2	-	3	-	.00	-	.00	-
F	Tragopogon dubius (a)	ab19	ab18	b19	a4	a1	ab5	.25	.01	.00	.04
F	Veronica biloba (a)	-	-	-	-	-	3	-	-	-	.00
F	Viguiera multiflora	-	17	11	1	16	4	.04	.00	.26	.06
F	Zigadenus paniculatus	-	-	-	2	3	4	-	.04	.01	.01
Total for Annual Forbs		19	19	154	260	411	851	0.76	1.60	1.37	15.52
Total for Perennial Forbs		234	261	414	225	140	188	12.37	2.87	4.19	10.76
Total for Forbs		253	280	568	485	551	1039	13.13	4.47	5.57	26.29

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

BROWSE TRENDS--

Management unit 05, Study no: 3

Type	Species	Strip Frequency				Average Cover %			
		'96	'01	'06	'11	'96	'01	'06	'11
B	Artemisia tridentata vaseyana	64	53	41	44	14.37	18.14	13.68	14.30
B	Chrysothamnus nauseosus albicaulis	1	1	0	0	-	-	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	12	13	13	9	.33	.18	.18	.68
B	Leptodactylon pungens	-	-	-	-	-	-	.03	-
B	Mahonia repens	22	21	24	22	.83	.45	.60	1.50
B	Opuntia sp.	6	5	2	4	.03	-	.03	-
B	Purshia tridentata	4	5	4	6	2.40	1.94	1.06	.74
Total for Browse		32	31	30	32	17.98	20.71	15.60	17.23

CANOPY COVER, LINE INTERCEPT--

Management unit 05, Study no: 3

Species	Percent Cover	
	'06	'11
Artemisia tridentata vaseyana	20.38	15.85
Chrysothamnus viscidiflorus viscidiflorus	.73	1.39
Mahonia repens	.80	1.16
Opuntia sp.	.03	.03
Purshia tridentata	1.01	.65

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 05, Study no: 3

Species	Average leader growth (in)		
	'01	'06	'11
Artemisia tridentata vaseyana	1.3	2.2	4.0
Purshia tridentata	1.9	1.5	1.4

BASIC COVER--

Management unit 05, Study no: 3

Cover Type	Average Cover %					
	'84	'90	'96	'01	'06	'11
Vegetation	3.50	6.00	50.76	60.62	61.56	75.20
Rock	5.25	6.75	5.53	3.97	3.74	4.13
Pavement	.50	2.00	1.27	1.48	.67	.72
Litter	79.50	71.00	61.27	49.72	45.27	44.14
Cryptogams	.50	0	.13	.95	.73	.18
Bare Ground	10.75	14.25	4.19	8.60	3.04	2.92

SOIL ANALYSIS DATA --

Management unit 05, Study no: 3, Study Name: East Canyon Reservoir

Effective rooting depth (in)	pH	Loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
10.8	6.3	48.7	28.0	23.3	2.4	20.6	163.2	0.4

PELLET GROUP DATA--

Management unit 05, Study no: 3

Type	Quadrat Frequency				Days use per acre (ha)		
	'96	'01	'06	'11	'01	'06	'11
Sheep	-	4	-	-	15 (38)	-	-
Rabbit	-	-	10	1	-	-	-
Grouse	-	1	-	-	2 (17) Groups/Acre	-	-
Elk	5	-	4	1	-	38 (93)	3 (8)
Deer	32	26	38	11	79 (195)	36 (89)	21 (51)
Cattle	-	-	-	-	1 (2)	1 (2)	-

BROWSE CHARACTERISTICS--

Management unit 05, Study no: 3

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>									
84	0	0	0	-	-	0	0	0	-/-
90	0	0	0	-	-	0	0	0	-/-
96	0	0	0	-	-	0	0	0	37/60
01	0	0	0	-	-	0	0	0	51/55
06	0	0	0	-	-	0	0	0	32/44
11	0	0	0	-	-	0	0	0	35/46
<i>Artemisia tridentata vaseyana</i>									
84	1998	3	28	68	-	42	58	3	25/24
90	1732	4	31	65	399	44	25	15	29/38
96	1900	15	64	21	20	32	2	8	30/45
01	1580	6	71	23	-	23	3	6	32/47
06	1040	2	42	56	-	31	0	46	32/52
11	1100	13	71	16	160	9	0	24	24/40
<i>Chrysothamnus nauseosus albicaulis</i>									
84	33	0	0	100	-	0	100	0	-/-
90	33	0	100	0	-	100	0	0	26/28
96	20	0	100	0	-	0	0	0	-/-
01	20	0	100	0	-	0	0	0	-/-
06	0	0	0	0	-	0	0	0	31/46
11	0	0	0	0	-	0	0	0	31/27
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
84	33	0	0	100	-	0	0	100	-/-
90	33	0	100	0	-	100	0	100	14/15
96	320	6	94	0	-	0	0	6	15/27
01	320	0	94	6	-	0	0	0	12/17
06	340	0	100	0	-	0	0	0	13/22
11	320	13	88	0	-	0	0	0	10/18

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<b>Mahonia repens</b>									
84	<b>0</b>	0	0	-	-	0	0	0	-/-
90	<b>0</b>	0	0	-	-	0	0	0	-/-
96	<b>2960</b>	22	78	-	40	0	0	0	5/6
01	<b>4460</b>	14	86	-	-	0	0	0	3/4
06	<b>4480</b>	16	84	-	100	0	0	0	3/4
11	<b>5580</b>	4	96	-	-	0	0	0	3/4
<b>Opuntia sp.</b>									
84	<b>66</b>	0	100	0	-	0	0	0	10/13
90	<b>66</b>	0	0	100	-	0	0	0	-/-
96	<b>380</b>	32	68	0	-	0	0	5	5/15
01	<b>180</b>	11	89	0	-	0	0	0	5/14
06	<b>80</b>	0	100	0	-	0	0	0	6/14
11	<b>100</b>	0	100	0	-	0	0	0	4/12
<b>Purshia tridentata</b>									
84	<b>199</b>	0	33	67	-	17	83	0	20/9
90	<b>264</b>	38	38	25	-	25	75	0	35/47
96	<b>120</b>	0	100	0	-	0	100	0	35/80
01	<b>100</b>	0	80	20	-	20	80	0	33/61
06	<b>80</b>	0	75	25	20	0	100	25	32/61
11	<b>200</b>	0	90	10	-	10	80	10	24/41
<b>Rosa woodsii</b>									
84	<b>0</b>	0	0	-	-	0	0	0	-/-
90	<b>0</b>	0	0	-	-	0	0	0	-/-
96	<b>0</b>	0	0	-	-	0	0	0	24/17
01	<b>0</b>	0	0	-	-	0	0	0	-/-
06	<b>0</b>	0	0	-	-	0	0	0	12/7
11	<b>0</b>	0	0	-	-	0	0	0	-/-