

NORTHEAST MANTUA RESERVOIR - TREND STUDY NO. 3-2-11

Vegetation Type: Mountain Big Sagebrush

Range Type: Crucial Deer Winter, Crucial Elk Winter

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

Land Ownership: Private

Elevation: 5,560 ft (5,560 m)

Aspect: West

Slope: 30%

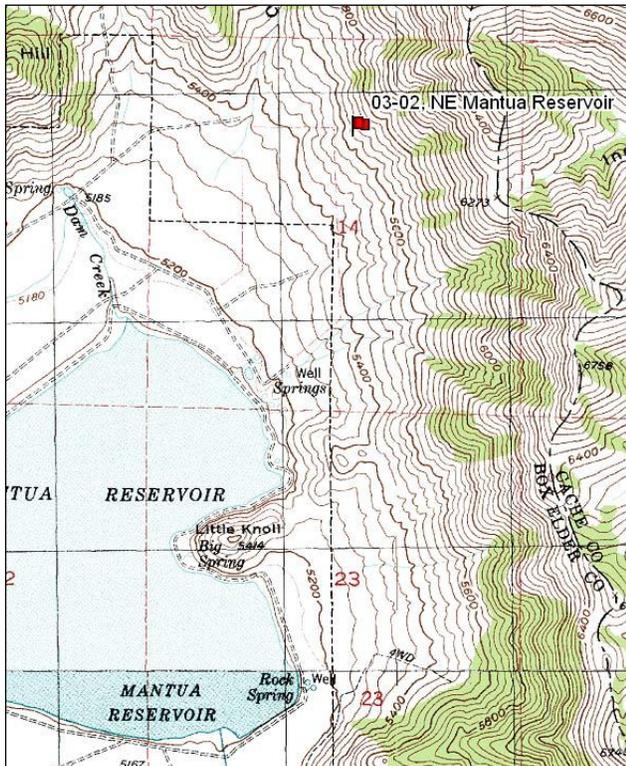
Transect bearing: 168° magnetic

Belt placement: line 1 (11 & 95ft), line 2 (59ft), line 3 (71ft), line 4 (43ft)

Directions:

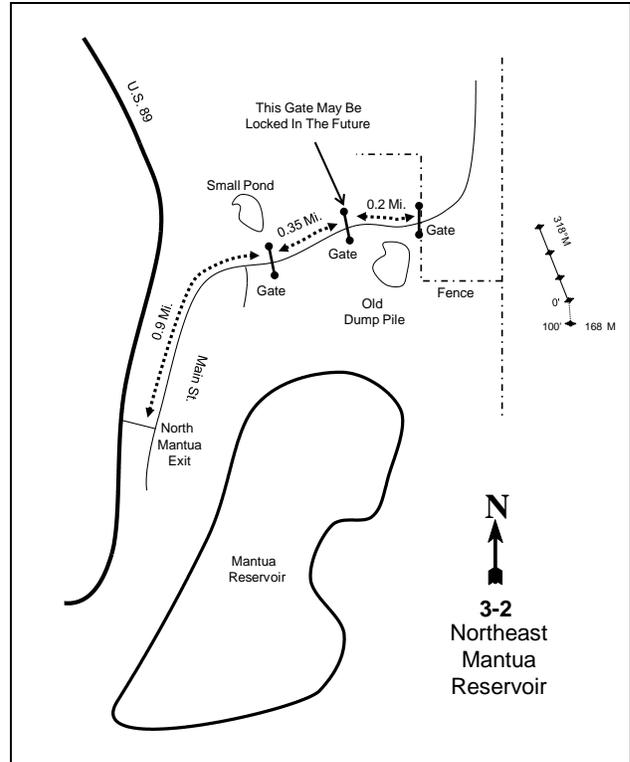
Turn east off of U.S. 89-91 at the north Mantua exit and travel east to Main Street. Turn left (north) on Main Street and proceed 0.9 miles to a gate with a small pond to the left. Proceed through the gate, stopping at another gate after 0.35 miles (this gate may be locked in the future). Proceed 0.2 mile to another gate with an old dump to the south. From the gate walk south-east to a “T” in the fence. From the “T” in the fence, walk 60 paces at a bearing of 112 degrees magnetic to the 0-foot baseline stake. Baseline 0-foot stake is marked by browse tag #7105. The first 100 feet of the baseline runs south at a bearing of 165 degrees magnetic. The last 300 feet run north off of the 0-foot stake at a bearing of 318 degrees magnetic.

Map Name: Mount Pisgah



Township: 9N Range: 1W Section: 14

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 423253 E 4597004 N

NORTHEAST MANTUA RESERVOIR - TREND STUDY NO. 3-2

Site Information

Site Description: The study samples a former mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) community that has transitioned to a grass community about one mile northeast of Mantua Reservoir. The study is on private land. The Ruby gas pipeline is about a half mile to the north of the site. Deer pellet groups were sampled in moderate abundance in 2001 and 2006, but low abundance in 2011. Elk pellet groups have been sampled in low abundance since 2001. Sampled domestic livestock sign has been minimal, and livestock appear to have little impact on the immediate area (Table - Pellet Group Data).

Browse: Browse composition from 1984 to 2001 was dominated by a moderately dense population of mountain big sagebrush. However, there was a large die-off of sagebrush and density decreased substantially in 2006, with further decreases in 2011. Decadence and poor vigor were low in the early years of the study, but both measurements were high in 2006. Utilization was heavy in 1984, but has been light to moderate in other sample years. Recruitment of young sagebrush plants was good in the early part of the study, but has been poor since 2006. Antelope bitterbrush (*Purshia tridentata*) and Saskatoon serviceberry (*Amelanchier alnifolia*) were not sampled in density measurements, but occur in small numbers on and around the site. Both species receive heavy use. Other preferred browse species are rare on the site. The increaser species broom snakeweed (*Gutierrezia sarothrae*) occurred in moderate density early in the study, but has also decreased in density since 2001 and is now rare on the site (Table - Browse Characteristics).

Herbaceous Understory: Perennial grasses are diverse and abundant on the site, but have become dominated by the weedy species bulbous bluegrass (*Poa bulbosa*). Bulbous bluegrass was rare at the outset of the study, but has steadily increased in frequency over the sample years. Cover of bulbous bluegrass increased substantially in 2011. The desirable species bluebunch wheatgrass (*Agropyron spicatum*) is the only other prevalent perennial grass species. The annual grass species cheatgrass (*Bromus tectorum*) and Japanese chess (*B. japonicus*) are also abundant on the site. The noxious weed medusahead (*Taeniatherum caput-medusae*) was sampled for the first time in 2011, but was observed in higher abundance around the study area.

A wide variety of forb species were sampled, but the forb composition is a mixture of annual and perennial forbs. The most common perennial forbs include western yarrow (*Achillea millefolium*), arrowleaf balsamroot (*Balsamorhiza sagittata*), and wayside gromwell (*Lithospermum ruderale*). The most abundant annual species were desert alysium (*Alyssum alyssoides*), autumn willowherb (*Epilobium brachycarpum*), storksbill (*Erodium cicutarium*), and yellow salsify (*Tragopogon dubius*). The noxious weed dyer's woad (*Isatis tinctoria*) was present in low numbers (Table - Herbaceous Trends).

Soil: The soil is in the Goring-Yeates Hollow association, which occurs on alluvial fans and mountain slopes. Parent material consists of alluvium, colluvium, and residuum derived from sandstone and quartzite (Soil Survey Staff 2011). The soil has a clay texture with a slightly alkaline soil reaction (pH 7.4) (Table - Soil Analysis Data). Bare ground cover is low, with a large amount of vegetation and litter cover (Table - Basic Cover). The soil erosion condition has been classified as stable since 2001.

Trend Assessments

Browse:

- **1984 to 1990 - up (+2):** The density of mountain big sagebrush increased by 23% from 1,731 plants/acre to 2,132 plants/acre. Recruitment of young sagebrush plants increased from 4% to 44% of the population.
- **1990 to 1996 - stable (0):** Differences in density may be related to the larger sample area used in 1996; therefore, trend was determined using other parameters. Decadence and poor vigor of sagebrush

remained similar at 14% and 4%, respectively. Recruitment of young sagebrush plants decreased to 17%, but is still considered to be good.

- **1996 to 2001 - stable (0):** Density of sagebrush remained similar at 1,840 plants/acre, and cover remained similar at 16%. Decadence increased to 26%, but poor vigor remained similar at 3%. Recruitment of young plants remained similar at 15%.
- **2001 to 2006 - down (-2):** There was a large die-off of mountain big sagebrush with a 49% decrease in density to 940 plants/acre. Cover of sagebrush decreased to 4%. Decadence increased to 55%, and poor vigor increased to 38%. Recruitment decreased to just 9% of the population.
- **2006 to 2011 - down (-2):** Sagebrush density decreased to 80 plants/acre, and had no notable cover. There was no recruitment of young plants into the population.

Grass:

- **1984 to 1990 - up (+2):** The sum of nested frequency of perennial grasses, excluding bulbous bluegrass, increased 87%. Bluebunch wheatgrass and Sandberg bluegrass (*Poa secunda*) increased significantly in nested frequency.
- **1990 to 1996 - down (-2):** There was a 45% decrease in the sum of nested frequency of perennial grasses, excluding bulbous bluegrass. The weedy species bulbous bluegrass increased significantly in nested frequency.
- **1996 to 2001 - slightly up (+1):** The sum of nested frequency of perennial grasses, excluding bulbous bluegrass, increased 21%, and cover increased from 5% to 7%. However, there was a significant increase in the nested frequency of the weedy species bulbous bluegrass, and cover increased from 4% to 8%. The two annual brome species decreased in combined cover from 17% to 11%, with a significant decrease in the nested frequency of Japanese chess.
- **2001 to 2006 - slightly up (+1):** The sum of nested frequency of perennial grasses, excluding bulbous bluegrass, increased 14%, and cover increased to 15%. The increase in cover is primarily due to an increase in cover of the perennial species bluebunch wheatgrass.
- **2006 to 2011 - slightly down (-1):** The sum of nested frequency of perennial grasses, excluding bulbous bluegrass, increased by 10%, and cover increased to 20%. Bluebunch wheatgrass has increased significantly in nested frequency since 2001, and cover has increased from 7% to 19% over the same period. However, there was a significant increase in nested frequency of the weedy species bulbous bluegrass, and cover increased to 24%. The noxious weed medusahead was sampled for the first time, and occurred at higher frequency in the area surrounding the study.

Forb:

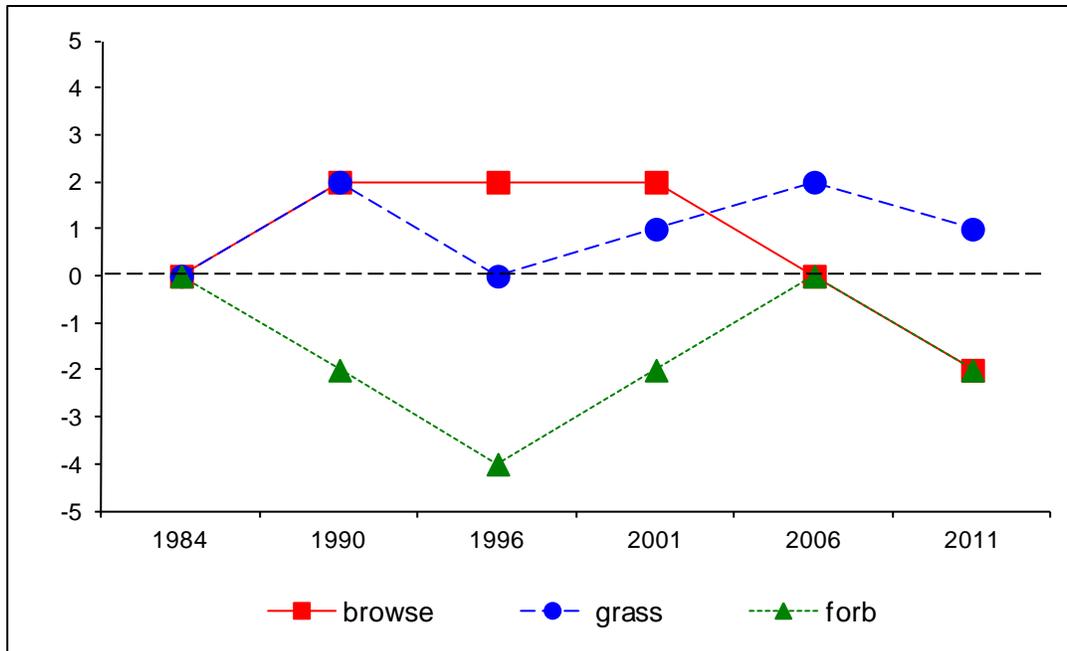
- **1984 to 1990 - down (-2):** The sum of nested frequency of perennial forbs decreased by 22%.
- **1990 to 1996 - down (-2):** The sum of nested frequency of perennial forbs decreased by 25%.
- **1996 to 2001 - up (+2):** There was a 58% increase in the sum of nested frequency of perennial forbs, and cover increased from 3% to 6%. The annual forb sum of nested frequency and cover also increased substantially.
- **2001 to 2006 - up (+2):** The sum of nested frequency of perennial forbs increased by 22%, and cover increased to 10%. The annual forb sum of nested frequency increased substantially.
- **2006 to 2011 - down (-2):** The perennial forb sum of nested frequency decreased by 24%, but cover increased to 12%. The annual forb sum of nested frequency also decreased, but cover increased from 7% to 12%.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
 Management unit 3, study no: 2

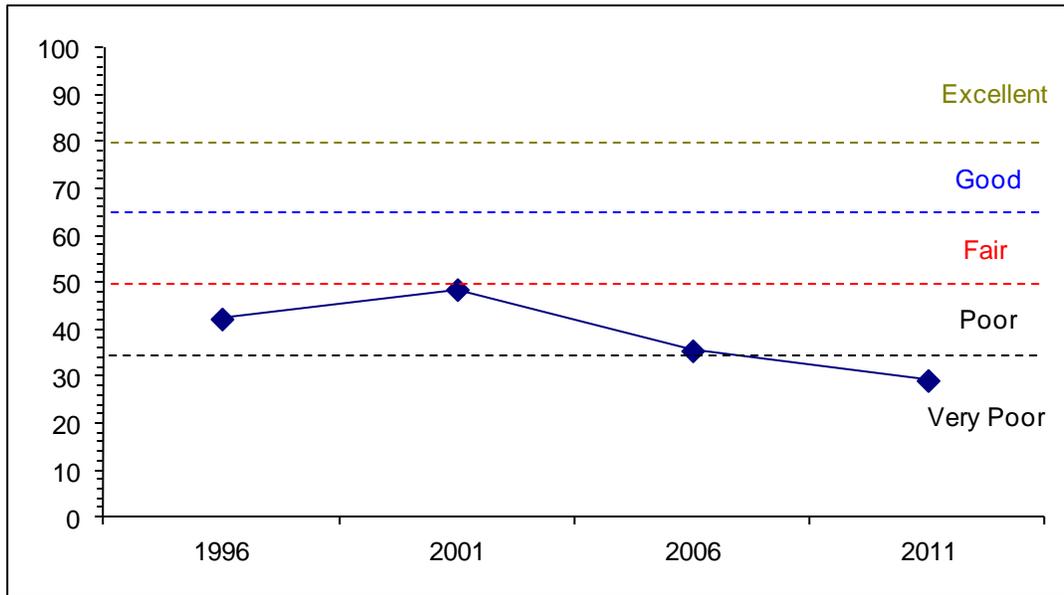
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover (-POBU)	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
96	21.4	11.0	8.2	10.6	-13.0	6.0	-2.0	42.2	Poor
01	21.1	6.1	7.1	14.6	-8.3	10.0	-2.0	48.5	Poor-Fair
06	5.7	0.0	0.0	30.0	-8.2	10.0	-2.0	35.5	Very Poor-Poor
11	0.7	0.0	0.0	30.0	-7.5	10.0	-4.0	29.1	Very Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 3 Study no: 2



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--
Management unit 3, Study no: 2



HERBACEOUS TRENDS--
Management unit 03, Study no: 2

Type	Species	Nested Frequency						Average Cover %			
		'84	'90	'96	'01	'06	'11	'96	'01	'06	'11
G	<i>Agropyron spicatum</i>	a140	bc204	ab163	ab167	abc168	c211	5.26	6.80	13.30	19.14
G	<i>Bromus japonicus</i> (a)	-	-	c349	b201	a139	b220	16.42	3.60	2.69	7.94
G	<i>Bromus tectorum</i> (a)	-	-	36	179	181	98	.86	7.52	8.30	2.08
G	<i>Koeleria cristata</i>	-	-	2	6	5	5	.00	.12	.18	.15
G	<i>Melica bulbosa</i>	a7	a3	a-	a-	b26	ab13	-	-	1.14	.10
G	<i>Oryzopsis hymenoides</i>	-	-	-	-	2	-	-	-	.03	-
G	<i>Poa bulbosa</i>	a5	a41	b79	c192	c177	d278	4.22	7.69	7.80	24.04
G	<i>Poa fendleriana</i>	4	-	-	-	-	-	-	-	-	-
G	<i>Poa secunda</i>	a20	b113	a12	a41	a42	a23	.05	.35	.76	.65
G	<i>Taeniatherum caput-medusae</i>	a-	a-	a-	a-	a-	b16	-	-	-	.06
Total for Annual Grasses		0	0	385	380	320	318	17.28	11.13	10.99	10.02
Total for Perennial Grasses		176	361	256	406	420	546	9.54	14.97	23.22	44.16
Total for Grasses		176	361	641	786	740	864	26.82	26.10	34.21	54.19
F	<i>Achillea millefolium</i>	b119	a47	a57	ab82	a44	a51	1.41	1.87	.90	2.54
F	<i>Agoseris glauca</i>	a-	a3	a1	a-	b13	ab6	.00	-	.05	.06
F	<i>Allium acuminatum</i>	2	-	-	-	-	-	-	-	-	-
F	<i>Alyssum alyssoides</i> (a)	-	-	a94	b205	b216	b173	.20	1.60	.83	4.32
F	<i>Arabis</i> sp.	-	-	-	-	4	-	-	-	.03	-
F	<i>Artemisia ludoviciana</i>	1	5	3	4	6	4	.15	.41	.53	.03
F	<i>Aster chilensis</i>	-	-	-	7	6	-	-	.30	.30	-
F	<i>Astragalus</i> sp.	b32	b30	a-	a8	a1	a-	-	.07	.03	-
F	<i>Balsamorhiza sagittata</i>	ab17	ab20	a13	a14	b32	ab20	.66	1.94	3.53	5.34
F	<i>Calochortus nuttallii</i>	5	-	3	10	4	3	.00	.05	.01	.01

Type	Species	Nested Frequency					Average Cover %				
		'84	'90	'96	'01	'06	'11	'96	'01	'06	'11
F	Camelina microcarpa (a)	-	-	-	-	-	5	-	.03	-	.03
F	Cirsium undulatum	-	-	2	-	-	-	.00	-	-	-
F	Collinsia parviflora (a)	-	-	a ⁻	a ¹	b ¹⁹	a ³	-	.00	.04	.01
F	Collomia linearis (a)	-	-	5	22	17	12	.01	.07	.05	.03
F	Comandra pallida	-	-	-	9	8	2	-	.04	.07	.03
F	Cordylanthus ramosus (a)	-	-	-	-	-	1	-	-	-	.03
F	Cryptantha sp.(a)	-	-	a ⁻	a ⁻	b ¹⁶	a ⁴	-	-	.03	.01
F	Cymopterus sp.	-	-	-	2	5	-	-	.00	.06	-
F	Draba sp. (a)	-	-	-	-	2	1	-	-	.00	.00
F	Epilobium brachycarpum (a)	-	-	b ¹⁵⁵	a ⁶⁴	c ²³²	a ⁵⁶	1.39	.21	2.00	.35
F	Eriogonum umbellatum	-	-	-	1	-	-	-	.00	-	-
F	Erodium cicutarium (a)	-	-	a ³	c ⁷⁶	d ¹³¹	b ³⁹	.03	2.55	1.75	.17
F	Galium aparine (a)	-	-	-	3	11	3	-	.03	.08	.01
F	Gilia sp. (a)	-	-	-	-	3	-	-	-	.00	-
F	Hackelia patens	a ³	c ³⁵	a ³	ab ¹¹	c ⁴⁹	bc ²⁸	.06	.16	.93	.45
F	Hedysarum boreale	-	-	-	2	-	-	-	.03	-	-
F	Helianthus annuus (a)	-	-	a ⁻	a ⁻	a ¹	b ⁸	-	-	.00	.22
F	Holosteum umbellatum (a)	-	-	a ⁻	b ¹⁵	b ¹²	a ⁻	-	.20	.03	-
F	Isatis tinctoria	3	9	18	9	20	11	.24	.08	.42	.46
F	Lactuca serriola (a)	a ⁻	a ³	a ⁻	b ³⁰	c ⁶⁸	d ¹⁹⁰	-	.24	.60	3.42
F	Lappula occidentalis (a)	-	-	5	5	10	2	.01	.39	.02	.00
F	Lithospermum ruderales	a ²	a ⁻	a ²	ab ¹¹	b ¹⁷	b ¹⁸	.18	.38	1.74	1.71
F	Lupinus argenteus	-	-	4	9	9	16	.21	.39	.63	1.02
F	Machaeranthera grindelioides	-	-	-	-	-	2	-	-	-	.00
F	Madia glomerata (a)	-	-	a ²	a ⁻	a ⁻	b ¹³	.00	-	-	.42
F	Medicago sativa	-	-	-	-	-	1	-	-	-	.03
F	Microsteris gracilis (a)	b ⁵⁴	a ⁻	a ³	a ⁶	b ³⁵	a ⁻	.00	.01	.10	-
F	Polygonum douglasii (a)	-	-	7	8	7	3	.03	.04	.01	.00
F	Ranunculus testiculatus (a)	-	-	2	5	3	-	.00	.01	.00	-
F	Rumex sp.	-	-	-	3	-	2	-	.03	-	.03
F	Senecio multilobatus	-	-	-	1	-	-	-	.03	-	-
F	Taraxacum officinale	-	-	-	-	-	1	-	-	-	.18
F	Tragopogon dubius (a)	c ¹²²	b ⁷⁴	a ¹²	c ¹⁰⁹	b ⁶⁹	c ¹²⁸	.04	2.66	1.00	2.02
F	Unknown forb-perennial	-	5	-	-	-	-	-	-	-	-
F	Verbascum thapsus	-	-	-	-	-	2	-	-	-	.03
F	Veronica biloba (a)	-	-	a ⁹	ab ²⁷	b ⁴⁶	b ⁴²	.01	.12	.15	.56
F	Wyethia amplexicaulis	b ¹⁴	a ⁻	a ³	a ⁻	a ²	a ²	.03	-	.15	.00
F	Zigadenus paniculatus	-	-	7	-	3	-	.04	.01	.03	-
Total for Annual Forbs		176	77	297	576	898	683	1.75	8.21	6.76	11.67
Total for Perennial Forbs		198	154	116	183	223	169	3.01	5.82	9.43	11.98
Total for Forbs		374	231	413	759	1121	852	4.76	14.04	16.20	23.66

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

BROWSE TRENDS--

Management unit 03, Study no: 2

Type	Species	Strip Frequency				Average Cover %			
		'96	'01	'06	'11	'96	'01	'06	'11
B	Artemisia tridentata vaseyana	60	55	37	3	16.34	15.71	4.01	-
B	Gutierrezia sarothrae	11	13	4	1	.36	.78	.30	-
B	Prunus virginiana	2	2	2	2	.00	.15	.38	.53
B	Purshia tridentata	1	1	1	0	.66	.85	.15	-
Total for Browse		74	71	44	6	17.37	17.49	4.85	0.53

CANOPY COVER, LINE INTERCEPT--

Management unit 03, Study no: 2

Species	Percent Cover	
	'06	'11
Artemisia tridentata vaseyana	4.73	.68
Gutierrezia sarothrae	.20	-
Prunus virginiana	.05	.53
Purshia tridentata	.96	-

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 03, Study no: 2

Species	Average leader growth (in)		
	'01	'06	'11
Artemisia tridentata vaseyana	3.4	2.9	4.8

BASIC COVER--

Management unit 03, Study no: 2

Cover Type	Average Cover %					
	'84	'90	'96	'01	'06	'11
Vegetation	3.25	10.25	50.70	55.77	59.57	68.22
Rock	6.75	4.75	5.68	4.36	4.72	6.12
Pavement	6.50	11.75	3.84	3.82	3.36	5.46
Litter	66.00	57.25	58.45	45.47	41.06	49.81
Cryptogams	0	0	0	0	.03	0
Bare Ground	17.50	16.00	5.36	9.88	11.09	7.47

SOIL ANALYSIS DATA --

Management unit 03, Study no: 2, Study Name: Mantua Reservoir

Effective rooting depth (in)	pH	Clay			%OM	PPM P	PPM K	ds/m
		% sand	% silt	% clay				
15.1	7.4	22.0	36.4	41.6	3.6	29.4	179.2	0.5

PELLET GROUP DATA--

Management unit 03, Study no: 2

Type	Quadrat Frequency				Days use per acre (ha)		
	'96	'01	'06	'11	'01	'06	'11
Sheep	-	-	-	1	-	1 (3)	-
Rabbit	-	2	-	-	-	-	-
Elk	-	1	1	-	-	-	3 (7)
Deer	5	10	7	1	21 (51)	25 (63)	1 (2)
Cattle	2	-	-	-	-	-	-

BROWSE CHARACTERISTICS--

Management unit 03, 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>									
84	0	0	0	-	-	0	0	0	-/-
90	0	0	0	-	-	0	0	0	-/-
96	0	0	0	-	-	0	0	0	37/37
01	0	0	0	-	-	0	0	0	30/35
06	0	0	0	-	-	0	0	0	41/40
11	0	0	0	-	-	0	0	0	26/24
<i>Artemisia tridentata vaseyana</i>									
84	1731	4	81	15	3133	19	81	4	33/36
90	2132	44	41	16	133	3	0	3	35/36
96	1860	17	69	14	20	32	0	4	27/49
01	1840	15	59	26	40	42	8	3	27/44
06	940	9	36	55	240	55	11	38	22/31
11	80	0	100	0	-	0	0	0	26/39
<i>Chrysothamnus viscidiflorus viscidiflorus</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	13/21
11	0	0	0	-	-	0	0	0	-/-
<i>Gutierrezia sarothrae</i>									
84	0	0	0	0	-	0	0	0	-/-
90	0	0	0	0	-	0	0	0	-/-
96	740	43	57	0	-	0	0	0	11/15
01	740	0	92	8	-	0	0	5	11/17
06	140	0	100	0	-	0	0	0	13/19
11	20	0	100	0	-	0	0	0	16/21

		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>Prunus virginiana</i>										
84	0	0	0	-	-	0	0	0	-/-	
90	0	0	0	-	-	0	0	0	-/-	
96	60	100	0	-	-	0	0	0	20/13	
01	120	0	100	-	-	0	0	0	-/-	
06	200	100	0	-	-	60	0	0	30/7	
11	160	25	75	-	-	75	0	0	32/33	
<i>Purshia tridentata</i>										
84	0	0	0	0	-	0	0	0	-/-	
90	0	0	0	0	-	0	0	0	-/-	
96	20	0	100	0	-	0	100	0	75/98	
01	20	0	0	100	-	0	0	0	-/-	
06	20	0	100	0	-	0	100	0	44/66	
11	0	0	0	0	-	0	0	0	21/33	