

LOWER HORSE RIDGE - TREND STUDY NO. 17-55-10

Vegetation Type: Mountain Brush

Range Type: Crucial Deer Winter, Crucial Elk Year-Long (Calving habitat)

NRCS Ecological Site Description: Not Available

Land Ownership: UDWR

Elevation: 7360 ft. (2244 m)

Aspect: North-Northwest

Slope: 19%

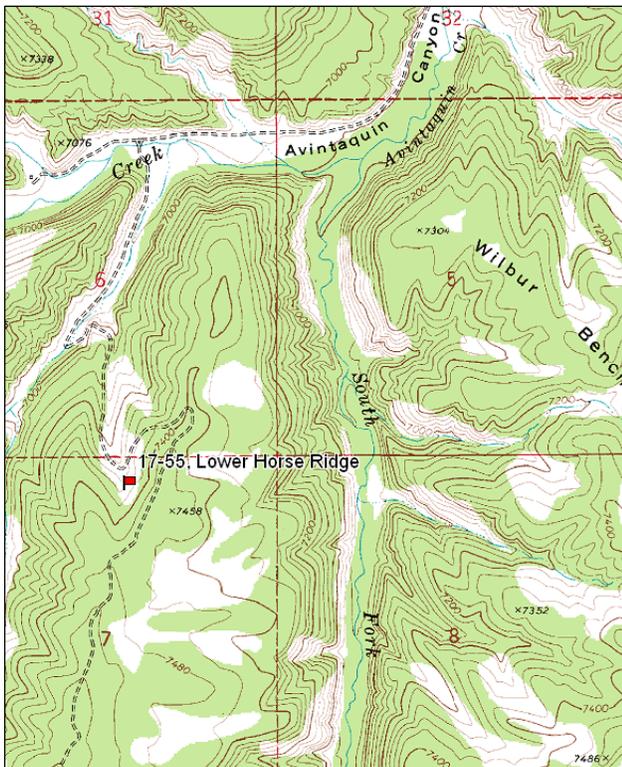
Transect bearing: 348° magnetic

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

Directions:

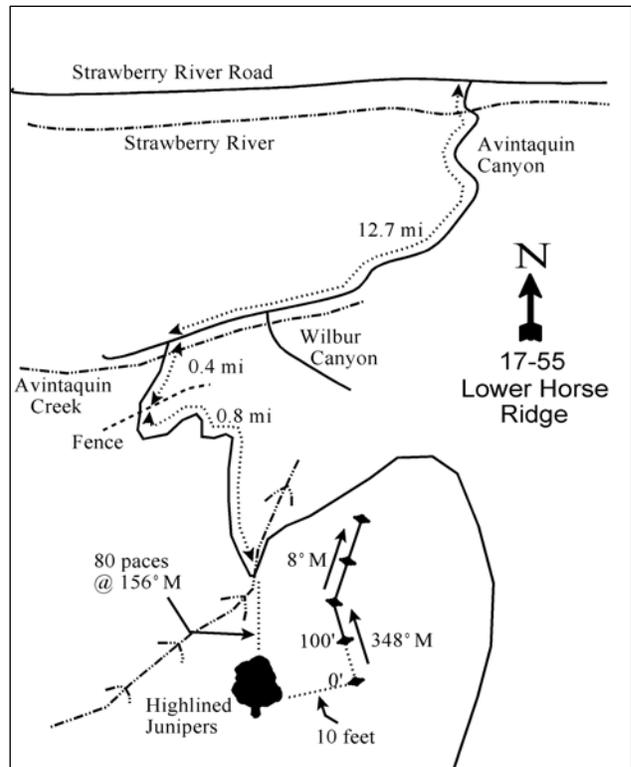
From the Strawberry River Road, proceed south up Avintaquin Canyon 12.7 miles. Turn left here onto a road hidden in the trees and cross Avintaquin Creek. Go up Horse Ridge Canyon 0.4 miles to a fence. Continue up the ridge 0.8 miles to a sharp left bend in the road. From the bend and the gully bottom, walk 80 paces bearing 156°M towards a couple of high-lined juniper trees. The 0-foot baseline stake is 10 feet away from one of the high-lined junipers.

Map Name: Gray Head Peak



Township: 6S Range: 8W Section: 7

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 514889 E 4425527 N

LOWER HORSE RIDGE - TREND STUDY NO. 17-55

Site Information

Site Description: The study is located on a steep side-hill near the north end of Horse Ridge within a mixed mountain brush community. The land is owned and managed by the Utah Division of Wildlife Resources (UDWR) in the Avintaquin Wildlife Management Area (WMA). The area has not been grazed by livestock for several decades. Pellet group transect data indicates light to moderate use by deer and elk since 2000, though use by elk has steadily increased over that time (Table - Pellet Group Data).

Browse: Several browse species occupy the site, but the key species consist of true mountain mahogany (*Cercocarpus montanus*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). True mountain mahogany provides the highest amount of cover of any browse species (Table - Browse Trends). Mahogany has been consistently heavily utilized since 1982, yet the population appears stable with good recruitment of young and low decadence. Mountain big sagebrush provides additional preferred forage and has had light to moderate use. Decadence and poor vigor of mountain big sagebrush has fluctuated over the sample years with high decadence and poor vigor in 1982 and 2005. Decadence and poor vigor have been moderate to low in all other sample years. Recruitment of young mountain big sagebrush plants has been mostly good over the course of the study. Several other browse species also occur including serviceberry (*Amelanchier utahensis*), dwarf rabbitbrush (*Chrysothamnus depressus*), mountain low rabbitbrush (*C. viscidiflorus* ssp. *lanceolatus*), white rubber rabbitbrush (*C. nauseosus* ssp. *hololeucus*), snowberry (*Symphoricarpos oreophilus*), gray horsebrush (*Tetradymia canescens*) and broom snakeweed (*Gutierrezia sarothrae*) (Table - Browse Characteristics). A few Rocky Mountain juniper (*Juniperus scopulorum*), Utah juniper (*J. osteosperma*) and pinyon pine (*Pinus edulis*) are also scattered throughout the area, but Utah juniper and Rocky Mountain juniper were not differentiated in density measurements (Table - Point-Quarter Tree Data).

Herbaceous Understory: Grasses are not overly diverse, but are fairly abundant. Bluebunch wheatgrass (*Agropyron spicatum*) dominates the grass component with other common grasses including sedge (*Carex* sp.), Salina wildrye (*Elymus salina*) and Indian ricegrass (*Oryzopsis hymenoides*). Forbs are diverse, but are only moderately abundant. The most common species is bastard toadflax (*Comandra pallida*) with other common species including Indian paintbrush (*Castilleja chromosa*), stemless goldenweed (*Haplopappus acaulis*) and wing eriogonum (*Eriogonum alatum*) (Table - Herbaceous Trends).

Soil: The soil texture is a loam with a considerable amount of surface limestone and neutral soil reactivity (pH 7.3). Organic matter is fairly high at 4.9%, but phosphorus may have limited availability for plant growth and development at 2.8 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is moderately low with a high amount of rock and pavement cover (Table - Basic Cover). Rock and pavement are concentrated on the surface between bunch grass and shrub interspaces. The soil erosion condition was classified as stable in 2005, but was slight in 2010 due to a large amount of soil and litter movement, flow patterns and a moderately active gully at the base of the hill.

Trend Assessments

Browse:

- **1982 to 1988 - up (+2):** There was a large increase in the density of true mountain mahogany and mountain big sagebrush. Poor vigor of true mountain mahogany decreased from 30% to 12%, and recruitment of young mahogany plants increased markedly. Decadence of mountain big sagebrush decreased from 50% to 14% and poor vigor decreased from 50% to 3%.
- **1988 to 1995 - stable (0):** Differences in density may be related to the larger sample area used in 1995; therefore, trend was determined using other parameters. Decadence and poor vigor remained low for the two key species. Recruitment of young plants decreased for both true mountain mahogany and mountain big sagebrush, but remained very good for both species.

- **1995 to 2000 - slightly up (+1):** The density of true mountain mahogany increased 21% from 1,360 plants/acre to 1,640 plants/acre and cover increased from 6% to 8%. Decadence and poor vigor of mahogany remained low, and recruitment of young plants remained good. Mountain big sagebrush density and cover also increased slightly, but decadence increased from 8% to 25% and poor vigor increased from 2% to 16%.
- **2000 to 2005 - stable (0):** True mountain mahogany density remained similar, but cover increased slightly to 10%. Decadence of mahogany also increased slightly to 13%. Mountain big sagebrush density decreased by 13% from 1,120 plants/acre to 980 plants/acre, though cover remained similar. Much of the decrease in density was due to a decrease in the recruitment of young plants. Decadence of mountain big sagebrush increased to 45% and poor vigor increased to 31%.
- **2005 to 2010 - stable (0):** There was little change in the density or cover of the two key browse species. Decadence and poor vigor of mountain big sagebrush both decreased to 13%, and recruitment of young sagebrush plants increased to 10%.

Grass:

- **1982 to 1988 - no trend (NT):** Only quadrat frequency data for grasses are available from 1982, so no trend was given.
- **1988 to 1995 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though there was a significant increase in the nested frequency of bluebunch wheatgrass and Salina wildrye and a significant decrease in the nested frequency of Sandberg's bluegrass (*Poa secunda*).
- **1995 to 2000 - down (-2):** The sum of nested frequency of perennial grasses decreased by 28%, but cover increased slightly from 14% to 16%.
- **2000 to 2005 - stable (0):** The perennial grass sum of nested frequency remained similar, though cover decreased to 11%.
- **2005 to 2010 - stable (0):** There was little change in the perennial grass sum of nested frequency, but cover increased to 17%.

Forb:

- **1982 to 1988 - no trend (NT):** Only quadrat frequency data for forbs are available from 1982, so no trend was given.
- **1988 to 1995 - down (-2):** The sum of nested frequency of perennial forbs decreased by 26%.
- **1995 to 2000 - down (-2):** The perennial forb sum of nested frequency decreased by 35% and cover decreased from 5% to 3%.
- **2000 to 2005 - up (+2):** There was a 24% increase in the sum of nested frequency and cover increased to 5%.
- **2005 to 2010 - down (-2):** The sum of nested frequency of perennial forbs decreased by 26% and cover decreased to 4%.

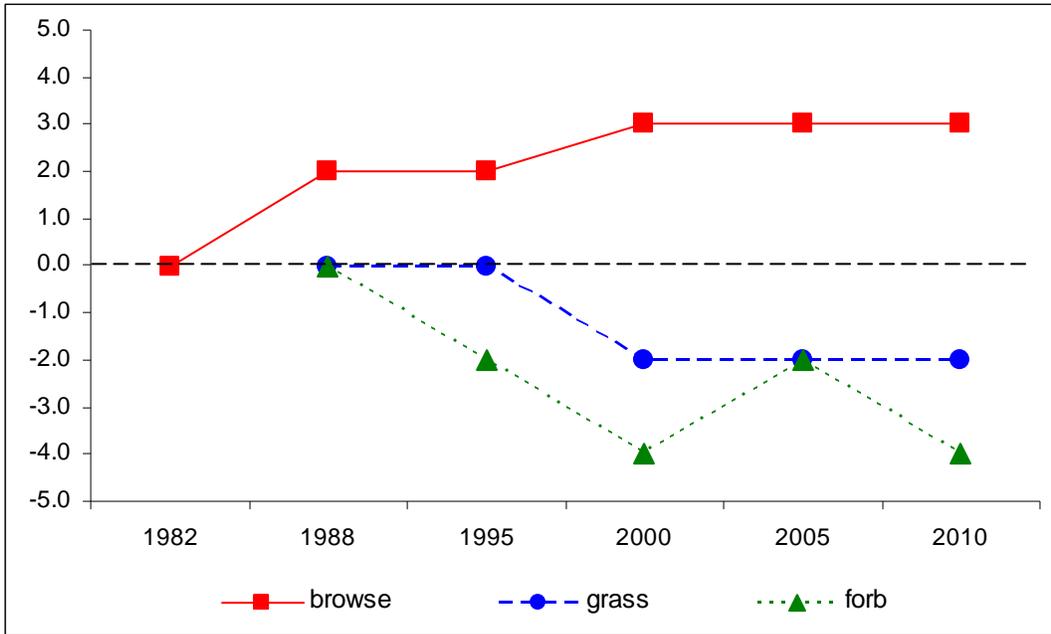
DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --

Management unit 17, study no: 55

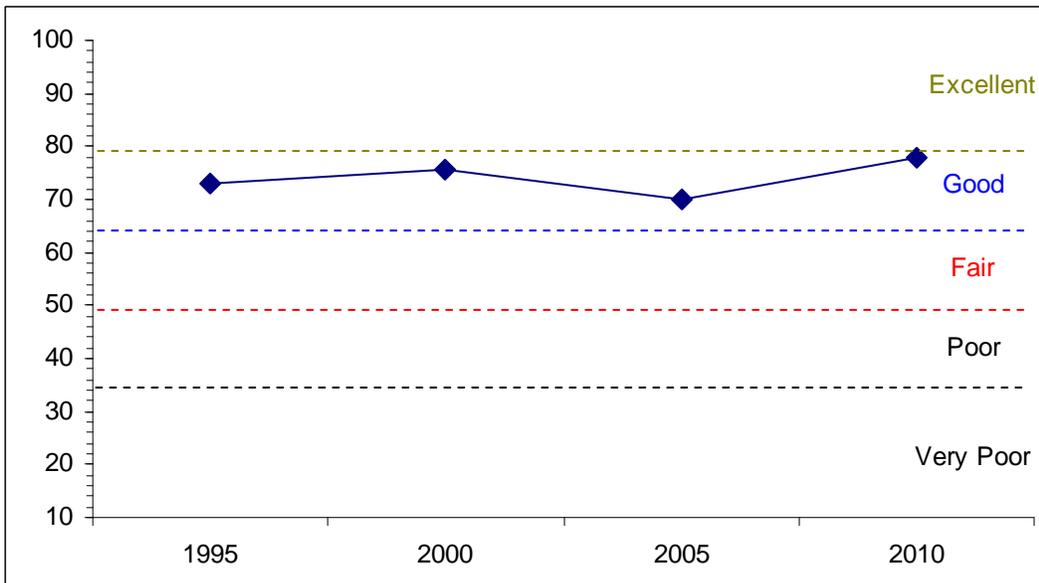
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
95	10.1	14.6	10.1	28.8	0.0	9.4	0.0	73.0	Good
00	17.1	13.3	8.9	30.0	0.0	6.3	0.0	75.5	Good
05	18.2	9.5	9.7	22.7	0.0	10.0	0.0	70.1	Good
10	20.1	13.2	7.3	30.0	0.0	7.1	0.0	77.8	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 17, Study no: 55



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--
Management unit 17, Study no: 55



HERBACEOUS TRENDS--
Management unit 17, Study no: 55

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron spicatum	c219	c230	bc190	a173	bc202	7.10	11.46	6.67	13.76
G	Carex sp.	62	37	40	53	38	1.20	1.43	1.45	1.29
G	Elymus salina	a46	c140	b83	ab63	ab54	5.44	2.54	2.05	1.71
G	Oryzopsis hymenoides	b81	b49	a18	b48	a15	.58	.29	1.15	.11
G	Poa fendleriana	-	3	3	-	7	.03	.15	-	.21
G	Poa secunda	b68	a2	a-	a-	a2	.03	-	-	.00
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		476	461	334	337	318	14.40	15.88	11.35	17.09
Total for Grasses		476	461	334	337	318	14.40	15.88	11.35	17.09
F	Achillea millefolium	3	-	-	-	-	-	-	-	-
F	Androsace septentrionalis (a)	-	a2	a-	b15	a-	.00	-	.22	-
F	Arabis sp.	-	6	2	5	-	.06	.00	.01	-
F	Aster chilensis	b86	a26	a13	a13	a15	.31	.05	.07	.09
F	Astragalus convallarius	a2	b15	a-	a2	a-	.17	.00	.01	-
F	Astragalus purshii	1	3	-	2	3	.01	-	.00	.00
F	Astragalus tenellus	4	-	-	-	-	-	-	-	-
F	Castilleja chromosa	c33	bc33	c44	ab10	a4	.51	.44	.08	.06
F	Chenopodium leptophyllum(a)	-	b5	a-	ab1	ab1	.02	-	.00	.00
F	Comandra pallida	b196	a137	a126	a132	a112	1.49	1.00	2.45	1.88
F	Crepis acuminata	4	-	1	9	2	-	.00	.04	.06
F	Cryptantha sp.	a9	ab26	a4	b32	ab21	.08	.06	.17	.16
F	Cynoglossum officinale	-	-	-	2	-	-	-	.00	-
F	Delphinium nuttallianum	1	-	-	-	-	-	-	-	-
F	Descurainia pinnata (a)	-	b10	a-	ab1	a-	.08	-	.00	-
F	Erigeron sp.	a-	ab1	ab4	a-	b13	.00	.01	-	.02
F	Eriogonum alatum	ab6	a1	ab13	b20	b17	.03	.10	.58	.33
F	Eriogonum umbellatum	-	-	-	-	2	-	-	-	.01
F	Haplopappus acaulis	c51	ab16	b31	bc39	a2	.32	.92	.70	.03
F	Hymenoxys richardsonii	a-	a-	a-	a-	b14	-	-	-	.24
F	Ipomopsis aggregata	4	-	-	1	-	-	-	.00	-
F	Lesquerella sp.	-	-	-	3	-	-	-	.15	-
F	Linum lewisii	a4	b24	a4	ab14	ab20	.12	.01	.15	.20
F	Lithospermum sp.	c26	b18	ab7	a-	a-	.26	.21	-	-
F	Machaeranthera canescens	b37	a6	a-	a1	a-	.07	-	.00	-
F	Machaeranthera grindelioides	a14	b50	a17	a19	a15	.71	.14	.34	.15
F	Pedicularis centranthera	-	-	-	-	-	-	-	.03	-
F	Penstemon caespitosus	b15	ab4	ab4	ab7	a-	.02	.01	.02	-
F	Penstemon humilis	b25	b18	a2	ab9	a-	.07	.03	.04	-
F	Phlox austromontana	c62	bc43	a7	ab22	a13	.35	.09	.23	.11
F	Phlox longifolia	-	5	4	5	-	.01	.01	.01	-
F	Potentilla gracilis	-	2	1	6	6	.00	.00	.04	.19
F	Schoenocrambe linifolia	-	-	-	1	-	-	-	.00	-
F	Senecio multilobatus	b18	ab7	a4	a3	a1	.04	.01	.03	.00

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
F	<i>Taraxacum officinale</i>	-	5	-	-	3	.03	-	-	.00
F	<i>Viguiera multiflora</i>	3	-	-	-	-	-	-	-	-
Total for Annual Forbs		0	17	0	17	1	0.10	0	0.23	0.00
Total for Perennial Forbs		604	446	288	357	263	4.71	3.14	5.22	3.57
Total for Forbs		604	463	288	374	264	4.82	3.14	5.46	3.57

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

BROWSE TRENDS--

Management unit 17, Study no: 55

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	<i>Amelanchier utahensis</i>	0	8	8	5	-	.48	.39	.63
B	<i>Artemisia frigida</i>	1	0	0	0	-	-	-	-
B	<i>Artemisia tridentata vaseyana</i>	34	34	31	32	1.06	2.26	2.27	2.16
B	<i>Cercocarpus montanus</i>	47	53	46	55	5.57	8.43	9.76	10.45
B	<i>Chrysothamnus depressus</i>	21	11	13	10	.36	.54	.10	.13
B	<i>Chrysothamnus nauseosus hololeucus</i>	1	3	3	0	-	-	.00	-
B	<i>Chrysothamnus viscidiflorus lanceolatus</i>	39	38	44	37	.84	1.58	.78	1.07
B	<i>Eriogonum corymbosum</i>	38	18	26	28	1.76	.53	.81	1.47
B	<i>Gutierrezia sarothrae</i>	56	18	63	30	1.14	.11	.84	.28
B	<i>Juniperus osteosperma</i>	0	3	4	3	.30	.30	.66	.78
B	<i>Juniperus scopulorum</i>	0	2	3	3	-	1.85	1.66	2.67
B	<i>Pinus edulis</i>	0	4	2	6	2.09	2.30	2.43	3.20
B	<i>Rosa woodsii</i>	0	4	2	2	-	.15	.03	.53
B	<i>Symphoricarpos oreophilus</i>	3	8	8	8	.03	.44	.56	.18
B	<i>Tetradymia canescens</i>	10	10	11	13	.09	.24	.18	.03
Total for Browse		250	214	264	232	13.26	19.25	20.49	23.62

CANOPY COVER, LINE INTERCEPT--

Management unit 17, Study no: 55

Species	Percent Cover		
	'00	'05	'10
Amelanchier utahensis	-	.53	.26
Artemisia tridentata vaseyana	-	1.86	2.84
Cercocarpus montanus	-	12.13	15.28
Chrysothamnus depressus	-	.08	-
Chrysothamnus viscidiflorus lanceolatus	-	1.23	.63
Eriogonum corymbosum	-	1.13	1.20
Gutierrezia sarothrae	-	.31	.13
Juniperus osteosperma	1.60	.75	.83
Juniperus scopulorum	-	2.13	1.81
Pinus edulis	2.00	3.16	3.86
Ribes sp.	-	-	.28
Symphoricarpos oreophilus	-	.90	1.50
Tetradymia canescens	-	.43	.36

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 17, Study no: 55

Species	Average leader growth (in)	
	'05	'10
Cercocarpus montanus	1.9	2.1

POINT-QUARTER TREE DATA--

Management unit 17, Study no: 55

Species	Trees per Acre				Average diameter (in)			
	'95	'00	'05	'10	'95	'00	'05	'10
Juniperus osteosperma	8	62	90	61	3.7	5.0	6.0	3.0
Pinus edulis	10	20	41	40	1.9	4.7	4.6	3.1

BASIC COVER--

Management unit 17, Study no: 55

Cover Type	Average Cover %					
	'82	'88	'95	'00	'05	'10
Vegetation	7.00	6.00	34.53	37.02	33.81	43.77
Rock	3.75	7.75	11.69	6.51	6.90	5.80
Pavement	19.50	21.25	4.91	18.27	16.18	16.28
Litter	41.50	43.50	32.45	36.79	29.86	40.77
Cryptogams	0	0	.39	.01	.15	.06
Bare Ground	28.25	21.50	18.20	16.13	25.62	20.32

SOIL ANALYSIS DATA --

Management unit 17, Study no: 55, Study Name: Lower Horse Ridge

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
16.3	7.3	27.3	46.2	26.6	4.9	2.8	336.0	1.8

PELLET GROUP DATA--

Management unit 17, Study no: 55

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	6	5	33	4
Elk	2	1	6	8
Deer	26	11	31	10
Cattle	-	-	1	-

Days use per acre (ha)		
'00	'05	'10
-	-	-
3 (7)	11 (26)	25 (61)
23 (58)	34 (83)	14 (35)
-	-	-

BROWSE CHARACTERISTICS--

Management unit 17, Study no: 55

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Amelanchier utahensis									
82	0	0	0	-	-	0	0	0	-/-
88	0	0	0	-	-	0	0	0	-/-
95	0	0	0	-	-	0	0	0	-/-
00	480	42	58	-	-	50	42	0	18/26
05	420	57	43	-	-	19	14	0	20/26
10	220	18	82	-	-	0	0	0	23/25
Artemisia frigida									
82	0	0	0	-	-	0	0	0	-/-
88	0	0	0	-	-	0	0	0	-/-
95	40	100	0	-	-	0	0	0	-/-
00	0	0	0	-	-	0	0	0	-/-
05	0	0	0	-	-	0	0	0	-/-
10	0	0	0	-	-	0	0	0	-/-
Artemisia tridentata vaseyana									
82	531	12	37	50	799	38	63	50	22/25
88	1931	72	14	14	-	14	0	3	14/17
95	1040	46	46	8	20	13	6	2	11/16
00	1120	20	55	25	20	21	5	16	16/22
05	980	8	47	45	20	49	14	31	17/21
10	1040	10	77	13	40	27	0	13	17/22
Cercocarpus montanus									
82	666	0	100	0	-	0	100	30	20/17
88	1132	41	59	0	199	53	47	12	30/23
95	1360	16	84	0	120	28	65	0	30/33
00	1640	17	82	1	20	27	35	0	43/37
05	1600	21	66	13	2400	10	84	5	42/40
10	1640	16	79	5	540	44	24	5	43/38

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Chrysothamnus depressus										
82	0	0	0	0	-	0	0	0	-/-	
88	465	29	57	14	-	29	0	14	4/6	
95	900	9	87	4	20	0	0	4	6/8	
00	440	0	95	5	-	5	5	0	4/7	
05	660	0	88	12	-	24	30	9	3/8	
10	340	12	82	6	20	18	0	0	5/7	
Chrysothamnus nauseosus hololeucus										
82	0	0	0	-	-	0	0	0	-/-	
88	0	0	0	-	-	0	0	0	-/-	
95	40	100	0	-	-	0	0	0	24/21	
00	60	33	67	-	-	0	0	0	7/10	
05	140	57	43	-	-	57	0	0	6/11	
10	0	0	0	-	-	0	0	0	-/-	
Chrysothamnus viscidiflorus lanceolatus										
82	2865	9	72	19	-	14	2	16	10/11	
88	5931	7	84	9	-	13	1	7	9/9	
95	2520	4	96	0	-	0	0	0	11/13	
00	2160	6	84	9	20	0	0	0	10/11	
05	2300	10	84	6	-	3	0	3	10/11	
10	1660	4	94	2	-	4	0	4	11/12	
Eriogonum corymbosum										
82	399	0	67	33	-	0	0	33	16/11	
88	932	36	36	29	66	7	0	14	11/11	
95	1140	26	72	2	-	12	0	0	12/16	
00	460	4	74	22	-	22	22	4	14/18	
05	740	5	76	19	160	5	3	11	11/15	
10	820	20	78	2	-	2	0	2	15/19	
Gutierrezia sarothrae										
82	2599	5	95	0	-	0	0	0	8/10	
88	6132	11	84	5	-	0	0	0	6/4	
95	3600	10	90	0	20	0	0	0	9/9	
00	940	23	77	0	-	0	0	0	4/4	
05	3960	12	86	2	60	2	0	0	6/6	
10	980	12	84	4	40	0	0	4	5/5	
Juniperus osteosperma										
82	66	100	0	-	-	0	0	0	-/-	
88	66	100	0	-	66	100	0	0	-/-	
95	0	0	0	-	-	0	0	0	-/-	
00	60	100	0	-	-	0	0	0	-/-	
05	80	25	75	-	-	0	0	0	-/-	
10	60	67	33	-	20	0	33	33	-/-	

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Juniperus scopulorum									
82	66	0	100	-	-	0	0	0	67/45
88	66	0	100	-	-	100	0	0	122/35
95	0	0	0	-	-	0	0	0	-/-
00	40	0	100	-	-	0	0	0	-/-
05	80	25	75	-	-	0	0	0	-/-
10	60	33	67	-	-	0	0	0	-/-
Pinus edulis									
82	66	0	100	-	-	0	0	0	63/44
88	66	0	100	-	-	0	0	0	79/55
95	0	0	0	-	-	0	0	0	-/-
00	80	50	50	-	-	0	0	0	-/-
05	60	0	100	-	-	0	0	0	-/-
10	120	67	33	-	-	0	0	0	-/-
Ribes sp.									
82	0	0	0	-	-	0	0	0	-/-
88	0	0	0	-	-	0	0	0	-/-
95	0	0	0	-	-	0	0	0	-/-
00	0	0	0	-	-	0	0	0	-/-
05	0	0	0	-	20	0	0	0	24/24
10	0	0	0	-	-	0	0	0	37/58
Rosa woodsii									
82	0	0	0	0	-	0	0	0	-/-
88	0	0	0	0	-	0	0	0	-/-
95	0	0	0	0	-	0	0	0	-/-
00	180	11	89	0	-	0	0	0	19/29
05	100	0	60	40	-	0	0	20	19/13
10	40	0	100	0	-	0	0	0	34/14
Symphoricarpos oreophilus									
82	199	67	33	0	-	0	33	0	7/9
88	399	67	33	0	-	67	0	0	11/10
95	60	0	100	0	-	0	0	0	12/17
00	320	0	100	0	-	0	0	6	16/16
05	400	40	55	5	-	0	0	5	14/37
10	380	21	79	0	40	16	0	0	14/24
Tetradymia canescens									
82	66	0	0	100	-	0	100	0	-/-
88	332	80	20	0	-	20	0	0	6/10
95	200	20	80	0	-	10	0	0	9/11
00	300	27	47	27	-	0	13	7	10/9
05	280	14	57	29	-	7	21	14	9/11
10	340	12	88	0	-	0	0	12	9/12