

TWIN HOLLOW - TREND STUDY NO. 11B-15-10

Vegetation Type: Mountain Brush

Range Type: Crucial Deer Winter, Crucial Elk Winter

NRCS Ecological Site Description: Mountain Shallow Loam (Black Sagebrush), R047XA438UT

Land Ownership: SITLA

Elevation: 8000 ft. (2439 m)

Aspect: Southeast

Slope: 20%-25%

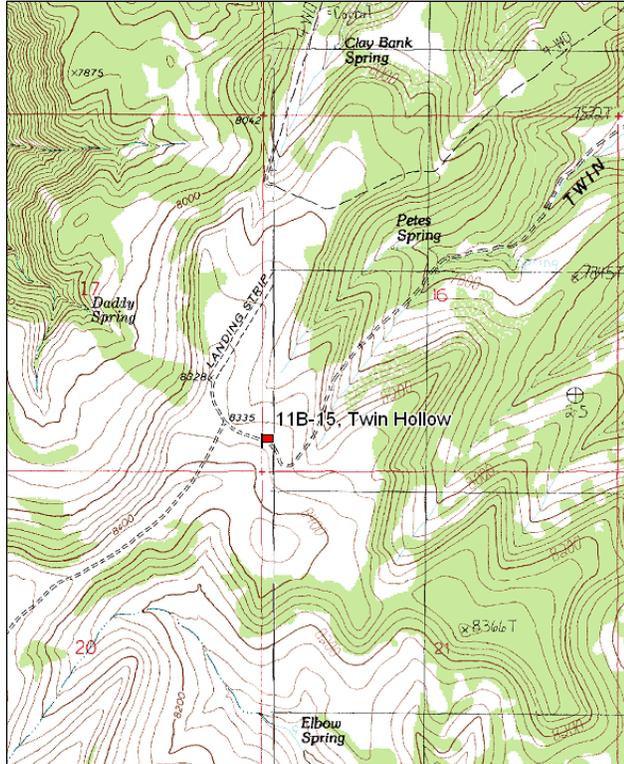
Transect bearing: 0'-300': 197° magnetic, 300'-500': 174° magnetic

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

Directions:

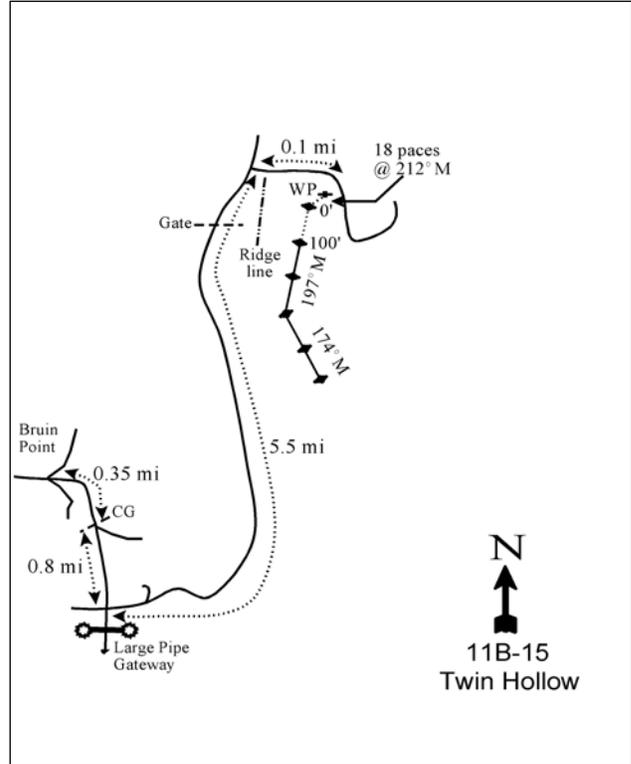
From Sunnyside, go up Water Canyon to the summit (Bruin Point). At the summit take the middle fork and go 0.35 miles. Stay right at the fork just beyond a cattle guard and go 0.9 miles. Turn left at the intersection just before the large pipe gateway and proceed 0.5 miles to a fork. Stay right and go 4.2 miles to a gate. Go 0.8 miles to a fork and remain right. Continue on the main road another 0.1 mile to a witness post on the right side of the road. The 0 foot stake is 18 paces away at a bearing of 212°M.

Map Name: Flat Canyon



Township: 13S Range: 15E Section: 15

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 564219 E 4393387 N

TWIN HOLLOW - TREND STUDY NO. 11B-15

Site Information

Site Description: The study samples a mountain brush community at the head of Twin Hollow and was established to monitor crucial winter range for elk and a transitional range for deer in most winters. The study is within a section of Utah State Institutional Trust Land (SITLA), but grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Green River allotment. Pellet group transect data estimated moderate use by elk in 2000 and 2005, but lighter use in 2010. Estimated deer use was light in 2000 and 2005, but was more moderate in 2010. The area is also utilized by wild horses and estimated horse use has been light since 2000. Estimated cattle use has been minimal on the site (Table - Pellet Group Data). Sage grouse were observed on the site in 2005.

Browse: The browse composition is good with a variety of highly preferred species on the site. Utah serviceberry (*Amelanchier utahensis*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and true mountain mahogany (*Cercocarpus montanus*) provide the majority of the browse cover on the site (Table - Browse Trends). All three species have shown mostly light to moderate use, stable densities, low decadence, and generally good vigor. Poor vigor was high in serviceberry in 2000 and was likely the result of very dry conditions which caused leaves to yellow and drop off prematurely (Table - Browse Characteristics). Antelope bitterbrush (*Purshia tridentata*) and black sagebrush are also present, but at much lower cover (Table - Browse Trends). Other common understory shrubs include dwarf rabbitbrush (*Chrysothamnus depressus*), stickyleaf low rabbitbrush (*C. viscidiflorus* ssp. *viscidiflorus*), snowberry (*Symphoricarpos oreophilus*) and broom snakeweed (*Gutierrezia sarothrae*).

Herbaceous Understory: Grasses are diverse and fairly abundant on the site. Bluebunch wheatgrass (*Agropyron spicatum*) is the dominant grass on the site. Salina wildrye (*Elymus salina*) was the co-dominant grasses species at the outset of the study in 1994, but decreased substantially in 2005. There was also a large increase of needle-and-thread (*Stipa comata*) in 2005. Forbs are diverse and provide nearly as much cover as grasses. Common forbs include bastard toad flax (*Comandra pallida*), sulfur eriogonum (*Eriogonum umbellatum*), several penstemon species (*Penstemon* spp.) and desert phlox (*Phlox austromontana*) (Table - Herbaceous Trends).

Soil: The soil texture is a loam with sandstone parent material and a neutral soil reaction (pH 7.0). Phosphorus may have limited availability for plant growth and development at 3.5 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is low with plentiful vegetation and litter cover. There is little rock cover on the surface except for some gravel and large flat rocks predominately at the end of the baseline (Table - Basic Cover). The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1994 to 2000 - stable (0):** Density of serviceberry and true mountain mahogany remained similar, but density of mountain big sagebrush decreased by 13% from 7,300 plants/acre to 6,380 plants/acre. However, cover of serviceberry and mountain big sagebrush both increased substantially.
- **2000 to 2005 - stable (0):** Serviceberry density decreased slightly, true mountain mahogany density increased slightly, and mountain big sagebrush density decreased substantially to 4,760 plants/acre. However, cover of all three species increased, and decadence and vigor remained good.
- **2005 to 2010 - stable (0):** Density of mountain big sagebrush and true mountain mahogany remained similar. Density of serviceberry increased, but cover decreased slightly. Mountain big sagebrush cover also decreased slightly.

Grass:

- **1994 to 2000 - slightly down (-1):** There was a 20% decrease in the sum of nested frequency of perennial grasses, though cover increased from 9% to 13%.
- **2000 to 2005 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 11% and cover increased to 15%. There was a slight change in composition with a significant decrease in the nested frequency of Salina wildrye and a significant increase in the nested frequency of needle-and-thread.
- **2005 to 2010 - slightly down (-1):** The perennial grass sum of nested frequency only decreased by 8%, but cover decreased from 15% to 11%.

Forb:

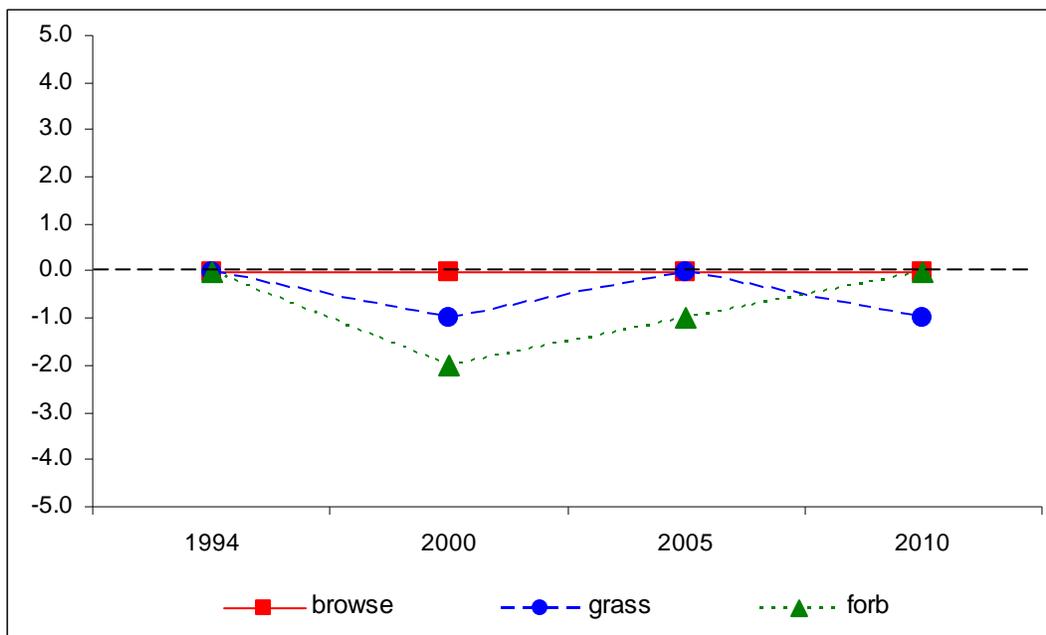
- **1994 to 2000 - down (-2):** The sum of nested frequency of perennial forbs decreased by 42% and cover decreased from 11% to 8%.
- **2000 to 2005 - slightly up (+1):** The perennial forb sum of nested frequency increased by 18% and cover increased to 10%.
- **2005 to 2010 - slightly up (+1):** The sum of nested frequency of perennial forbs increased by 17%, though cover remained similar.

DEER DESIRABLE COMPONENTS INDEX - HIGH POTENTIAL SCALE --
Management unit 11B, study no: 15

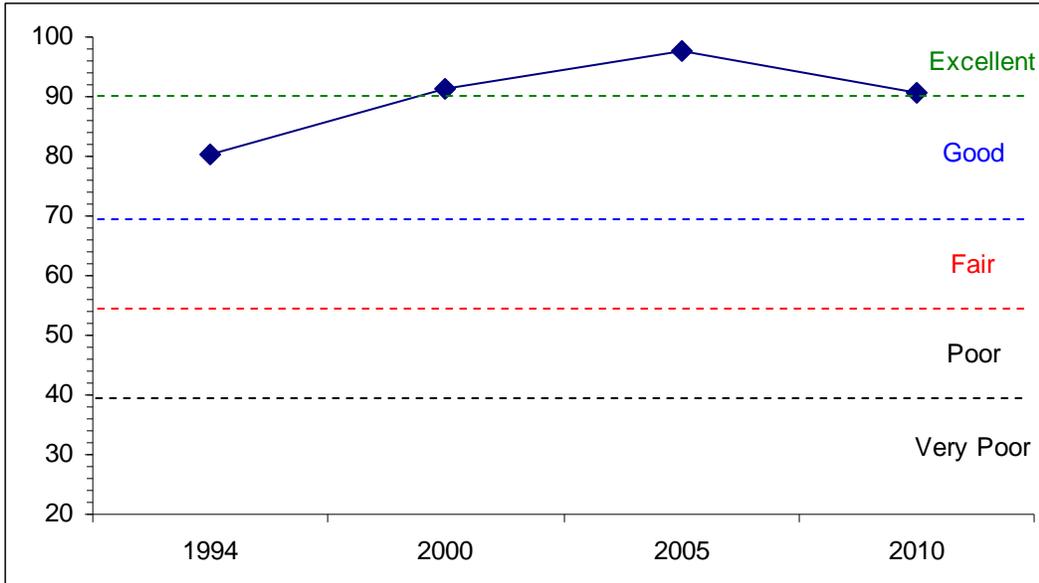
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	27.4	13.6	10.8	18.6	0.0	10.0	0.0	80.4	Good
00	30.0	13.4	11.7	26.1	0.0	10.0	0.0	91.2	Good-Excellent
05	30.0	13.3	14.7	29.8	0.0	10.0	0.0	97.7	Excellent
10	30.0	13.7	15.0	22.0	0.0	10.0	0.0	90.7	Good-Excellent

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 11B, Study no: 15



DEER DESIRABLE COMPONENTS INDEX TREND, HIGH POTENTIAL--
 Management unit 11B, Study no: 15



HERBACEOUS TRENDS--
 Management unit 11B, Study no: 15

Type	Species	Nested Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
G	<i>Agropyron spicatum</i>	a159	ab178	b232	ab218	1.77	6.01	9.63	6.83
G	<i>Bromus carinatus</i>	a-	a-	ab5	b10	-	-	.04	.06
G	<i>Carex sp.</i>	9	5	15	19	.02	.15	.40	.45
G	<i>Elymus salina</i>	b142	b128	a5	a2	4.34	4.93	.03	.00
G	<i>Koeleria cristata</i>	b24	a2	ab20	ab13	.19	.06	.39	.33
G	<i>Oryzopsis hymenoides</i>	ab7	a-	b15	b17	.07	-	.41	.25
G	<i>Poa fendleriana</i>	62	58	48	49	1.33	.77	.80	.83
G	<i>Sitanion hystrix</i>	bc26	a3	c39	ab15	.26	.04	.62	.22
G	<i>Stipa columbiana</i>	b23	b15	a-	ab4	.57	.40	.03	.06
G	<i>Stipa comata</i>	a-	a-	b61	b53	-	-	2.15	1.89
G	<i>Stipa lettermani</i>	b257	a16	a10	a15	.74	.65	.36	.05
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		509	405	450	415	9.32	13.03	14.88	11.02
Total for Grasses		509	405	450	415	9.32	13.03	14.88	11.02
F	<i>Androsace septentrionalis (a)</i>	4	5	14	11	.01	.00	.02	.09
F	<i>Arabis sp.</i>	3	1	6	-	.00	.00	.01	-
F	<i>Arenaria fendleri</i>	9	5	2	3	.06	.04	.06	.01
F	<i>Aster sp.</i>	b24	a8	a2	a7	.18	.04	.00	.06
F	<i>Astragalus convallarius</i>	b18	a1	a2	a1	.07	.00	.03	.00
F	<i>Astragalus miser</i>	1	-	3	10	.00	-	.00	.12
F	<i>Astragalus sp.</i>	b11	a2	ab4	ab2	.03	.03	.01	.01
F	<i>Balsamorhiza sagittata</i>	-	-	5	11	-	.03	.07	.39
F	<i>Calochortus nuttallii</i>	-	-	-	4	-	-	-	.03
F	<i>Castilleja flava</i>	b36	a11	ab22	ab23	.15	.05	.34	.15

Type	Species	Nested Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
F	Castilleja linariaefolia	a-	a-	a-	b29	-	-	-	.15
F	Chaenactis douglasii	b15	a-	a-	ab5	.04	-	-	.01
F	Chenopodium fremontii (a)	9	-	-	3	.04	-	-	.03
F	Chenopodium leptophyllum(a)	ab5	a-	b18	a1	.01	-	.03	.00
F	Collinsia parviflora (a)	c65	b10	a-	a-	.38	.08	-	-
F	Comandra pallida	a150	b201	a118	b196	2.10	3.40	2.03	2.41
F	Crepis acuminata	a-	a3	c76	b36	-	.03	.91	.26
F	Cryptantha sp.	-	1	-	1	-	.00	-	.00
F	Erigeron eatonii	b110	a23	a22	a10	.44	.13	.30	.03
F	Erigeron flagellaris	16	14	4	9	.18	.08	.03	.02
F	Eriogonum alatum	a-	a-	ab11	b8	-	-	.07	.21
F	Eriogonum racemosum	b54	a9	a2	a5	1.12	.07	.06	.03
F	Eriogonum umbellatum	150	115	154	128	2.83	1.30	2.17	2.09
F	Hymenoxys acaulis	a-	a1	ab6	b18	-	.03	.01	.06
F	Hymenoxys richardsonii	5	-	-	1	.06	-	-	.03
F	Ipomopsis aggregata	ab15	ab2	b13	a1	.07	.01	.03	.00
F	Linum lewisii	b30	a-	ab10	a3	.06	-	.02	.03
F	Lithospermum sp.	ab16	a8	b40	b42	.32	.18	1.21	.60
F	Machaeranthera canescens	b12	a-	a2	ab10	.08	-	.03	.05
F	Machaeranthera grindelioides	b30	a2	a6	a-	.18	.03	.03	-
F	Microsteris gracilis (a)	-	-	-	-	-	-	-	-
F	Oenothera sp.	c33	a-	b17	a-	.36	-	.66	-
F	Penstemon caespitosus	b90	a38	a34	a48	.91	.15	.39	1.19
F	Penstemon palmeri	3	-	4	-	.01	-	.03	-
F	Penstemon watsonii	a29	a22	ab33	b51	.25	.70	1.11	.55
F	Petradoria pumila	a-	a-	a2	b16	-	-	.03	.24
F	Phlox austromontana	b50	b58	a19	ab36	1.11	1.65	.13	.68
F	Phlox longifolia	58	27	35	48	.11	.21	.21	.57
F	Polygonum douglasii (a)	b41	a-	c99	b54	.07	-	.34	.14
F	Taraxacum officinale	4	8	4	9	.03	.04	.06	.19
F	Tragopogon dubius	-	-	-	1	-	-	-	.00
Total for Annual Forbs		124	15	131	69	0.51	0.08	0.40	0.26
Total for Perennial Forbs		972	560	658	772	10.82	8.26	10.14	10.28
Total for Forbs		1096	575	789	841	11.33	8.35	10.54	10.55

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

BROWSE TRENDS--

Management unit 11B, Study no: 15

Type	Species	Strip Frequency				Average Cover %			
		'94	'00	'05	'10	'94	'00	'05	'10
B	Amelanchier utahensis	25	35	38	38	4.98	7.68	9.42	7.75
B	Artemisia frigida	1	0	0	0	-	-	-	-
B	Artemisia nova	23	24	15	20	1.37	.73	.42	.87
B	Artemisia tridentata vaseyana	71	68	64	67	6.51	10.85	13.11	9.36
B	Cercocarpus montanus	41	41	42	48	6.06	6.55	7.96	7.33
B	Chrysothamnus depressus	16	20	21	14	.80	.19	.91	.44
B	Chrysothamnus viscidiflorus viscidiflorus	84	47	50	57	1.26	.67	1.43	1.51
B	Gutierrezia sarothrae	27	14	19	13	.48	.12	.21	.16
B	Opuntia sp.	2	1	2	0	-	-	-	.03
B	Purshia tridentata	2	2	5	6	-	.38	.78	.63
B	Symphoricarpos oreophilus	52	45	39	38	2.41	2.78	3.74	4.39
B	Tetradymia canescens	2	0	0	3	.03	-	-	-
Total for Browse		346	297	295	304	23.93	30.00	38.00	32.49

CANOPY COVER, LINE INTERCEPT--

Management unit 11B, Study no: 15

Species	Percent Cover	
	'05	'10
Amelanchier utahensis	13.58	16.01
Artemisia nova	.76	1.29
Artemisia tridentata vaseyana	15.18	12.93
Cercocarpus montanus	9.96	11.85
Chrysothamnus depressus	.46	.50
Chrysothamnus viscidiflorus viscidiflorus	1.33	2.51
Gutierrezia sarothrae	.30	.25
Purshia tridentata	.41	1.39
Symphoricarpos oreophilus	5.15	5.91
Tetradymia canescens	-	.06

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 11B, Study no: 15

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata vaseyana	2.5	1.5
Cercocarpus montanus	4.3	3.2

BASIC COVER--

Management unit 11B, Study no: 15

Cover Type	Average Cover %			
	'94	'00	'05	'10
Vegetation	42.89	48.85	54.02	54.09
Rock	2.13	1.44	2.12	.85
Pavement	.41	2.82	2.56	2.86
Litter	44.90	62.65	43.07	47.44
Cryptogams	.00	0	0	.03
Bare Ground	21.18	17.28	15.23	14.25

SOIL ANALYSIS DATA --

Management unit 11B, Study no: 15, Study Name: Twin Hollow

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
17.1	7.0	44.0	31.4	24.6	4.6	3.5	291.2	0.7

PELLET GROUP DATA--

Management unit 11B, Study no: 15

Type	Quadrat Frequency				Days use per acre (ha)		
	'94	'00	'05	'10	'00	'05	'10
Rabbit	5	1	5	-	-	-	-
Moose	-	-	1	-	-	-	-
Horse	4	4	5	-	9 (23)	8 (20)	2 (6)
Elk	11	13	20	2	69 (169)	46 (114)	13 (31)
Deer	5	5	13	7	5 (12)	5 (13)	27 (68)
Cattle	-	-	1	-	-	4 (9)	-

BROWSE CHARACTERISTICS--

Management unit 11B, Study no: 15

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
Amelanchier utahensis									
94	1180	5	93	2	20	10	0	0	42/49
00	1160	17	81	2	60	34	0	50	44/51
05	1000	28	70	2	-	24	40	0	46/56
10	1660	41	57	2	120	35	14	2	44/53
Artemisia frigida									
94	20	0	100	-	-	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 nova									
94	820	22	76	2	20	15	0	0	11/13
00	1180	7	93	0	-	2	0	0	10/14
05	600	7	90	3	1500	10	0	0	10/13
10	1740	62	38	0	100	24	8	0	9/15

		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>Artemisia tridentata vaseyana</i>										
94	7300	10	87	3	80	3	.82	1	16/17	
00	6380	10	81	10	80	11	0	2	16/22	
05	4740	4	85	11	240	22	23	3	21/27	
10	4620	11	79	10	120	45	8	13	18/28	
<i>Cercocarpus montanus</i>										
94	2540	50	39	10	340	24	0	8	44/48	
00	2520	57	40	2	3560	32	2	2	46/47	
05	2980	76	21	3	2180	36	23	2	53/56	
10	2720	44	54	1	1760	14	17	.73	49/49	
<i>Chrysothamnus depressus</i>										
94	1700	4	96	0	-	0	0	0	5/6	
00	1300	0	97	3	-	2	0	3	3/5	
05	1360	3	96	1	-	22	26	1	5/8	
10	740	0	100	0	-	0	0	0	5/8	
<i>Chrysothamnus viscidiflorus viscidiflorus</i>										
94	5560	6	94	0	-	0	0	0	8/7	
00	1580	0	95	5	-	0	0	5	11/10	
05	2140	21	79	0	-	9	.93	0	12/10	
10	3120	0	100	0	-	3	0	0	11/12	
<i>Gutierrezia sarothrae</i>										
94	1340	12	88	0	-	0	0	0	6/5	
00	780	0	100	0	-	0	0	0	4/4	
05	640	9	88	3	40	0	0	0	9/8	
10	600	0	100	0	-	0	0	0	7/7	
<i>Opuntia sp.</i>										
94	40	50	50	0	-	0	0	0	2/11	
00	20	0	0	100	-	0	0	0	-/-	
05	60	0	100	0	-	0	0	0	4/8	
10	0	0	0	0	-	0	0	0	4/9	
<i>Purshia tridentata</i>										
94	40	50	50	-	-	0	0	0	-/-	
00	40	0	100	-	-	0	0	0	18/40	
05	100	40	60	-	-	60	0	0	19/28	
10	120	0	100	-	-	67	17	0	21/39	
<i>Symphoricarpos oreophilus</i>										
94	2420	7	93	1	-	3	0	2	12/19	
00	1560	15	79	5	-	0	0	8	10/18	
05	1440	17	83	0	-	0	0	0	13/22	
10	1720	21	79	0	80	0	0	0	10/17	

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Tetradymia canescens										
94	40	0	100	-	-	0	0	0	7/7	
00	0	0	0	-	-	0	0	0	6/10	
05	0	0	0	-	-	0	0	0	14/11	
10	100	20	80	-	-	0	0	0	9/9	