

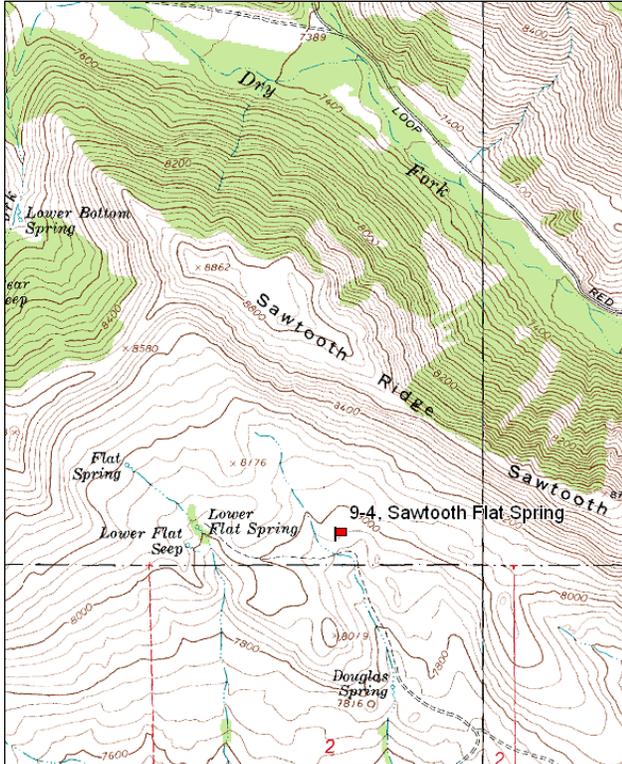
SAWTOOTH-FLAT SPRING - TREND STUDY NO. 9-4-10

Vegetation Type: Mountain Big Sagebrush-Bitterbrush
Range Type: Crucial Deer Winter, Crucial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 7965 ft. (2428 m)
Aspect: Southeast
Slope: 16%
Transect bearing: 0'-100': 359° magnetic, 100'-400': 323° magnetic
Belt placement: line 1 (13 & 92ft), line 2 (40ft), line 3 (52ft), line 4 (71ft).

Directions:

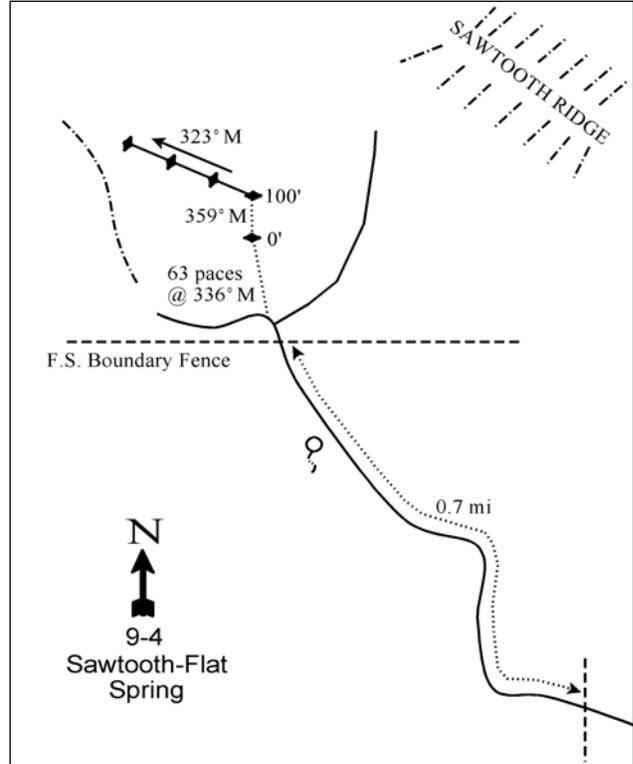
From Lapoint, drive east then turn north just before the bridge over Deep Creek. Proceed north for 6.85 miles to a fork. Bear right toward Deep Creek Ranch. Stay on this road for 9.8 miles to a dirt road on the left heading north up Pine Ridge. This road can also be reached by driving 3 miles west from Dry Fork. The gate may be locked. Turn left and drive 1.65 miles to a cattle guard. Continue 1.1 miles to a gate. Go through the gate and 0.7 miles to the fence on the Forest Service boundary. Go through the gate and stop. From the yellow fencepost near the gate, walk 63 paces north bearing 336°M to the 0-foot baseline stake.

Map Name: Lake Mountain



Township: 2S Range: 19E Section: 35

Diagrammatic Sketch:



GPS: NAD 83, UTM 12T 605042 E 4494348 N

SAWTOOTH FLAT SPRING - TREND STUDY NO. 9-4

Site Information

Site Description: The study is located on the south side of Sawtooth Ridge, east of Lows Flat Spring, and samples a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and grass community with an important antelope bitterbrush (*Purshia tridentata*) component. This study is located in the Lake Mountain allotment which is managed by the U.S. Forest Service. Pellet group transect data has indicated decreasing use by deer, from heavy use in 2000 to more moderate use in 2010. Estimated use by elk has also decreased since 2000, but was already fairly light in 2000. Estimated cattle use has been light since 2000 (Table - Pellet Group Data).

Browse: Key browse on the site consist of antelope bitterbrush and mountain big sagebrush. Sagebrush is more abundant and provides the majority of the cover on the site (Table - Browse Trends). The sagebrush is comprised of a fairly dense stand of large, light to moderately used, mature plants with moderate decadence. Recruitment of young sagebrush plants has generally been good, though it has been marginal in several sample years. Antelope bitterbrush is the most preferred browse species, as is evident from the heavy use it has received over the course of the study. The bitterbrush population is comprised of mostly mature plants with a prostrate growth form that averages just over 1 foot tall. Decadence of bitterbrush has decreased since 1995 and was low in 2010. Recruitment of young bitterbrush plants has been generally good over the sample years. Other browse species are infrequent, but include snowberry (*Symphoricarpos oreophilus*), mountain low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *lanceolatus*) and a few scattered serviceberry plants (*Amelanchier utahensis*) (Table - Browse Characteristics).

Herbaceous Understory: Grasses are diverse and abundant on the site. Needle-and-thread (*Stipa comata*), Letterman needlegrass (*S. lettermani*), Kentucky bluegrass (*Poa pratensis*) and mutton bluegrass (*P. fendleriana*) are the most abundant grass species. Due to recent seed head removal from livestock, species identification was difficult for some grasses in 1988 and 2005. Forbs are also diverse and abundant on the site. There are numerous valuable forb species with arrowleaf balsamroot (*Balsamorhiza sagittata*) and silvery lupine (*Lupinus argenteus*) being the most abundant. Combined, these two species provide nearly all of the forb cover. Annual forbs were moderately abundant in 1995 and 2005, but have been almost non-existent in other sample years (Table - Herbaceous Trends).

Soil: The soils are sandy loam in texture with a moderately acidic soil reaction (pH 6.1) and relatively high organic matter (4.3%) (Table - Soil Analysis Data). Bare ground cover is relatively low, though it increased in 2005 with a decrease in vegetation and litter cover provided by perennial grasses (Table - Basic Cover). The soil erosion condition was classified as stable in 2005 and 2010.

Trend Assessments

Browse:

- **1982 to 1988 - slightly up (+1):** The density of mountain big sagebrush and bitterbrush both increased substantially, but decadence also increased in both species. Decadence increased from 14% to 34% in sagebrush and from 0% to 18% in bitterbrush.
- **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 of mountain big sagebrush decreased to 14%, but decadence of bitterbrush increased slightly to 22%.
- **1995 to 2000 - slightly up (+1):** The density of mountain big sagebrush increased by 34% from 2,040 plants/acre to 2,740 plants/acre, and cover increased from 12% to 15%. However, bitterbrush density decreased by 12% from 1,720 plants/acre to 1,520 plants/acre with a slight decrease in cover from 4% to 3%. Decadence of sagebrush increased to 23%, but decadence of bitterbrush decreased to 11%.
- **2000 to 2005 - stable (0):** There was little change in the mountain big sagebrush or bitterbrush populations.

- **2005 to 2010 - stable (0):** The mountain big sagebrush and bitterbrush populations changed little, though cover decreased from 14% to 11% in sagebrush and from 3% to 2% in bitterbrush.

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):** The perennial grass sum of nested frequency remained similar.
- **1995 to 2000 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 14%, but cover increased from 23% to 30%.
- **2000 to 2005 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, though cover decreased substantially to 12%.
- **2005 to 2010 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 15%, but cover increased to 20%.

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 - up (+2):** The sum of nested frequency of perennial forbs increased by 20%.
- **1995 to 2000 - down (-2):** The perennial forb sum of nested frequency decreased by 35%, despite cover remaining similar at 20%.
- **2000 to 2005 - slightly up (+1):** There was a 17% increase in the sum of nested frequency of perennial forbs with a slight increase in cover to 21%.
- **2005 to 2010 - stable (0):** There was little change in the sum of nested frequency of perennial forbs and a slight decrease in cover to 20%.

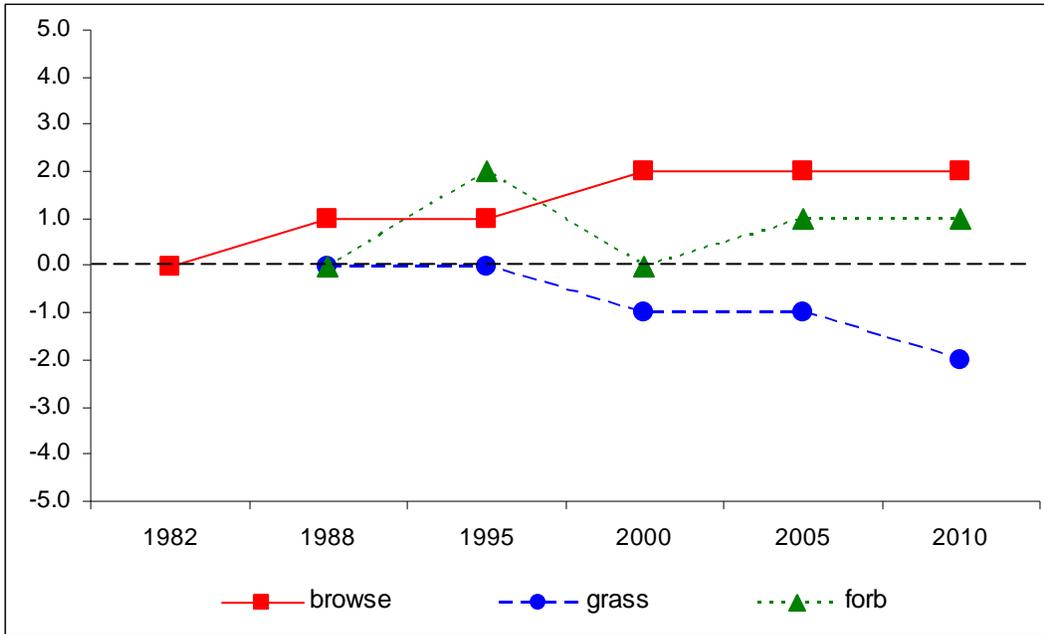
DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --

Management unit 9, study no: 4

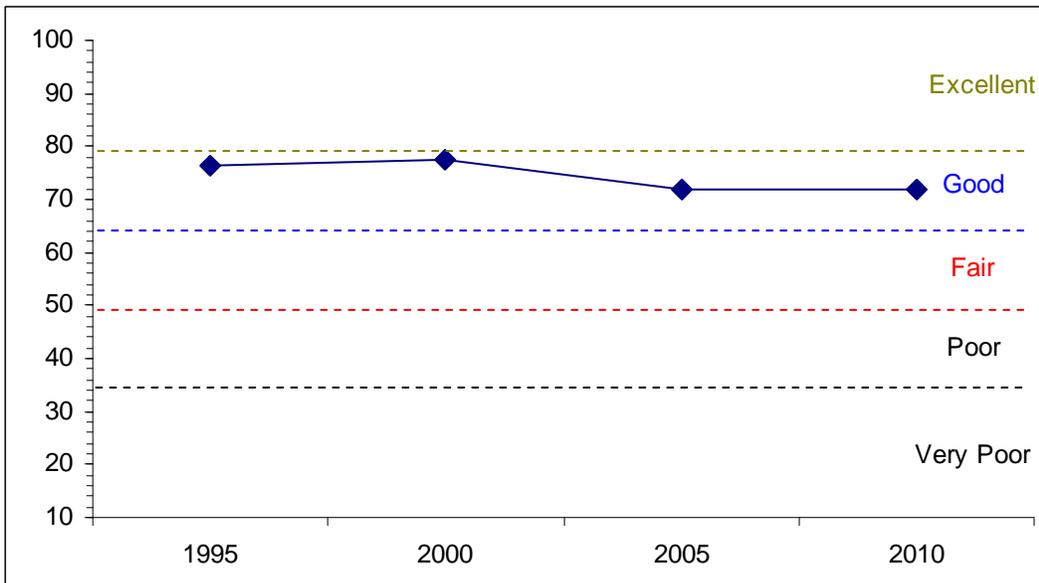
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
95	21.2	10.2	5.0	30.0	0.0	10.0	0.0	76.5	Good
00	23.9	8.7	4.9	30.0	0.0	10.0	0.0	77.6	Good
05	21.2	8.9	7.7	23.9	0.0	10.0	0.0	71.7	Good
10	17.0	10.6	4.3	30.0	0.0	10.0	0.0	71.9	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 9, Study no: 4



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--
Management unit 9, Study no: 4



HERBACEOUS TRENDS--
Management unit 09, Study no: 4

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
G	Agropyron dasystachyum	a ₅₉	b ₁₁₆	a ₇₀	a ₈₀	a ₃₈	1.42	.69	.52	.42
G	Carex sp.	b ₈₅	a ₂₂	a ₄₉	a ₂₁	a ₃₆	.24	2.16	.12	.60
G	Koeleria cristata	b ₂₃	a ⁻	a ₅	a ₂	a ₇	.00	.06	.03	.18
G	Poa fendleriana	b ₃₁₅	a ₁₃₁	a ₁₃₅	a ₁₅₃	a ₁₆₇	3.02	4.46	2.95	6.41
G	Poa pratensis	a ₈₁	d ₁₃₈	d ₁₆₅	ab ₉₀	bc ₁₃₇	7.83	9.85	2.15	7.11
G	Poa secunda	b ₂₉	ab ₁₄	a	b ₂₃	ab ₁₁	.09	.00	.27	.07
G	Sitanion hystrix	b ₁₀	ab ₅	a ₁	b ₂	a ⁻	.03	.03	.00	-
G	Stipa comata	a ₄₅	b ₁₆₈	bc ₁₉₃	c ₂₀₇	a ₄₈	5.97	12.59	4.78	1.74
G	Stipa lettermani	b ₈₃	c ₁₄₀	a ₁₄	b ₉₂	bc ₁₂₅	4.17	.49	1.12	3.34
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		730	734	635	670	569	22.81	30.35	11.97	19.90
Total for Grasses		730	734	635	670	569	22.81	30.35	11.97	19.90
F	Agoseris glauca	ab ₃	ab ₇	ab ₁₁	b ₁₂	a ⁻	.02	.07	.07	-
F	Allium sp.	a ₂	c ₁₁₈	ab ₂₈	b ₅₀	b ₅₃	.36	.19	.16	.15
F	Antennaria rosea	ab ₅	b ₁₃	a ₁	a ₁	a ⁻	.30	.03	.03	-
F	Arabis sp.	b ₅₁	a ₆	a ₇	a ₄	a ⁻	.01	.04	.01	-
F	Artemisia ludoviciana	-	-	4	-	-	-	.03	-	-
F	Aster sp.	-	-	-	-	1	-	-	-	.03
F	Astragalus sp.	4	6	-	-	-	.01	-	-	-
F	Balsamorhiza hookeri	-	-	-	1	-	-	-	.15	-
F	Balsamorhiza sagittata	152	160	148	141	153	14.00	15.28	16.07	14.87
F	Calochortus nuttallii	-	2	-	1	5	.01	-	.00	.01
F	Castilleja linariaefolia	-	4	2	1	-	.01	.03	.03	-
F	Chenopodium fremontii (a)	-	-	-	2	-	-	-	.00	-
F	Chenopodium leptophyllum(a)	-	b ₁₅	a ⁻	ab ₈	a ₁	.03	-	.01	.00
F	Collinsia parviflora (a)	-	c ₁₇₃	a ₁₈	d ₂₅₅	b ₆₈	1.33	.05	1.29	.15
F	Collomia linearis (a)	-	d ₂₆₄	b ₂₄	c ₁₃₈	a ⁻	2.08	.08	.43	-
F	Comandra pallida	-	3	7	-	-	.01	.09	-	-
F	Crepis acuminata	a ₂	b ₂₁	a ₁	a ₅	a ⁻	.45	.00	.01	-
F	Cryptantha sp.	a ⁻	a ₂	a ⁻	a ₅	b ₂₉	.00	-	.01	.13
F	Delphinium nuttallianum	-	-	-	4	-	-	-	.04	-
F	Descurainia pinnata (a)	-	b ₁₃	a ⁻	b ₂₈	a ⁻	.07	-	.05	-
F	Draba sp. (a)	-	-	-	1	-	-	-	.00	-
F	Erigeron eatonii	6	-	4	5	5	-	.01	.04	.03
F	Erigeron flagellaris	8	1	5	-	-	.00	.06	.00	-
F	Eriogonum alatum	4	-	-	6	-	-	-	.01	-
F	Eriogonum racemosum	9	7	16	5	11	.09	.28	.03	.33
F	Eriogonum umbellatum	a ₁	ab ₁₄	ab ₁₃	b ₁₇	ab ₇	.30	.14	.12	.07
F	Heterotheca villosa	a ⁻	a ⁻	a ₂	a ₄	b ₆₂	-	.03	.03	.36
F	Lomatium sp.	18	11	5	7	3	.03	.06	.02	.00
F	Lupinus argenteus	a ₅₅	b ₉₁	ab ₇₇	ab ₇₃	b ₈₄	3.35	2.72	3.32	3.17
F	Lychnis drummondii	ab ₆	b ₁₃	a ₁	ab ₇	ab ₅	.09	.00	.04	.01
F	Mertensia sp.	-	-	-	3	3	-	-	.15	.15

Type	Species	Nestled Frequency					Average Cover %			
		'88	'95	'00	'05	'10	'95	'00	'05	'10
F	Orobanche fasciculata	-	8	3	4	-	.02	.03	.00	-
F	Orthocarpus sp. (a)	-	-	-	-	3	-	-	-	.00
F	Penstemon humilis	_b 52	_b 34	_b 20	_a 3	_a 3	.17	.31	.01	.01
F	Phlox longifolia	_c 96	_b 43	_{ab} 20	_b 43	_a 9	.20	.07	.22	.02
F	Polygonum douglasii (a)	-	_b 76	_a 11	_b 73	_a 7	.22	.02	.17	.02
F	Potentilla gracilis	-	3	3	2	-	.03	.00	.00	-
F	Sedum lanceolatum	-	1	-	-	3	.00	-	-	.00
F	Senecio integerrimus	_a -	_{ab} 2	_{ab} 2	_b 12	_a -	.15	.03	.05	-
F	Senecio multilobatus	1	2	1	10	3	.03	.00	.02	.03
F	Taraxacum officinale	-	-	-	3	3	-	-	.15	.00
F	Tragopogon dubius	7	7	-	-	-	.01	-	-	-
F	Unknown forb-annual (a)	-	_a -	_a -	_a -	_b 13	-	-	-	.06
F	Unknown forb-perennial	5	-	-	-	-	-	-	-	-
F	Zigadenus elegans	_a -	_a 4	_a 1	_b 18	_{ab} 11	.01	.03	.09	.02
Total for Annual Forbs		0	541	53	505	92	3.76	0.15	1.97	0.23
Total for Perennial Forbs		487	583	382	447	453	19.71	19.58	20.95	19.45
Total for Forbs		487	1124	435	952	545	23.47	19.73	22.93	19.69

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

BROWSE TRENDS--

Management unit 09, Study no: 4

Type	Species	Strip Frequency				Average Cover %			
		'95	'00	'05	'10	'95	'00	'05	'10
B	Amelanchier utahensis	0	1	0	2	-	-	-	-
B	Artemisia tridentata vaseyana	72	78	78	78	12.34	15.40	13.57	11.12
B	Chrysothamnus viscidiflorus lanceolatus	5	4	4	4	.30	.36	.18	.15
B	Eriogonum heracleoides	3	7	16	10	.06	.30	.12	.42
B	Mahonia repens	2	2	2	3	.00	.03	.06	.18
B	Opuntia fragilis	3	2	3	2	.01	.00	-	-
B	Pediocactus simpsonii	1	0	0	0	.03	-	-	-
B	Purshia tridentata	52	54	43	45	3.87	3.12	2.80	2.04
B	Symphoricarpos oreophilus	11	12	6	9	.30	.52	1.12	.71
Total for Browse		149	160	152	153	16.93	19.73	17.88	14.64

CANOPY COVER, LINE INTERCEPT--

Management unit 09, Study no: 4

Species	Percent Cover	
	'05	'10
Artemisia tridentata vaseyana	23.38	17.51
Mahonia repens	-	.15
Purshia tridentata	8.44	5.78
Symphoricarpos oreophilus	1.10	1.36

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 09, Study no: 4

Species	Average leader growth (in)	
	'05	'10
Artemisia tridentata vaseyana	2.2	1.2
Purshia tridentata	9.2	1.5

BASIC COVER--

Management unit 09, Study no: 4

Cover Type	Average Cover %					
	'82	'88	'95	'00	'05	'10
Vegetation	7.25	12.50	61.72	64.45	46.85	54.43
Rock	1.75	1.50	2.08	1.64	2.65	1.01
Pavement	0	2.00	1.07	1.77	.98	2.92
Litter	67.75	73.25	63.34	65.68	49.43	42.36
Cryptogams	.75	0	0	.42	.13	0
Bare Ground	22.50	10.75	5.61	7.58	19.03	12.91

SOIL ANALYSIS DATA --

Management unit 9, Study no: 4, Study Name: Sawtooth-Flat Spring

Effective rooting depth (in)	pH	sandy loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
9.2	6.1	67.4	18.4	14.3	4.3	28.2	236.8	0.7

PELLET GROUP DATA--

Management unit 09, Study no: 4

Type	Quadrat Frequency			
	'95	'00	'05	'10
Rabbit	5	4	38	8
Elk	5	8	7	-
Deer	31	30	25	14
Cattle	9	1	9	3

Days use per acre (ha)		
'00	'05	'10
-	-	-
25 (63)	11 (28)	3 (7)
75 (185)	58 (142)	31 (76)
16 (39)	23 (56)	2 (4)

BROWSE CHARACTERISTICS--

Management unit 09, Study no: 4

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 utahensis</i>									
82	0	0	0	-	-	0	0	0	-/-
88	0	0	0	-	-	0	0	0	-/-
95	0	0	0	-	-	0	0	0	-/-
00	20	0	100	-	-	0	0	0	-/-
05	0	0	0	-	-	0	0	0	13/16
10	80	100	0	-	-	0	0	0	14/13
<i>Artemisia tridentata vaseyana</i>									
82	1464	5	82	14	-	0	0	0	26/30
88	3931	15	47	37	133	34	5	2	22/20
95	2040	10	76	14	60	56	4	4	27/43
00	2740	9	67	23	600	4	.72	8	28/39
05	2680	16	63	22	2260	37	18	7	32/40
10	2760	9	75	17	100	38	19	7	28/37
<i>Chrysothamnus viscidiflorus lanceolatus</i>									
82	0	0	0	-	-	0	0	0	-/-
88	0	0	0	-	-	0	0	0	-/-
95	120	0	100	-	-	0	0	0	14/28
00	120	0	100	-	-	0	0	0	15/24
05	100	20	80	-	-	20	20	0	10/16
10	100	0	100	-	-	0	0	0	14/18
<i>Eriogonum heracleoides</i>									
82	0	0	0	-	-	0	0	0	-/-
88	0	0	0	-	-	0	0	0	-/-
95	120	50	50	-	-	0	0	0	10/13
00	220	0	100	-	-	0	0	0	4/6
05	700	14	86	-	20	37	9	0	5/6
10	340	0	100	-	-	0	0	0	3/9
<i>Mahonia repens</i>									
82	0	0	0	-	-	0	0	0	-/-
88	0	0	0	-	-	0	0	0	-/-
95	80	100	0	-	-	0	0	0	4/5
00	60	100	0	-	-	0	0	0	2/4
05	460	0	100	-	-	0	0	0	2/4
10	360	11	89	-	-	0	0	0	4/6

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>Opuntia fragilis</i>									
82	0	0	0	0	-	0	0	0	-/-
88	731	55	9	36	66	0	0	18	5/4
95	80	25	75	0	-	0	0	0	2/5
00	80	0	100	0	-	0	0	0	2/5
05	120	33	67	0	-	0	0	0	1/2
10	40	50	50	0	-	0	0	0	1/3
<i>Pediocactus simpsonii</i>									
82	0	0	0	-	-	0	0	0	-/-
88	0	0	0	-	-	0	0	0	-/-
95	20	0	100	-	-	0	0	0	3/4
00	0	0	0	-	-	0	0	0	-/-
05	0	0	0	-	-	0	0	0	-/-
10	0	0	0	-	-	0	0	0	-/-
<i>Purshia tridentata</i>									
82	1066	0	100	0	-	44	38	0	19/28
88	1865	14	68	18	-	21	79	0	17/28
95	1720	10	67	22	-	33	48	9	13/32
00	1520	14	75	11	20	13	62	8	14/32
05	1440	13	75	13	-	8	89	6	14/31
10	1420	7	90	3	-	3	92	1	13/29
<i>Symphoricarpos oreophilus</i>									
82	266	100	0	0	-	0	0	0	-/-
88	332	20	80	0	-	40	0	0	18/18
95	460	26	74	0	40	43	0	0	19/38
00	260	8	77	15	-	0	0	8	19/50
05	220	9	91	0	-	45	0	0	17/35
10	340	6	94	0	-	0	0	0	18/33