

Trend Study 21A-13-07

Study site name: Dennis Spring .

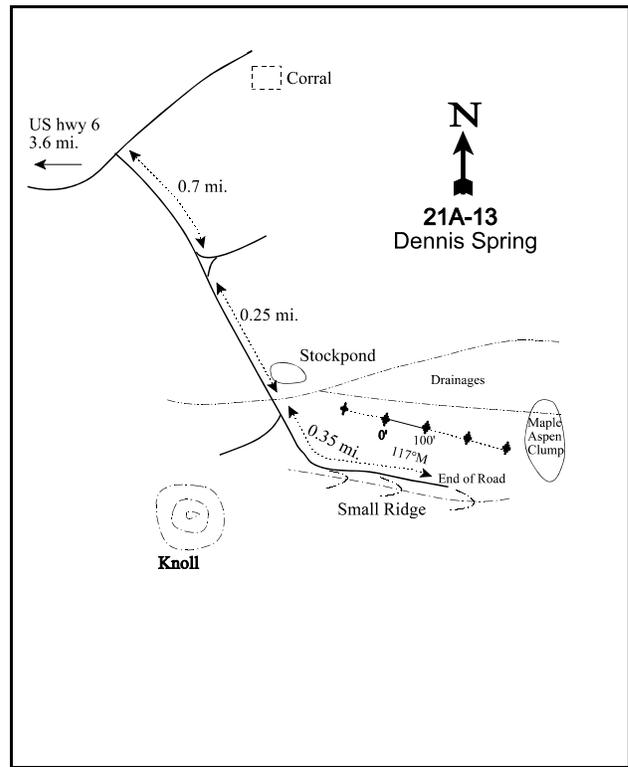
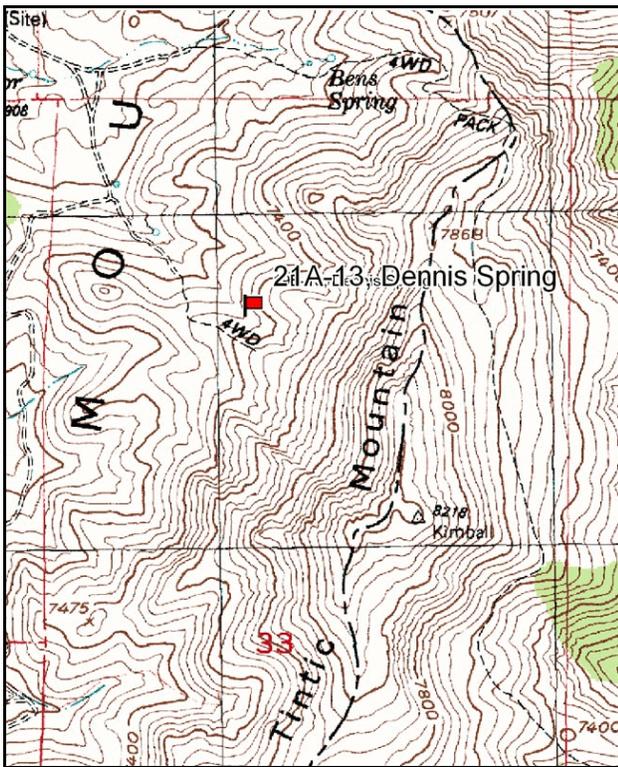
Vegetation type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 117 degrees magnetic.

Frequency belt placement: Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 2 on 1ft and belt 5 on 1ft.

LOCATION DESCRIPTION

From mile marker 130 on Highway U.S. 6, proceed east for 1.6 miles to a fork and go left. Proceed 2.0 miles on the "Dennis Road" up Copperpolis Creek to a fork. Turn right (to the southeast) and travel uphill for 0.70 miles to another fork. Turn right again for 0.25 miles to where there is a fork turning off sharply to the right and a stockpond on the left. Continue straight ahead (on the left fork) for an additional 0.35 miles to where the road ends on top of a small ridge. At this point, there will be an aspen-maple stand to your immediate left-front at the head of a small drainage. Just behind you, there should be a knoll. From the front-rightmost maple tree of the clump to your front, walk 13 paces on an azimuth of 8 degrees to the number 300-foot stake. The 0-foot marker of the baseline is marked by a red browse tag, number 3945, is located in the approximate middle of a triangle formed by three boulders. All plot markers consists of steel fenceposts 15" to 20" in height.



Map Name: Tintic Mountain

Diagrammatic Sketch

Township 11S, Range 2W, Section 33

GPS: NAD 83, UTM 12S 408019 E 4408894 N

DISCUSSION

Dennis Spring - Trend Study No. 21A-13

Study Information

This study samples summer range near the bottom of a swale, approximately one-quarter mile (0.4 km) from Dennis Spring [elevation: 7,390 feet (2,252 m), slope: 25%, aspect: northwest]. Prior to 2001, the plant community was dominated by a moderately tall mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) population interspersed with lower growing shrubs. Except for a few isolated aspen (*Populus tremuloides*) clones and patches of bigtooth maple (*Acer grandidentatum*), the area is devoid of tree cover. A wildfire burned through the area in 2001, greatly reducing the browse component. There was a very slight decrease in pellet group quadrat frequencies following the fire. Deer use was estimated at 7 days use/acre (18 ddu/ha) in 2002 and 1 day use/acre (3 ddu/ha) in 2007. Elk use was estimated at 7 days use/acre (17 edu/ha) in 2007. Sheep use was estimated at 13 days use/acre (33 sdu/ha) in 2002 and 20 days use/acre (50 sdu/ha) in 2007. Mormon crickets (*Anabrus simplex*) were also abundant in 2002 and appeared to have utilized many of the herbaceous plants.

Soil

The soil is classified as a Wallsburg-Yeates Hollow complex (USDA-NRCS 2007). The soils in the Wallsburg series are shallow and well-drained, and formed in residuum and colluvium from limestone, sandstone, and shale. The soils in the Yeates Hollow series are deep and well-drained or moderately well-drained, and formed in alluvium, colluvium, and residuum from conglomerate, sandstone, and quartzite. The soil texture is a sandy clay loam, and the pH is moderately acidic (5.9). Relative vegetation cover decreased from 39% in 1997 to 25% in 2002 following the fire, then increased to 39% in 2007. Relative bare ground cover increased from 14% in 1997 to 45% in 2002, then decreased to 25% in 2007. The soil erosion condition was classified as stable in 2002 and moderate in 2007 due to indications of surface litter, rock, and soil movement, as well as pedestalling, flow patterns, and gullies.

Browse

Mountain big sagebrush is the preferred browse species, and provided 79% of the total browse cover in 1997, 23% in 2002, and 77% in 2007. Its density has steadily increased from 4,920 plants/acre (12,157 plants/ha) in 1997 to 9,500 plants/acre (23,474 plants/ha) in 2007. The population was largely mature in 1997 before the burn, and in 2002 only young plants were sampled. By 2007, approximately half of the population was young and half was mature. Vigor has been good on most plants in every sample year, and use has been mostly light. Annual leader growth averaged 1.8 inches (4.5 cm) in 2007.

Stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) is also present, and its density has declined from 5,560 plants/acre (13,739 plants/ha) in 1997 to 2,700 plants/acre (6,672 plants/ha) in 2007. Rabbitbrush provided most shrub cover in 2002. Snowberry (*Symphoricarpos oreophilus*), Oregon grape (*Mahonia repens*), Myrtle pachistima (*Pachistima myrsinites*), Woods' rose (*Rosa woodsii*), and gray horsebrush (*Tetradymia canescens*) have also been sampled at lower densities.

Herbaceous Understory

Average perennial grass cover has remained low, but stable, at 3%-4% since 1997. Subalpine needlegrass (*Stipa columbiana*) was the most abundant grass in 1997 and 2002, providing 48% and 51% of the total grass cover, respectively. Cheatgrass (*Bromus tectorum*) became the most abundant grass in 2007. It increased from 15% of the total grass cover in 2002 to 51% in 2007. Average cheatgrass cover increased from 1% in 2002 to 4% in 2007. Other grasses present include bluebunch wheatgrass (*Agropyron spicatum*), bottlebrush squirreltail (*Sitanion hystrix*), slender wheatgrass (*Agropyron trachycaulum*), and crested wheatgrass (*Agropyron cristatum*).

Average perennial forb cover remained stable at 10% in 1997 and 2002, then decreased to 2% by 2007. The most abundant perennial species include silvery lupine (*Lupinus argenteus*), ballhead waterleaf (*Hydrophyllum capitatum*), longleaf phlox (*Phlox longifolia*), and prickly lettuce (*Lactuca serriola*). Lupine provided 65% of the total forb cover in 1997, then declined significantly to only 10% in 2002. Waterleaf was the most abundant forb in 2002 and 2007; it comprised 28% and 42% of the total forb cover, respectively. Common houndstongue (*Cynoglossum officinale*), a noxious weed, was sampled in 1983-2002, but in low frequencies. Annual forbs have provided 15%-22% of the total forb cover since 1997. The most abundant annual species include lambsquarters (*Chenopodium album*), Douglas knotweed (*Polygonum douglasii*), and blue-eyed Mary (*Collinsia parviflora*).

1989 TREND ASSESSMENT

The trend for browse is up. Sagebrush density increased from 1,199 plants/acre (2,963 plants/ha) to 8,532 plants/acre (21,082 plants/ha). Young plants increased from 6% of the population to 61%, and seedlings were also sampled at a density of 1,533 seedlings/acre (3,788 seedlings/ha). Decadence decreased from 17% of the population to only 1%. Vigor was good on all sampled plants, and use decreased to light. The trend for grass is up. The sum of nested frequency for perennial grasses increased 22%. The trend for forbs is stable. The sum of nested frequency for perennial forbs changed little. Lupine decreased significantly in nested frequency, while tapertip hawksbeard (*Crepis acuminata*) and aster (*Aster* sp.) increased significantly in nested frequency.

browse - up (+2)

grass - up (+2)

forb - stable (0)

1997 TREND ASSESSMENT

The trend for browse is slightly down. Sagebrush density decreased from 8,532 plants/acre (21,082 plants/ha) to 4,920 plants/acre (12,157 plants/ha), however, this change can be attributed to the increase in sampling area in 1997. The population was largely mature. Decadence increased from 1% of the population to 11%, while young recruitment decreased from 61% of the population to 1%. Plants displaying poor vigor increased slightly to 8% of the population. Use remained light. The trend for grass is up. The sum of nested frequency for perennial grasses increased 38%. Subalpine needlegrass (*Stipa columbiana*) increased significantly in nested frequency, while bluebunch wheatgrass and Sandberg bluegrass (*Poa secunda*) decreased significantly in nested frequency. The trend for forbs is down. The sum of nested frequency for perennial forbs decreased 21%. Hawksbeard decreased significantly in nested frequency. Houndstongue quadrat frequency increased slightly from 16% to 23%. The Desirable Components Index (DCI) was not calculated for this study since it is on summer range.

winter range condition (DCI) - Not applicable, summer range

browse - slightly down (-1)

grass - up (+2)

forb - down (-2)

2002 TREND ASSESSMENT

The trend for browse is stable. Sagebrush density increased 45% following the fire, from 4,920 plants/acre (12,157 plants/ha) to 7,120 plants/acre (17,593 plants/ha). However, average sagebrush cover decreased from 32% to 1%. The population has been converted from a mature, dense-canopied population to one with an open canopy composed completely of young, vigorous plants. The density of young sagebrush plants is high, so the sagebrush component should develop rather quickly. The trend for grass is down. The sum of nested frequency for perennial grasses decreased 45%. Squirreltail decreased significantly in nested frequency. Cheatgrass increased significantly in nested frequency, however, its average cover changed very little. The trend for forbs is slightly up. The sum of nested frequency for perennial forbs increased 17%. Longleaf phlox and prickly lettuce increased significantly in nested frequency, while lupine and houndstongue decreased significantly in nested frequency. Total forb cover increased from 11% to 13%.

winter range condition (DCI) - Not applicable, summer range
browse - stable (0) grass - down (-2) forb - slightly up (+1)

2007 TREND ASSESSMENT

The trend for browse is up. Sagebrush density increased from 7,120 plants/acre (17,593 plants/ha) to 9,500 plants/acre (23,474 plants/ha), and its average cover increased from 1% to 23%. Fifty-two percent of the plants were young, while 48% were mature. Seedling density was extremely high at 26,420 plants/acre (65,283 plants/ha). Vigor remained excellent and use was mostly light, with 4% of the sampled plants showing moderate use. The trend for grass is up. The sum of nested frequency for perennial grasses increased substantially. Crested wheatgrass, squirreltail, and smooth brome (*Bromus inermis*) increased significantly in nested frequency. Cheatgrass did not change significantly in nested frequency, although its cover increased from 1% to 4%. The trend for forbs is down. The sum of nested frequency for perennial forbs decreased 61%. Five perennials, including waterleaf, lupine, phlox, lambstongue groundsel (*Senecio integerrimus*), and clover (*Trifolium* sp.) decreased significantly in nested frequency. Houndstongue was not sampled.

winter range condition (DCI) - Not applicable, summer range
browse - up (+2) grass - up (+2) forb - down (-2)

HERBACEOUS TRENDS --
Management unit 21A, Study no: 13

Type	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
G	Agropyron cristatum	-	-	a4	a1	b16	.00	.15	.21
G	Agropyron spicatum	bc72	c80	a47	a31	ab45	.32	.54	1.08
G	Agropyron trachycaulum	-	-	-	a8	a12	-	.21	.28
G	Bromus inermis	-	-	a3	a2	b15	.00	.15	.14
G	Bromus japonicus (a)	-	-	-	-	-	.00	-	-
G	Bromus tectorum (a)	-	-	a26	b129	b148	.41	.71	3.86
G	Oryzopsis hymenoides	-	-	-	-	1	-	-	.03
G	Poa fendleriana	-	a3	a9	a8	a9	.21	.27	.19
G	Poa secunda	b45	b32	a6	a1	-	.04	.00	-
G	Sitanion hystrix	a12	ab23	bc43	a3	c51	.59	.20	.78
G	Stipa columbiana	-	a19	b105	b64	b52	1.50	2.38	.97
G	Stipa lettermani	-	-	-	a2	a6	-	.01	.04
Total for Annual Grasses		0	0	26	129	148	0.42	0.70	3.86
Total for Perennial Grasses		129	157	217	120	207	2.69	3.94	3.73
Total for Grasses		129	157	243	249	355	3.11	4.65	7.60

Type	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
F	<i>Agoseris glauca</i>	a5	-	a2	a3	a4	.00	.04	.01
F	<i>Arabis</i> sp.	a7	a9	-	-	-	-	-	-
F	<i>Arenaria fendleri</i>	a2	a1	-	-	-	-	-	-
F	<i>Artemisia ludoviciana</i>	-	-	-	-	1	-	-	.03
F	<i>Astragalus convallarius</i>	b18	ab7	a3	ab12	ab6	.01	.31	.04
F	<i>Aster</i> sp.	a2	b33	-	a1	a1	-	.00	.00
F	<i>Astragalus</i> sp.	-	-	3	-	-	.00	-	-
F	<i>Calochortus nuttallii</i>	a1	-	a1	a1	-	.00	.00	-
F	<i>Chenopodium album</i> (a)	-	-	b83	c142	a6	.40	1.41	.02
F	<i>Chenopodium leptophyllum</i> (a)	-	-	-	-	6	-	-	.01
F	<i>Cirsium</i> sp.	a3	a3	a2	a2	-	.00	.03	-
F	<i>Collomia linearis</i> (a)	-	-	a5	-	a1	.01	-	.00
F	<i>Comandra pallida</i>	-	a2	a2	-	-	.00	-	-
F	<i>Collinsia parviflora</i> (a)	-	-	b190	a19	a41	1.08	.06	.14
F	<i>Crepis acuminata</i>	b23	a142	b33	a-	a1	.25	.00	.03
F	<i>Cymopterus</i> sp.	-	-	2	-	-	.00	-	-
F	<i>Cynoglossum officinale</i>	b34	b32	b39	a10	-	.76	.19	-
F	<i>Epilobium brachycarpum</i> (a)	-	-	-	3	-	-	.00	-
F	<i>Erigeron</i> sp.	-	-	a3	a3	-	.03	.00	-
F	<i>Eriogonum racemosum</i>	b14	ab10	-	a2	-	-	.00	-
F	<i>Gayophytum ramosissimum</i> (a)	-	-	-	b28	a7	-	.25	.01
F	<i>Geranium</i> sp.	a3	a3	-	-	-	-	-	-
F	<i>Hackelia patens</i>	a7	-	-	-	a3	-	-	.00
F	<i>Hydrophyllum capitatum</i>	-	-	-	b62	a40	-	3.67	1.21
F	<i>Lathyrus brachycalyx</i>	a18	a15	a18	a17	a2	.25	.46	.15
F	<i>Lactuca serriola</i>	-	-	a4	b122	-	.01	1.11	-
F	<i>Lupinus argenteus</i>	d208	c147	c140	b47	a8	7.32	1.29	.11
F	<i>Machaeranthera canescens</i>	-	a2	a2	-	a9	.00	-	.04
F	<i>Microsteris gracilis</i> (a)	-	-	a32	a14	a20	.09	.22	.04
F	<i>Penstemon</i> sp.	-	-	-	a3	a3	-	.01	.03
F	<i>Phlox longifolia</i>	a79	ab96	a76	b133	a81	.22	2.54	.47
F	<i>Polygonum douglasii</i> (a)	-	-	a20	b83	c123	.06	.81	.40
F	<i>Senecio integerrimus</i>	-	-	-	b29	a15	-	.32	.08
F	<i>Senecio multilobatus</i>	-	-	b44	-	a1	.45	-	.00
F	<i>Solidago</i> sp.	56	-	-	-	-	-	-	-
F	<i>Streptanthus cordatus</i>	-	-	5	-	-	.03	-	-

Type	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
F	Taraxacum officinale	a ³	a ⁶	a ¹⁵	a ²	-	.05	.03	-
F	Trifolium sp.	ab ¹⁴	bc ²³	c ³⁷	bc ²²	a ³	.10	.22	.01
F	Viguiera multiflora	-	-	1	-	-	.00	-	-
F	Viola sp.	-	1	-	-	-	-	-	-
Total for Annual Forbs		0	0	330	289	204	1.65	2.76	0.64
Total for Perennial Forbs		497	532	432	471	178	9.56	10.28	2.23
Total for Forbs		497	532	762	760	382	11.21	13.05	2.88

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

BROWSE TRENDS --

Management unit 21A, Study no: 13

Type	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	Acer grandidentatum	1	0	0	-	-	-
B	Amelanchier alnifolia	2	0	0	-	-	-
B	Artemisia tridentata vaseyana	91	70	93	32.23	1.43	22.61
B	Chrysothamnus nauseosus albicaulis	7	1	0	.69	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	80	83	70	2.67	2.71	3.39
B	Hydrophyllum capitatum	0	0	0	-	-	.15
B	Juniperus osteosperma	2	0	0	1.12	-	-
B	Mahonia repens	29	28	28	1.33	.86	1.43
B	Pachistima myrsinites	0	0	3	-	.03	-
B	Purshia tridentata	0	0	0	.03	-	-
B	Rosa woodsii	5	8	7	.06	.09	.33
B	Symphoricarpos oreophilus	55	29	18	2.23	.43	1.24
B	Tetradymia canescens	6	11	6	.21	.53	.18
B	Unknown browse	1	0	0	-	-	-
Total for Browse		279	230	225	40.60	6.10	29.33

CANOPY COVER, LINE INTERCEPT --

Management unit 21A, Study no: 13

Species	Percent Cover	
	'02	'07
<i>Artemisia tridentata vaseyana</i>	1.41	35.98
<i>Chrysothamnus viscidiflorus viscidiflorus</i>	2.46	5.25
<i>Mahonia repens</i>	.53	2.58
<i>Pachistima myrsinites</i>	-	.08
<i>Rosa woodsii</i>	.03	.11
<i>Symphoricarpos oreophilus</i>	1.13	1.61
<i>Tetradymia canescens</i>	.20	.33

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 21A, Study no: 13

Species	Average leader growth (in)	
	'02	'07
<i>Artemisia tridentata vaseyana</i>	-	1.8

BASIC COVER --

Management unit 21A, Study no: 13

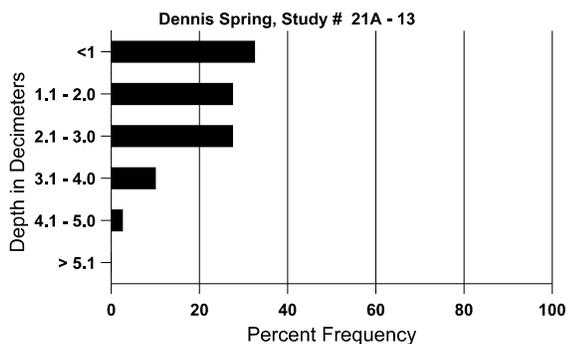
Cover Type	Average Cover %				
	'83	'89	'97	'02	'07
Vegetation	1.00	10.75	47.86	28.06	43.91
Rock	6.00	7.25	3.45	6.38	4.96
Pavement	.50	0	1.26	3.86	2.77
Litter	68.50	57.50	54.12	22.89	32.51
Cryptogams	0	0	.04	.85	0
Bare Ground	24.00	24.50	17.09	50.06	28.49

SOIL ANALYSIS DATA --

Herd Unit 21A, Study no: 13, Dennis Spring

Effective rooting depth (in)	Temp °F (depth)	pH	Sandy clay loam			%OM	ppm P	ppm K	dS/m
			% sand	% silt	% clay				
11.5	52.3 (13.7)	5.9	48.4	27.1	24.6	5.2	52.0	553.6	.5

Stoniness Index



PELLET GROUP DATA --

Management unit 21A, Study no: 13

Type	Quadrat Frequency		
	'97	'02	'07
Sheep	8	6	8
Rabbit	3	1	1
Horse	-	-	1
Elk	4	-	8
Deer	14	4	4
Cattle	1	-	-

Days use per acre (ha)	
'02	'07
13 (33)	20 (50)
-	-
-	-
-	7 (17)
7 (18)	1 (3)
-	-

BROWSE CHARACTERISTICS --

Management unit 21A, Study no: 13

		Age class distribution (plants per acre)					Utilization					
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Acer grandidentatum												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	200	-	200	-	-	-	0	0	-	-	0	-/-
97	20	-	20	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	-/-
Amelanchier alnifolia												
83	0	-	-	-	-	-	0	0	0	-	0	-/-
89	66	-	-	-	66	-	0	100	100	-	0	-/-
97	40	-	40	-	-	-	0	0	0	-	0	-/-
02	0	-	-	-	-	-	0	0	0	-	0	-/-
07	0	-	-	-	-	-	0	0	0	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata vaseyana</i>												
83	1199	-	66	933	200	-	28	0	17	-	0	32/29
89	8532	1533	5200	3266	66	-	0	0	1	-	0	17/20
97	4920	40	60	4320	540	380	.81	0	11	4	8	34/36
02	7120	1020	7120	-	-	100	0	0	0	-	0	8/11
07	9500	26420	4880	4580	40	60	4	0	0	.21	.21	25/33
<i>Chrysothamnus nauseosus albicaulis</i>												
83	0	-	-	-	-	-	0	0	0	-	0	-/-
89	0	-	-	-	-	-	0	0	0	-	0	-/-
97	200	-	20	100	80	-	70	0	40	30	30	44/38
02	20	-	20	-	-	-	0	100	0	-	0	-/-
07	0	-	-	-	-	-	0	0	0	-	0	-/-
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
83	15266	-	1800	13466	-	-	0	0	0	-	0	15/13
89	9533	133	1600	2533	5400	-	31	45	57	.20	.69	12/8
97	5560	100	820	4700	40	20	12	1	1	.71	.71	10/10
02	4700	-	960	3720	20	-	6	.85	0	.42	.42	8/10
07	2700	500	280	2200	220	-	25	2	8	2	11	14/18
<i>Juniperus osteosperma</i>												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	40	-	40	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Mahonia repens</i>												
83	333	-	-	333	-	-	0	0	0	-	0	4/6
89	533	-	400	133	-	-	25	0	0	-	0	5/3
97	4540	20	340	4200	-	-	0	0	0	-	0	4/5
02	6340	-	20	6240	80	100	0	0	1	.94	5	3/5
07	8320	-	-	8320	-	-	0	0	0	-	0	4/6
<i>Pachistima myrsinites</i>												
83	133	-	133	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	60	-	20	40	-	-	33	0	-	-	33	5/9

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Rosa woodsii												
83	533	-	-	533	-	-	0	0	0	-	0	12/3
89	399	-	266	-	133	-	17	17	33	-	0	-/-
97	180	20	140	40	-	-	0	0	0	-	0	-/-
02	260	-	260	-	-	-	0	0	0	-	8	-/-
07	240	-	60	180	-	-	8	0	0	-	0	12/15
Symphoricarpos oreophilus												
83	799	-	66	733	-	-	25	17	0	-	8	23/21
89	1265	-	133	66	1066	-	16	84	84	-	0	17/14
97	2540	20	320	2200	20	-	5	.78	1	-	.78	12/20
02	1160	20	800	360	-	-	2	2	0	-	0	11/24
07	420	-	40	380	-	-	24	0	0	-	10	13/27
Tetradymia canescens												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	220	-	40	180	-	-	0	0	-	-	0	15/16
02	400	-	100	300	-	-	0	0	-	-	0	9/14
07	240	-	80	160	-	-	8	0	-	-	0	12/26
Unknown browse												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	20	-	-	20	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	-/-