

Trend Study 16B-4-07

Study site name: Dry Creek Chaining.

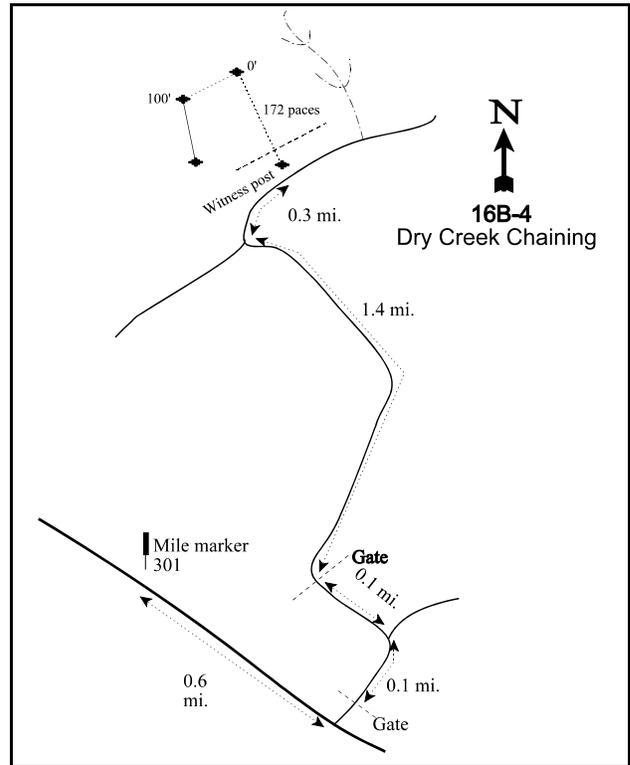
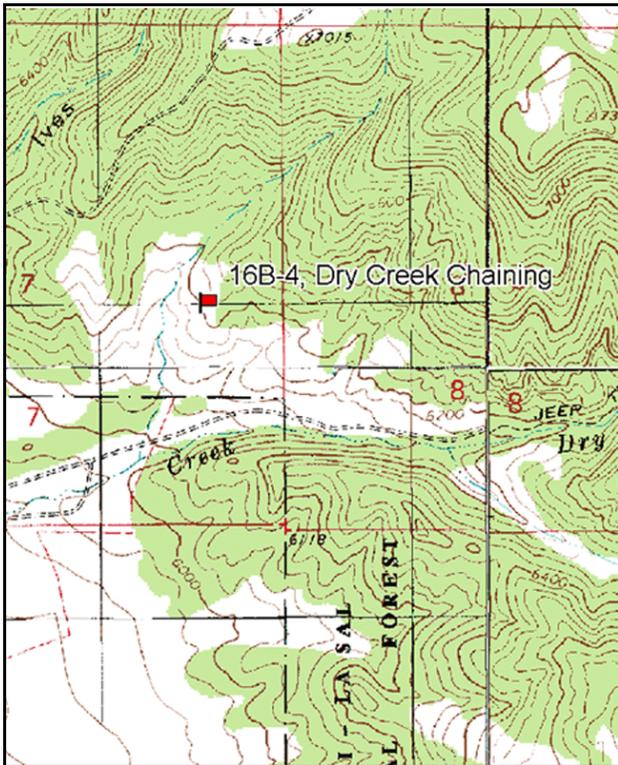
Vegetation type: Chained, Seeded P-J.

Compass bearing: frequency baseline 229 degrees magnetic (line 2 @ 162°M).

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

LOCATION DESCRIPTION

From mile marker 301 on U.S. 89, go south 0.6 miles to a gate on the left. Go through this gate (east) 0.1 miles to a fork. Stay left and go 0.1 miles through another gate and veer right. Go 1.4 miles to a fork and turn right. Go 0.3 miles to a witness post at a gully on the left. From this post, walk 172 paces north going over a fence about 100 feet from the road to the 0-foot baseline stake marked by browse tag # 188.



Map Name: Spencer Canyon

Diagrammatic Sketch

Township 11S, Range 4E, Section 7

GPS: NAD 83, UTM 12S 456266 E 4414177 N

DISCUSSION

Dry Creek Chaining - Trend Study No. 16B-4

Study Information

This winter range study was established in 1989 on an old pinyon-juniper chaining on Forest Service land, and is near the site of a 1978 line-intercept transect [elevation: 6,200 feet (1,890 m), slope: 20%, aspect: southwest]. Thistle Creek and a large pond are about 1.5 mile (2.4 km) to the west, though water may potentially be found closer in one of two nearby ephemeral streams. Big game use of the area has been moderately low. Other than a moderately small stand of true mountain mahogany (*Cercocarpus montanus*), very little preferred browse is growing within the chaining. As a result, the carrying capacity for wintering big game is limited. From the pellet group transect data, there were an estimated 11 deer days use/acre (28 ddu/ha) in 2002 and 5 deer days use/acre (13 edu/ha) in 2007. Elk use was estimated at 34 days use/acre (84 edu/ha) in 2002 and 25 days use/acre (61 edu/ha) in 2007. About half of the deer and elk pellet groups appeared to be from spring use in 2002. Rabbit pellets have been sampled in 20%-30% of the quadrats.

Soil

The soil is shallow, rocky, and has a clay loam texture. Percent organic matter is relatively high at 3.2% and the soil is neutral in reactivity (pH of 7.3). The relative litter cover has accounted for an average 40% of the total ground cover since 1989. There is evidence of some sheet erosion and sedimentation buildup in nearby gullies from past erosion events. The erosion condition was classified as stable in 2002. In 2007, the erosion condition increased to moderate as a result of litter, pavement, and soil movement, and the presence of rills.

Browse

The overstory is composed of pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), and Gambel oak (*Quercus gambelii*). The most important browse species is true mountain mahogany. Antelope bitterbrush (*Purshia tridentata*) is also present, but occurs at approximately one-half the density of mahogany. Gambel oak has a higher density than either mahogany or bitterbrush, but is less preferred and has a lower forage value. Canopy cover of mahogany has been consistent at 6%, and density has been estimated at 400 plants/acre (990 plants/ha) since 2002. Young plants have consistently comprised 10% or less of the population. The decadent portion of the population has been more variable. Decadent plants comprised 42% of the population in 1989, 0% in 1997, 50% in 2002, and 25% in 2007. The proportion of plants exhibiting poor vigor has followed a similar pattern. Eleven percent of the population had poor vigor in 1989, 0% in 1997, 20% in 2002, and 15% in 2007. Annual leader growth averaged only 1.8 inches (4.6 cm) in 2002 and 1.3 inches (3.4 cm) in 2007. It was noted that short leader growth may have caused an overestimation in browse use in 2002. Mahogany use was light-moderate in all sample years except 2002 when 60% of the plants had having heavy use.

Canopy cover of bitterbrush increased from 1% in 2002 to 3% in 2007. The estimated density declined from 360 plants/acre (890 plants/ha) in 1997 to 240 plants/acre (594 plants/ha) in 2002, and remained stable in 2007. Most of the decline was from the loss of young plants, and was likely the result of drought (Utah Climate Summaries 2007). Low reproduction often accompanies drought and so this decline is not surprising. Gambel oak density was estimated at 4,300 stems/acre (10,640 stems/ha) in 1989, most of which were classified as young. During subsequent sample years, a much larger, more representative area was sampled and oak density was estimated to be much lower. In 2007, oak density was estimated at 860 stems/acre (2,130 stems/ha). The percentage of plants exhibiting poor vigor has ranged from 0% to 14%. Browse use on oak remained low until 2007 when heavy use was observed on 28% of the plants.

Broom snakeweed (*Gutierrezia sarothrae*) and pricklypear cactus (*Opuntia* sp.) were common in more open areas near the baseline in 1997, although they were not sampled in the 1989 density plots. Since 1997, snakeweed density has ranged from 120 plants/acre (297 plants/ha) to 2,060 plants/acre (5,100 plants/ha).

Changes in snakeweed density coincide with variations in precipitation (Utah Climate Summaries 2007).

The canopy cover of Utah juniper decreased from 13% in 2002 to 11% in 2007. The population density was consistent at 96 to 99 trees/acre (238 to 245 trees/ha) from 1989 through 2002. In 2007, juniper density decreased to 87 trees/acre (215 trees/ha). The average trunk diameter increased from 3.7 inches (9.4 cm) in 1997 to 7.3 inches (18.5 cm) in 2007. The canopy cover of pinyon pine increased from 7% in 2002 to 9% in 2007. The density of pinyon pine has been more variable. In 1989, there were an estimated 87 trees/acre (215 trees/ha). The density decreased to 65 trees/acre (161 trees/ha) in 1997, and increased to 120 trees/acre (297 trees/ha) in 2002. In 2007, the density decreased to 64 trees/acre (158 trees/ha). Pinyon pine trunk diameter was 6.5 inches (16.5 cm) in 1997, 3.2 inches (8.1 cm) in 2002 and 4.3 inches (10.9 cm) in 2007. The increase in pinyon density and decrease in trunk diameter in 2002 suggest that the young trees had been recruited into the population. For both species, the populations consisted of fewer, larger trees in 2007.

Herbaceous Understory

The herbaceous understory makes up approximately one-third of the vegetation cover. Cover of perennial grasses decreased from 6% in 1997 to 3% in 2002, then increased to 4% in 2007. Perennial grasses are diverse but have steadily declined in the sum of nested frequency since the initial reading in 1989. This decline could be attributed, at least in part, to the increasing pinyon-juniper component in the community. The most common perennial grass species are crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*Agropyron intermedium*), Sandberg bluegrass (*Poa secunda*). Of these three, intermediate wheatgrass is the dominant species and has comprised an average 3% cover since 1997. Quadrat frequency of intermediate wheatgrass decreased from 57% in 1989 to 24% by 2007. Cheatgrass (*Bromus tectorum*) is moderately abundant and has been found in 39% to 48% of the quadrats since 1997. Cheatgrass cover has not exceeded 2% in any sample year.

Forb species are diverse but infrequent, and are not a significant component of the vegetation. Perennial and annual forb cover have provided approximately 5% cover since 1997. Rock goldenrod (*Petradoria pumila*) is the most abundant perennial forb and accounts for the majority of forb cover. Bur buttercup (*Ranunculus testiculatus*), an allelopathic annual (Buchanan et al. 1978), has steadily increased in quadrat frequency each sample year, but has not comprised more than 1% of the total ground cover.

1997 TREND ASSESSMENT

The browse trend is stable. True mountain mahogany density decreased 43%, though some of the decrease appears to be the result of the larger area sampled beginning in 1997. Mahogany decadency decreased from 42% to 0%, and the proportion of plants exhibiting poor vigor decreased from 11% to 0% of the population. Antelope bitterbrush density increased eleven-fold, but this increase is likely to be the result of the increased sample area, as well. Browse use on bitterbrush shifted from light to moderate-heavy. The grass trend is down. The sum of nested frequency of perennial grasses decreased 29%. There were significant decreases in the nested frequencies of intermediate wheatgrass, smooth brome (*Bromus inermis*), and a sedge species (*Carex* sp.). The nested frequency of Sandberg bluegrass increased significantly. The forb trend is slightly up. Even though the sum of nested frequency increased 43%, forbs are still infrequent and account for a small proportion of vegetation cover. Additionally, the species that were present have a low forage value. The Desirable Components Index (DCI) score was fair due to the absence of decadent preferred browse species, a moderate percentage of young plants in the browse population, and low annual grass cover.

winter range condition (DCI) - fair (53) Mid-level potential scale

browse - stable (0)

grass - down (-2)

forb - slightly up (+1)

2002 TREND ASSESSMENT

The browse trend is slightly down. Although mahogany density increased 11%, decadence increased from 0% to 50%. The proportion of plants exhibiting poor vigor and classified as dying increased from 0% to 20%.

Additionally, heavily browsed plants increased from 0% to 60% of the mahogany population. The density of bitterbrush decreased 33%. There were no young plants sampled, and decadence increased to 8% of the population. All of the decadent plants were classified as dying. Browse use shifted from light-moderate to moderate-heavy, and heavily browsed plants increased from 28% to 58% of the population. However, mahogany can survive extreme browse use (Turley et al. 2003). The trend for grass is down. The sum of nested frequency decreased 25% for perennial grasses, including a significant decrease in the nested frequency of intermediate wheatgrass. The forb trend is slightly down. Even though the sum of nested frequency of perennial forbs decreased 39%, the forb component was relatively small and provided little forage. The DCI score decreased to very poor due to the large increase in preferred browse plants classified as decadent and the loss of more perennial grass cover.

winter range condition (DCI) - very poor (30) Mid-level potential scale

browse - slightly down (-1)

grass - down (-2)

forb - slightly down (-1)

2007 TREND ASSESSMENT

The browse trend is stable. Density of mahogany and bitterbrush remained constant. Mahogany decadence decreased from 50% to 25% of the population, and the plants with heavy browse use decreased from 60% to 0%. The proportion of mahogany plants exhibiting poor vigor decreased to 15% of the population. Young plants increased to 8% of the bitterbrush population, and heavy browse use decreased to 25%. Otherwise, the bitterbrush population was stable. Heavy browse use was measured on Gambel oak for the first time, and occurred on 28% of the population. Additionally, there was an increase in the percentage of Gambel oak plants with poor vigor, and the increase was likely from frost damage. The grass trend is slightly down. The sum of nested frequency of perennial grasses decreased 14%, and that of annual grasses increased 14%. There was a significant decrease in the nested frequency of crested wheatgrass. The forb trend is stable. The sum of nested frequency of perennial forbs increased 36%, but they continued to make up a relatively small proportion of the vegetative community. The sum of nested frequency of annual forbs increased two-fold. One-third of this increase was from bur buttercup and the other two-thirds were from species that have little effect on trend. The increase in bur buttercup was significant and was larger than the increase in all of the perennials combined. The DCI score improved to poor due to the increase in young browse plants, although there was still low perennial grass and forb cover.

winter range condition (DCI) - poor (40) Mid-level potential scale

browse - stable (0)

grass - slightly down (-1)

forb - stable (0)

HERBACEOUS TRENDS --
Management unit 16B, Study no: 4

Type	Species	Nested Frequency				Average Cover %		
		'89	'97	'02	'07	'97	'02	'07
G	Agropyron cristatum	ab50	b51	b59	a22	.43	.90	.16
G	Agropyron intermedium	c171	b121	a66	a60	4.38	1.51	2.14
G	Agropyron smithii	-	-	-	8	-	-	.18
G	Agropyron spicatum	b45	ab21	ab31	a15	.44	.48	.57
G	Bromus inermis	b71	a21	a19	a27	.47	.21	.46
G	Bromus japonicus (a)	-	-	a2	a6	-	.00	.01
G	Bromus tectorum (a)	-	a121	a117	a130	1.60	1.82	1.91
G	Carex sp.	b19	a3	-	-	.15	-	-
G	Oryzopsis hymenoides	b19	b17	a3	ab5	.23	.03	.18
G	Poa fendleriana	a11	-	a8	a2	-	.13	.03
G	Poa secunda	a6	b45	ab25	b42	.34	.15	.25
G	Sitanion hystrix	a11	a4	-	-	.03	-	-
Total for Annual Grasses		0	121	119	136	1.60	1.83	1.92
Total for Perennial Grasses		403	283	211	181	6.49	3.44	3.99
Total for Grasses		403	404	330	317	8.09	5.27	5.92
F	Alyssum alyssoides (a)	-	a25	b138	c231	.06	1.58	1.73
F	Aster sp.	-	-	1	-	-	.00	-
F	Balsamorhiza sagittata	a2	a3	a4	a2	.24	.60	.33
F	Camelina microcarpa (a)	-	a6	a4	-	.04	.01	-
F	Calochortus nuttallii	-	6	-	-	.01	-	-
F	Chaenactis douglasii	-	3	-	-	.00	-	-
F	Cirsium sp.	a12	a13	-	-	.18	-	-
F	Cryptantha sp.	a6	a17	-	a11	.10	-	.08
F	Cymopterus longipes	-	a-	-	b6	.00	-	.01
F	Descurainia pinnata (a)	-	a13	a7	a9	.03	.01	.01
F	Draba sp. (a)	-	a42	-	a34	.08	-	.08
F	Epilobium brachycarpum (a)	-	1	-	-	.00	-	-
F	Eriogonum brevicaule	-	-	-	10	-	-	.02
F	Erodium cicutarium (a)	-	a2	a1	a9	.00	.00	.07
F	Eriogonum umbellatum	a1	-	a5	a5	-	.01	.18
F	Gayophytum ramosissimum(a)	-	15	-	-	.03	-	-
F	Gilia sp. (a)	-	-	-	3	-	-	.00
F	Holosteum umbellatum (a)	-	2	-	-	.00	-	-
F	Lappula occidentalis (a)	-	a9	-	a13	.02	-	.16
F	Lactuca serriola	a3	-	a2	-	-	.00	-

T y p e	Species	Nested Frequency				Average Cover %		
		'89	'97	'02	'07	'97	'02	'07
F	Lesquerella sp.	-	-	-	5	-	-	.02
F	Medicago sativa	_a 3	-	_a 1	-	-	.00	-
F	Microsteris gracilis (a)	-	_a 5	_a 3	_a 6	.01	.00	.01
F	Penstemon humilis	_a 7	_a 6	_a 2	-	.18	.03	-
F	Petroradia pumila	_a 43	_a 55	_a 46	_a 60	2.95	1.92	2.30
F	Phlox longifolia	_a 5	_a 16	_a 8	-	.22	.01	-
F	Polygonum douglasii (a)	-	_a 3	_a 1	_a 1	.00	.00	.00
F	Ranunculus testiculatus (a)	-	_a 20	_a 50	_b 109	.04	.18	.90
F	Streptanthus cordatus	_a 1	-	_a 4	-	-	.01	-
F	Unknown forb-annual (a)	-	44	-	-	.09	-	-
Total for Annual Forbs		0	187	204	415	0.42	1.80	2.99
Total for Perennial Forbs		83	119	73	99	3.91	2.61	2.95
Total for Forbs		83	306	277	514	4.34	4.42	5.95

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

BROWSE TRENDS --

Management unit 16B, Study no: 4

T y p e	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	Artemisia tridentata vaseyana	1	1	1	-	.03	.15
B	Cercocarpus montanus	17	16	15	5.50	4.05	3.05
B	Chrysothamnus nauseosus albicaulis	0	2	1	-	-	-
B	Gutierrezia sarothrae	32	3	20	.98	.00	.53
B	Juniperus osteosperma	6	9	11	3.23	5.64	7.93
B	Opuntia sp.	6	12	13	.18	.30	.21
B	Pinus edulis	3	6	5	3.64	5.24	5.76
B	Purshia tridentata	11	10	10	1.85	1.67	1.78
B	Quercus gambelii	10	13	13	2.11	2.78	2.17
B	Symphoricarpos oreophilus	5	7	9	.62	1.31	1.37
Total for Browse		91	79	98	18.13	21.03	22.98

BROWSE TRENDS--
 CANOPY COVER, LINE INTERCEPT --
 Management unit 16B, Study no: 4

Species	Percent Cover	
	'02	'07
Artemisia tridentata vaseyana	.06	.08
Cercocarpus montanus	6.18	6.09
Gutierrezia sarothrae	-	.68
Juniperus osteosperma	12.50	11.06
Opuntia sp.	.05	.06
Pinus edulis	6.61	9.41
Purshia tridentata	1.16	2.71
Quercus gambelii	3.61	2.04
Symphoricarpos oreophilus	2.75	2.71

KEY BROWSE ANNUAL LEADER GROWTH --
 Management unit 16B, Study no: 4

Species	Average leader growth (in)	
	'02	'07
Artemisia tridentata vaseyana	-	1.3
Cercocarpus montanus	1.8	1.3
Purshia tridentata	1.7	1.5

POINT-QUARTER TREE DATA --
 Management unit 16B, Study no: 4

Species	Trees per Acre	
	'02	'07
Juniperus osteosperma	99	87
Pinus edulis	120	64

Average diameter (in)	
'02	'07
4.7	7.3
3.2	4.3

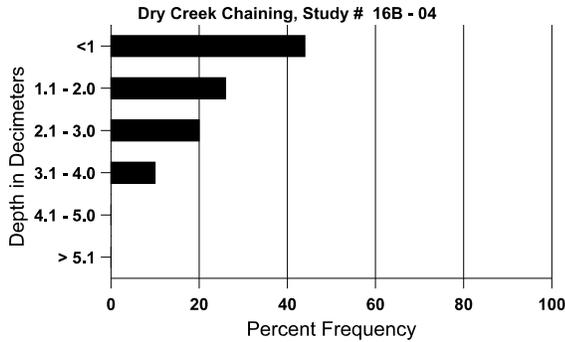
BASIC COVER --
 Management unit 16B, Study no: 4

Cover Type	Average Cover %			
	'89	'97	'02	'07
Vegetation	6.75	28.67	28.29	33.39
Rock	12.50	14.30	14.53	13.53
Pavement	10.25	7.50	7.72	13.73
Litter	57.50	41.10	45.35	35.95
Cryptogams	2.25	4.38	3.63	3.41
Bare Ground	10.75	14.62	25.72	22.22

SOIL ANALYSIS DATA --
Herd Unit 16B, Study no: 04, Dry Creek Chaining

Effective rooting depth (in)	Temp °F (depth)	pH	Clay loam			%OM	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
11.1	53.0 (15.6)	7.3	34.7	30.7	34.6	3.2	9.2	80.0	.6

Stoniness Index



PELLET GROUP DATA --
Management unit 16B, Study no: 4

Type	Quadrat Frequency		
	'97	'02	'07
Rabbit	20	21	31
Elk	13	13	12
Deer	9	5	2

Days use per acre (ha)	
'02	'07
-	-
34 (84)	25 (61)
11 (28)	5 (13)

BROWSE CHARACTERISTICS --
Management unit 16B, Study no: 4

Year	Plants per Acre (excluding seedlings)	Age class distribution (plants per acre)					Utilization						Average Height Crown (in)
		Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor		
Amelanchier utahensis													
89	33	-	-	33	-	-	0	0	-	-	0	68/23	
97	0	-	-	-	-	-	0	0	-	-	0	-/-	
02	0	-	-	-	-	-	0	0	-	-	0	-/-	
07	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>												
89	0	-	-	-	-	-	0	0	0	-	0	-/-
97	20	-	-	20	-	-	0	0	0	-	0	8/9
02	20	-	-	-	20	-	0	100	100	100	100	7/12
07	20	-	-	-	20	60	0	0	100	100	100	13/24
<i>Cercocarpus montanus</i>												
89	632	-	66	300	266	-	26	0	42	11	11	54/40
97	360	-	40	320	-	-	17	0	0	-	0	47/49
02	400	-	20	180	200	-	20	60	50	20	20	51/56
07	400	540	40	260	100	-	30	0	25	15	15	52/57
<i>Chrysothamnus nauseosus albicaulis</i>												
89	0	-	-	-	-	-	0	0	0	-	0	-/-
97	0	-	-	-	-	-	0	0	0	-	0	13/16
02	40	-	20	-	20	-	0	0	50	-	0	-/-
07	40	-	-	40	-	-	0	100	0	-	0	28/27
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
89	33	-	-	-	33	-	0	0	100	100	100	-/-
97	0	-	-	-	-	-	0	0	0	-	0	-/-
02	0	-	-	-	-	-	0	0	0	-	0	-/-
07	0	-	-	-	-	-	0	0	0	-	0	16/20
<i>Gutierrezia sarothrae</i>												
89	0	-	-	-	-	-	0	0	0	-	0	-/-
97	2060	60	180	1840	40	40	0	0	2	2	2	9/10
02	120	-	-	60	60	40	0	0	50	50	50	5/4
07	1280	-	20	1180	80	20	0	2	6	3	3	8/9
<i>Juniperus osteosperma</i>												
89	132	-	66	66	-	-	0	0	0	-	0	96/47
97	120	-	-	120	-	80	0	0	0	-	0	72/61
02	200	-	-	200	-	60	0	0	0	-	10	78/47
07	260	-	20	220	20	-	0	0	8	-	0	-/-
<i>Opuntia sp.</i>												
89	0	-	-	-	-	-	0	0	0	-	0	-/-
97	180	-	-	140	40	20	0	0	22	22	22	5/10
02	500	-	20	460	20	-	0	0	4	4	4	5/9
07	380	-	-	340	40	-	0	5	11	5	5	6/13

		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)
Pinus edulis												
89	66	-	66	-	-	-	0	0	0	-	0	-/-
97	60	-	20	40	-	-	0	0	0	-	0	-/-
02	140	20	40	100	-	-	0	0	0	-	0	-/-
07	120	40	-	100	20	-	0	0	17	-	17	-/-
Purshia tridentata												
89	33	-	-	33	-	-	0	0	0	-	0	19/43
97	360	-	80	280	-	-	33	28	0	-	0	19/39
02	240	-	-	220	20	20	42	58	8	8	8	16/45
07	240	-	20	200	20	20	42	25	8	-	8	22/51
Quercus gambelii												
89	4299	100	2633	1333	333	-	.77	0	8	-	.77	73/30
97	600	20	-	560	40	20	0	0	7	-	0	36/29
02	920	-	-	860	60	160	0	0	7	4	4	37/23
07	860	20	340	340	180	300	5	28	21	14	14	37/27
Symphoricarpos oreophilus												
89	33	-	33	-	-	-	0	0	0	-	0	-/-
97	220	-	20	200	-	-	0	0	0	-	0	22/28
02	260	-	40	220	-	-	0	0	0	-	0	13/26
07	720	-	320	380	20	-	3	3	3	3	3	22/40