

Trend Study 16C-5-07

Study site name: Cane Valley.

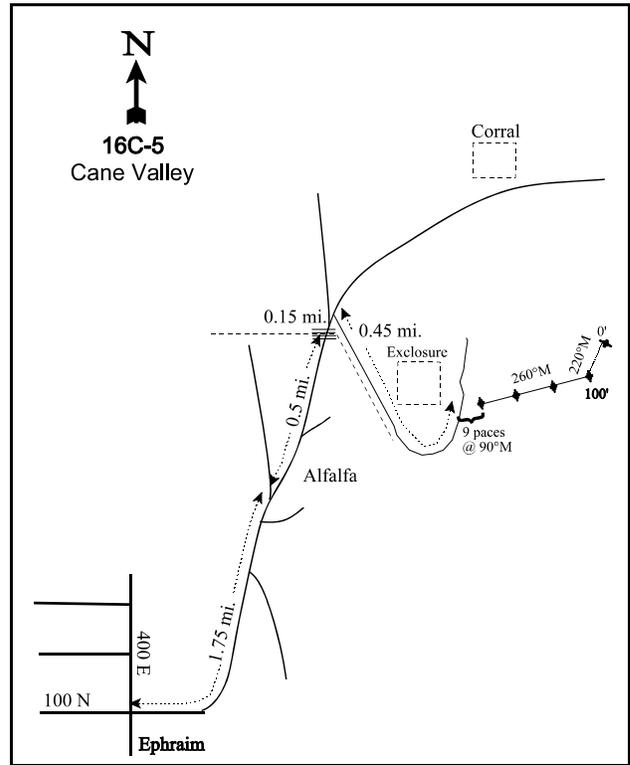
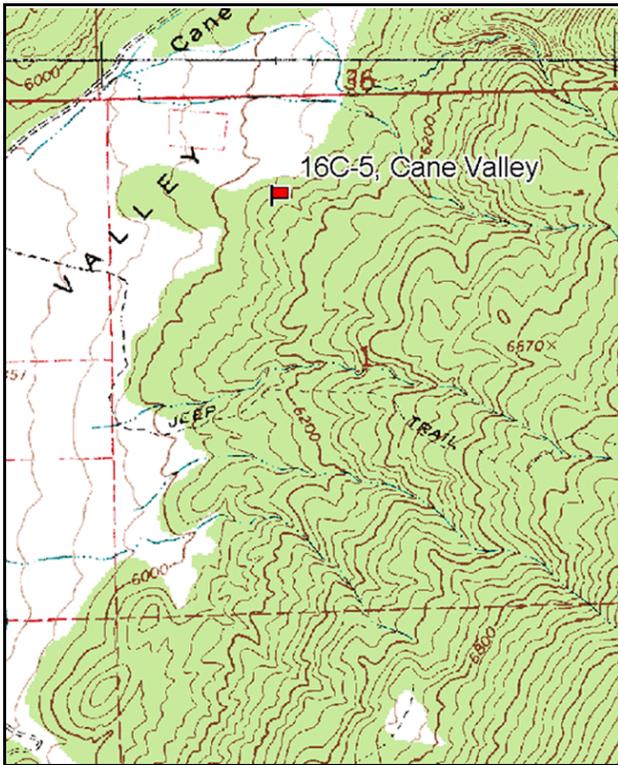
Vegetation type: Chained, Seeded P-J.

Compass bearing: frequency baseline 220 degrees magnetic (lines 2-4 @ 260°M).

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

LOCATION DESCRIPTION

From the intersection of 400 East and 100 North in Ephraim, proceed up 100 North for 1.75 miles. The pavement will end and the road will head in a northerly direction. At 1.75 miles the road will fork, stay right. Proceed up the road for an additional 0.50 miles until you come to a cattleguard where a fence crosses the road. At this point the road forks twice. Take the road to the right for 0.15 miles. Turn right and follow along the fence in a southeasterly direction for 0.25 miles to an enclosure on the east side of the road. From the enclosure, continue left up the road for 0.2 miles where the 400-foot stake is 50 feet east of the road.



Map Name: Ephraim

Diagrammatic Sketch

Township 17S, Range 3E, Section 1

GPS: NAD 83, UTM 12S 453813 E 4358071 N

DISCUSSION

Cane Valley - Trend Study No. 16C-5

Study Information

This study monitors a chained and seeded Utah juniper (*Juniperus osteosperma*) site east of Ephraim [elevation: 6,100 feet (1,859 m), slope: 30%, aspect: west]. The slopes above Cane Valley were two-way chained and aerially seeded in 1982, including 650 acres (263 ha) of Utah Division of Wildlife Resources land. In the fall of 2003, a two-way hollow and seeding treatment was done on the level ground below the study, including the lower 100 feet (30 m) of the study baseline. A spring about 200 yards (183 m) north provides a permanent water source for the area. From the pellet group transect, deer use was estimated at 76 days use/acre (187 ddu/ha) in 2002 and 122 days use/acre (301 ddu/ha) in 2007. Elk use was estimated at 25 days use/acre (61 edu/ha) in 2002 and 58 days use/acre (144 edu/ha) in 2007. Several domestic sheep pellet groups were also sampled in the transect in 2002 and there was an estimated 13 sheep days use/acre (31 sdu/ha). Sheep are grazed on the adjacent private land. Chukar, partridge, mourning doves, and rabbits have also been observed on the site.

Soil

The soil is in the Atepic series which consists of shallow, well-drained, slowly permeable soils formed in colluvium and residuum derived from shale on hillsides with a 10%-40% slope (USDA-NRCS 2007). The soil is clay to clay loam in texture and slightly alkaline in reactivity (pH of 7.4). Sheet erosion was active before the treatment in 1982. Since the treatment, there has been an increase in herbaceous cover and less evidence of erosion. There are large gullies on both sides of the study that show no erosion activity. Relative bare ground cover was 21% in 1997, 14% in 2002, and 18% in 2007. The sum of the relative vegetation and litter cover has averaged 61%-63% since 1997. In 2002, the erosion condition was classified as stable. In 2007, the erosion condition was classified as moderate due to light pedestalling around plants, the formation of rills and gullies, and the moderate translocation of soil, surface rock, and litter.

Browse

Palatable browse is limited, which may be due to poor establishment following seeding. The canopy cover of all these species was less than 1% in 2002 and 2007. The density of mountain big sagebrush increased from 40 plants/acre (99 plants/ha) in 1997 to 360 plants/acre (889 plants/ha) in 2007, and the age structure of the population shifted from mostly mature to mostly young. Average annual leader growth on mountain big sagebrush was 2 inches (5.1 cm) in 2002 and 1.7 inches (4.4 cm) in 2007. Utah serviceberry (*Amelanchier utahensis*), fourwing saltbush (*Atriplex canescens*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), winterfat (*Ceratoides lanata*), and antelope bitterbrush (*Purshia tridentata*) all occur in low densities. Use of these species has been mostly moderate-heavy. In 2002, none of the preferred browse had any seedlings or young in their populations. Average annual leader growth of winterfat was 3.7 inches (9.4 cm) in 2007. Bitterbrush average annual leader growth was 0.9 inches (2.3 cm) in 2007. Narrowleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *stenophyllus*) broom snakeweed (*Gutierrezia sarothrae*) are the most abundant species in terms of density.

The canopy cover of juniper decreased from 13% in 2002 to 8% in 2007. The point-centered quarter data estimate was 343 trees/acre (847 trees/ha) in 2002 and 262 trees/acre (647 trees/ha) in 2007. The average trunk diameter was 2.2 inches (5.6 cm) in 2002 and 2.7 inches (6.9 cm) in 2007. Pinyon pine (*Pinus edulis*) estimates were 19 trees/acre (47 trees/ha), and average trunk diameter was 5 inches (12.7 cm) in 2007. As juniper and pinyon overstory cover increases it is expected that the browse understory will decrease (Taush and West 1994). In 2007, it was noted that a mechanical treatment of some kind was used north and west of the study. It was noticed in 2007 photographs that mountain big sagebrush and junipers were missing compared to 2002 photographs, which is probably due to this treatment.

Herbaceous Understory

Grasses are the dominant vegetation type. Perennial grasses comprised 15% of the ground cover in 1997, and 20% in 2002 and 2007. Both native and introduced species are present with three wheatgrass species, bluebunch (*Agropyron spicatum*), intermediate (*Agropyron intermedium*), and crested (*Agropyron cristatum*), being the most abundant. Since 1997, bluebunch wheatgrass provided 7%-13% total ground cover, intermediate wheatgrass provided 4%-5% cover, and crested wheatgrass provided 1%-3% cover. Other perennial grasses sampled include orchardgrass (*Dactylis glomerata*), Russian wildrye (*Elymus junceus*), Indian ricegrass (*Oryzopsis hymenoides*), mutton bluegrass (*Poa fendleriana*), Sandberg bluegrass (*Poa secunda*), and bottlebrush squirreltail (*Sitanion hystrix*). Annual species, specifically cheatgrass (*Bromus tectorum*), were infrequent in 1997, and were not sampled in 2002. In 2007, cheatgrass had a quadrat frequency of 63%, and provided 2% of the total ground cover.

Forbs are moderately diverse and low growing species are the most abundant. Perennial forbs comprised 4% of the ground cover in 1997, 3% in 2002, and 4% in 2007. Rock goldenrod (*Petradoria pumila*), Hood's phlox (*Phlox hoodii*), stemless goldenweed (*Haplopappus acaulis*), and Fendler sandwort (*Arenaria fendleri*) are the most abundant perennial species. Annual forbs are infrequent, and bur buttercup (*Ranunculus testiculatus*), an allelopathic species (Buchanan et al. 1978), is the most common. It provided less than 1% cover in 2002, increasing to 5% in 2007. Annual forb cover has increased from less than 1% in 1997 and 2002 to 8% in 2007. Two noxious weeds, field bindweed (*Convolvulus arvensis*) and musk thistle (*Cardus nutans*) have been sampled, but at low abundance.

1997 TREND ASSESSMENT

The trend for browse is stable. There was little preferred browse. Mountain big sagebrush density increased from 0 plants/acre to 40 plants/acre (99 plants/ha). There was no recruitment of young and no decadence in the population, and vigor was excellent. Plant use was light-moderate. Winterfat density increased from 0 plants/acre to 140 plants/acre (346 plants/ha). All of the plants sampled were mature and healthy, despite heavy browsing. Bitterbrush density increased from 0 plants/acre to 40 plants/acre (99plants/ha). All of the plants were mature, health, and had been heavily browsed. The trend for grass is slightly down. The sum of nested frequency of perennial grasses decreased 12%. The nested frequencies of bluebunch wheatgrass, intermediate wheatgrass, and orchardgrass all significantly increased. The nested frequency for bottlebrush squirreltail significantly decreased. The forb trend is stable. There was little change in the sum of nested frequency of perennial forbs. Field bindweed was not sampled, but musk thistle was. The Desirable Components Index (DCI) score was very poor due to very little browse cover, excellent perennial grass cover, little annual grass cover, moderate-high perennial forb cover, and the presence of a noxious weed species.

winter range condition (DCI) - very poor (30) Mid-level potential scale
browse - stable (0) grass - slightly down (-1) forb - stable (0)

2002 TREND ASSESSMENT

The browse trend is stable. Preferred forage species remained limited. Mountain big sagebrush density increased to 80 plants/acre (198 plants/ha), winterfat density decreased to 80 plants/acre (198 plants/ha), and bitterbrush density remained stable. The recruitment of young, decadence, plant vigor, and browse use of these species remained stable. The grass trend is slightly down. The sum of nested frequency for perennial grasses decreased 13%. Orchardgrass and bottlebrush squirreltail decreased significantly in nested frequency, while bluebunch wheatgrass increased significantly in nested frequency. No annual grasses were measured. The forb trend is stable. Perennial forbs declined 15% in sum of nested frequency. However, the nested frequency of bur buttercup decreased significantly and quadrat frequency decreased from 42% to 12%. Additionally, there were no noxious weeds sampled. The DCI score remained very poor.

winter range condition (DCI) - very poor (29) Mid-level potential scale
browse - stable (0) grass - slightly down (-1) forb - stable (0)

2007 TREND ASSESSMENT

The browse trend is slightly up. Preferred forage species remained limited. Mountain big sagebrush density increased four-fold to 360 plants/acre (889 plants/ha), and 94% of these were young. This increase is likely the result of the two-way harrow and seeding treatment. Decadence and plant vigor was similar to previous years. Browse use was mostly light-moderate. Winterfat density decreased to 40 plants/acre (98 plants/ha) and bitterbrush density decreased to 20 plants/acre (49 plants/ha). The number of young and decadent plants, plant vigor, and use of these species was similar to previous measurements. The grass trend is stable. The sum of nested frequency of perennial grasses greatly increased, however, that of cheatgrass also increased significantly. Cheatgrass was not measured in 2002, but was measured in 63% of the quadrats in 2007, providing 2% of the total ground cover. The forb trend is slightly down. The nested frequency of perennial forbs greatly increased. However, the increase in bur buttercup nested frequency was even greater. It increased from 2% of the total forb cover in 2002 to 67% of the total forb cover in 2007. The DCI score remained very poor.

winter range condition (DCI) - very poor (28) Mid-level potential scale

browse - slightly up (+1)

grass - stable (0)

forb - slightly down (-1)

HERBACEOUS TRENDS --

Management unit 16C, Study no: 5

T y p e	Species	Nested Frequency				Average Cover %		
		'89	'97	'02	'07	'97	'02	'07
G	Agropyron cristatum	a5	a18	a20	b59	.85	1.54	2.78
G	Agropyron intermedium	a18	b117	b91	b113	3.94	4.74	5.28
G	Agropyron spicatum	a61	b118	c162	bc140	7.21	12.67	10.58
G	Bromus japonicus (a)	-	2	-	-	.00	-	-
G	Bromus tectorum (a)	-	a33	-	b173	.15	-	2.36
G	Dactylis glomerata	a3	b23	a3	a4	.64	.03	.03
G	Elymus junceus	a1	a2	a4	-	.15	.18	-
G	Festuca ovina	-	-	-	3	-	-	.03
G	Oryzopsis hymenoides	b47	ab30	a10	a16	.95	.26	.11
G	Poa bulbosa	-	-	-	1	-	-	.01
G	Poa fendleriana	a7	a1	a4	a1	.03	.03	.03
G	Poa secunda	bc30	ab15	a9	c41	.58	.02	.53
G	Sitanion hystrix	c230	b31	a5	a10	.56	.03	.12
Total for Annual Grasses		0	35	0	173	0.15	0	2.36
Total for Perennial Grasses		402	355	308	388	14.93	19.53	19.53
Total for Grasses		402	390	308	561	15.09	19.53	21.89
F	Alyssum alyssoides (a)	-	a7	a6	b270	.02	.01	2.61
F	Antennaria rosea	-	a6	a4	-	.01	.01	-
F	Arabis sp.	a1	a3	-	-	.00	-	-
F	Arenaria fendleri	-	a34	a23	b59	.10	.12	.22
F	Astragalus calycosus	-	a5	a2	a9	.01	.00	.07

Type	Species	Nested Frequency				Average Cover %		
		'89	'97	'02	'07	'97	'02	'07
F	<i>Astragalus convallarius</i>	-	-	-	2	-	-	.03
F	<i>Astragalus</i> sp.	_a 5	_a 12	-	_a 1	.05	-	.00
F	<i>Castilleja linariaefolia</i>	-	-	-	3	-	-	.00
F	<i>Camelina microcarpa</i> (a)	-	_a 5	-	_a 1	.01	-	.00
F	<i>Carduus nutans</i> (a)	-	-	-	-	.03	-	-
F	<i>Calochortus nuttallii</i>	-	-	-	1	-	-	.00
F	<i>Chaenactis douglasii</i>	-	_a 5	-	_a 3	.04	-	.00
F	<i>Chenopodium fremontii</i> (a)	-	3	-	-	.00	-	-
F	<i>Cirsium</i> sp.	_a 7	_a 1	-	-	.00	-	-
F	<i>Convolvulus arvensis</i>	8	-	-	-	-	-	-
F	<i>Cryptantha</i> sp.	_b 33	_a 8	-	_a 3	.03	-	.01
F	<i>Descurainia pinnata</i> (a)	-	-	-	15	-	-	.08
F	<i>Erigeron</i> sp.	-	1	-	-	.00	-	-
F	<i>Eriogonum</i> sp.	_a 3	_a 4	-	-	.03	-	-
F	<i>Haplopappus acaulis</i>	_a 5	_{bc} 21	_c 37	_{ab} 15	.61	.91	.63
F	<i>Lactuca serriola</i>	_a 12	-	-	_a 4	-	-	.01
F	<i>Linum lewisii</i>	-	-	-	13	-	-	.03
F	<i>Lomatium</i> sp.	-	-	-	12	-	-	.15
F	<i>Machaeranthera canescens</i>	_a 8	-	-	_a 3	-	-	.04
F	<i>Medicago sativa</i>	-	_a -	-	_a 3	.01	-	.03
F	<i>Penstemon humilis</i>	_a 8	_a 2	_a 8	_a 3	.01	.01	.03
F	<i>Petrorhiza pumila</i>	_a 1	_b 30	_b 45	_b 42	1.82	1.54	1.71
F	<i>Phlox hoodii</i>	_a 107	_a 97	_a 89	_a 78	1.09	.78	.82
F	<i>Phlox longifolia</i>	-	-	4	-	-	.03	-
F	<i>Ranunculus testiculatus</i> (a)	-	_b 111	_a 29	_c 297	.65	.08	5.31
F	<i>Salsola iberica</i> (a)	-	-	-	-	-	-	.00
F	<i>Sanguisorba minor</i>	_b 19	_a 3	-	_a 8	.03	-	.04
F	<i>Sphaeralcea coccinea</i>	_a 3	_a 3	-	_a 4	.01	-	.03
F	<i>Sphaeralcea grossulariifolia</i>	-	-	-	-	-	-	.00
F	<i>Streptanthus cordatus</i>	5	-	-	-	-	-	-
F	<i>Trifolium douglasii</i>	-	11	-	-	.07	-	-
F	<i>Tragopogon dubius</i>	_b 31	_a 3	_a 1	-	.00	.00	-
F	<i>Trifolium</i> sp.	-	-	-	8	-	-	.02
Total for Annual Forbs		0	126	35	583	0.71	0.10	8.02
Total for Perennial Forbs		256	249	213	274	3.99	3.43	3.93
Total for Forbs		256	375	248	857	4.70	3.53	11.95

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

BROWSE TRENDS --

Management unit 16C, Study no: 5

Type	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	Amelanchier utahensis	1	0	0	-	-	-
B	Artemisia tridentata vaseyana	2	3	13	-	-	.03
B	Atriplex canescens	0	1	0	-	.03	-
B	Ceratoides lanata	5	3	2	.06	.04	-
B	Chrysothamnus depressus	2	0	2	-	-	.03
B	Chrysothamnus nauseosus albicaulis	1	0	0	-	-	-
B	Chrysothamnus viscidiflorus stenophyllus	46	53	52	3.88	4.23	3.56
B	Ephedra viridis	0	1	0	-	-	-
B	Gutierrezia sarothrae	3	14	10	-	.84	.06
B	Juniperus osteosperma	18	23	14	3.65	9.14	6.65
B	Purshia tridentata	2	2	1	-	-	-
Total for Browse		80	100	94	7.60	14.28	10.35

CANOPY COVER, LINE INTERCEPT --

Management unit 16C, Study no: 5

Species	Percent Cover	
	'02	'07
Artemisia tridentata vaseyana	.06	-
Ceratoides lanata	.01	-
Chrysothamnus viscidiflorus stenophyllus	3.91	2.73
Gutierrezia sarothrae	.16	.08
Juniperus osteosperma	12.71	7.53
Purshia tridentata	.13	-

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 16C, Study no: 5

Species	Average leader growth (in)	
	'02	'07
Artemisia tridentata vaseyana	2.0	1.7
Ceratoides lanata	-	3.7

POINT-QUARTER TREE DATA --
Management unit 16C, Study no: 5

Species	Trees per Acre	
	'02	'07
Juniperus osteosperma	343	262

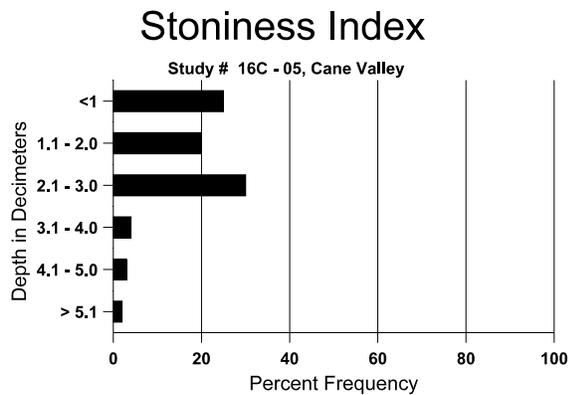
Average diameter (in)	
'02	'07
2.2	2.7

BASIC COVER --
Management unit 16C, Study no: 5

Cover Type	Average Cover %			
	'89	'97	'02	'07
Vegetation	11.50	27.65	35.98	40.87
Rock	11.75	8.64	10.51	12.12
Pavement	15.25	6.38	15.90	12.04
Litter	48.50	33.02	35.79	29.60
Cryptogams	0	.27	1.75	.93
Bare Ground	13.00	20.74	15.79	20.34

SOIL ANALYSIS DATA --
Herd Unit 16C, Study no: 05, Cane Valley

Effective rooting depth (in)	Temp °F (depth)	pH	Clay			%OM	ppm P	ppm K	dS/m
			% sand	% silt	% clay				
14.0	60.0 (14.7)	7.4	28.0	29.4	42.6	5.0	12.4	188.8	.4



PELLET GROUP DATA --
 Management unit 16C, Study no: 5

Type	Quadrat Frequency		
	'97	'02	'07
Sheep	4	7	-
Rabbit	4	24	42
Elk	26	10	12
Deer	25	43	49
Cattle	1	-	1

Days use per acre (ha)	
'02	'07
13 (31)	-
-	-
25 (61)	58 (144)
76 (187)	122 (301)
-	-

BROWSE CHARACTERISTICS --
 Management unit 16C, Study no: 5

		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)
Amelanchier utahensis												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	20	-	20	-	-	-	0	0	-	-	0	1/7
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	-/-
Artemisia tridentata vaseyana												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	40	-	-	40	-	20	50	0	-	-	0	12/11
02	80	-	-	80	-	20	25	25	-	-	0	15/23
07	360	-	340	20	-	-	17	6	-	-	0	11/16
Atriplex canescens												
89	33	-	-	33	-	-	0	0	-	-	0	37/26
97	0	-	-	-	-	-	0	0	-	-	0	61/77
02	20	-	-	20	-	-	0	0	-	-	0	30/48
07	0	-	-	-	-	-	0	0	-	-	0	38/25
Ceratoides lanata												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	140	-	-	140	-	-	14	71	-	-	0	4/5
02	80	-	-	80	-	-	25	50	-	-	0	7/10
07	40	-	-	40	-	-	0	100	-	-	0	7/9
Chrysothamnus depressus												
89	33	-	-	33	-	-	0	0	-	-	0	4/9
97	40	-	-	40	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	60	-	40	20	-	-	0	100	-	-	0	4/7

		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)
Chrysothamnus nauseosus albicaulis												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	20	-	20	-	-	-	0	0	-	-	0	15/17
02	0	-	-	-	-	-	0	0	-	-	0	8/9
07	0	-	-	-	-	-	0	0	-	-	0	11/12
Chrysothamnus viscidiflorus stenophyllus												
89	566	-	33	533	-	-	0	0	0	-	0	8/10
97	3640	40	560	3080	-	-	7	0	0	-	0	11/16
02	4920	-	120	4340	460	160	7	.40	9	.40	.40	8/15
07	4120	-	220	3300	600	140	37	13	15	8	8	7/12
Ephedra viridis												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	20	-	-	20	-	-	0	100	-	-	0	5/4
07	0	-	-	-	-	-	0	0	-	-	0	-/-
Gutierrezia sarothrae												
89	366	-	-	333	33	-	0	0	9	-	0	9/12
97	100	-	-	100	-	-	0	0	0	-	0	6/6
02	860	-	-	800	60	40	0	0	7	-	0	7/9
07	440	-	100	320	20	40	0	0	5	5	5	6/7
Juniperus osteosperma												
89	266	133	233	33	-	-	0	0	-	-	0	71/52
97	380	-	240	140	-	20	0	0	-	-	0	-/-
02	480	-	100	380	-	60	0	4	-	-	0	-/-
07	320	-	200	120	-	-	0	0	-	-	0	-/-
Purshia tridentata												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	40	-	-	40	-	-	0	100	-	-	0	6/14
02	40	-	-	40	-	-	0	100	-	-	0	8/17
07	20	-	-	20	-	-	0	100	-	-	0	7/12
Symphoricarpos oreophilus												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	10/21
07	0	-	-	-	-	-	0	0	-	-	0	-/-