

Trend Study 16A-9-07

Study site name: Birch Creek .

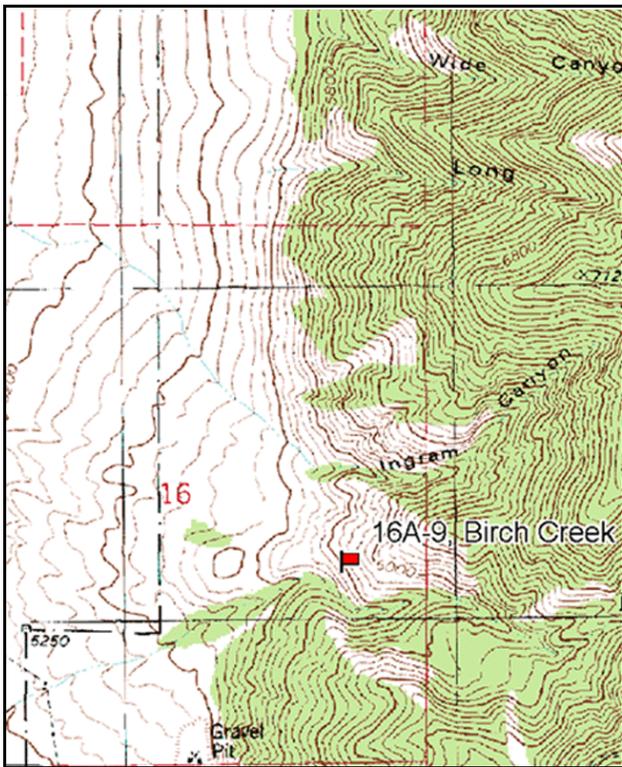
Vegetation type: Mountain Brush .

Compass bearing: frequency baseline 20 degrees magnetic (line 2 @ 50°M, line 3-4 @ 53°M).

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

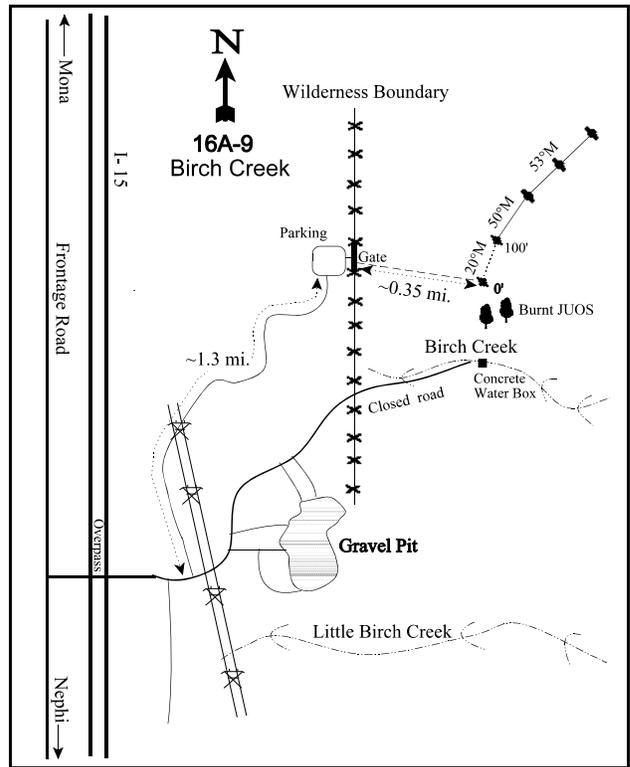
LOCATION DESCRIPTION

Beginning at the overpass where the road to Little Birch Canyon passes over I-15 (north of the northernmost Nephi exit), take the first left just before the powerlines cross the road. Proceed about 1.3 miles east-northeast to a parking lot. From the wilderness boundary, walk east for about 0.35 miles to the 0-foot stake. The 0-foot baseline stake is near a cliffrose bush on a small trail running parallel along the bench. Browse tag #197 marks the 0-foot baseline stake.



Map Name: Mona

Township 12S, Range 1E, Section 16



Diagrammatic Sketch

GPS: NAD 83, UTM 12S 429592 E 4402342 N

## DISCUSSION

### Birch Creek - Trend Study No. 16A-9

#### Study Information

This study is located at the mouth of Little Birch Creek [elevation: 5,780 feet (1,762 m), slope: 55%, aspect: southwest]. The range type is a sparse mixture of Stansbury cliffrose (*Cowania mexicana* ssp. *stansburiana*), Utah serviceberry (*Amelanchier utahensis*), and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Water is available in Birch Creek approximately 150 yards (137 m) downslope from the baseline. A fire burned the majority of the study in 2001, although the end of the baseline was spared, leaving some healthy browse intact. The area is considered critical deer and elk winter range. Deer and elk pellet groups were sampled at quadrat frequencies of 30% and 15% in 1997, respectively. Deer use was estimated at 44 days use/acre (109 ddu/ha) in 2002 and 39 days use/acre (96 ddu/ha) in 2007. Elk use was estimated at 20 days use (50 edu/ha) in 2002 and 38 days use/acre (94 edu/ha) in 2007.

#### Soil

The soil was formed in colluvium derived from limestone (USDA-NRCS 2007). It is shallow and extremely rocky, and there are numerous rock outcrops. The soil texture is a sandy loam with a neutral pH (7.1). The organic matter content is 3.1%. Some erosion has occurred due to the steep slope. There are microterraces on the downslope side of the vegetation. The erosion condition was classified as slight in 2002 due to pedestalling and surface litter and rock movement, but was classified as stable in 2007.

#### Browse

The main browse species are serviceberry, cliffrose, and mountain big sagebrush. Serviceberry has been sampled at the highest density of the three species. In 1997, the density was estimated at 640 plants/acre (1,581 plants/ha). Most of the serviceberry burned in the fire, but had resprouted by 2002, with a density of 1,300 plants/acre (3,212 plants/ha). By 2007, the density was 920 plants/acre (2,272 plants/ha). Ninety-three percent of the plants were either young or had reached maturity, and were vigorous in 2007. Before the fire, use of serviceberry was mostly moderate-heavy. In 2007, use was mostly light, with some moderate and heavy use. Annual leader growth averaged 1.1 inches (2.8 cm) in 2007.

Cliffrose density was estimated at 180 plants/acre (445 plants/ha) in 1997. The majority of the population consisted of large, mature plants with an average height of 5.4 feet (1.6 m). The fire burned most of the cliffrose, but left a few plants unburned upslope at the end of the baseline. Only an estimated 40 plants/acre (99 plants/ha), 20 young and 20 mature, were sampled in 2007, all of which displayed good vigor. Use of the available cliffrose has been consistently moderate-heavy throughout the study. Annual leader growth averaged 1.3 inches (3.2 cm) in 2007.

Mountain big sagebrush density was 360 plants/acre (889 plants/ha) in 1997. The population consisted of mostly mature plants, with high recruitment. All of the plants were vigorous, and use was moderate-heavy. The fire eliminated most of the sagebrush. In 2002, the few plants that were sampled were mostly decadent and classified as dying, and no plants were sampled in 2007. Other preferred browse, including black sagebrush (*Artemisia nova*), true mountain mahogany (*Cercocarpus montanus*), and fourwing saltbush (*Atriplex canescens*), were sampled in very low densities.

#### Herbaceous Understory

The grass component of the understory is not very diverse, and the majority of the grass cover has been provided by bluebunch wheatgrass (*Agropyron spicatum*) and cheatgrass (*Bromus tectorum*) since 1997. Sandberg bluegrass (*Poa secunda*) also occurs in low frequency. Grass cover has increased since the fire, from 13% in 1997 to 15% in 2002 and 29% in 2007. Cheatgrass provided 46% of the total grass cover in 1997, 63% in 2002, and 59% in 2007. Bluebunch wheatgrass provided 53% of the total grass cover in 1997, 32% in 2002,

and 38% in 2007.

Forbs are relatively diverse, but provide little quality forage. Total forb cover has ranged from 4% to 7% since 1997. The majority of the perennial forb cover is provided by northern sweetvetch (*Hedysarum boreale*) and shortstem wild buckwheat (*Eriogonum brevicaulle*). Annual species dominate the forb component of the understory. The most common annuals are storksbill (*Erodium cicutarium*), which outcompetes native species (Buchanan et al. 1978), and pale alyssum (*Alyssum alyssoides*).

#### 1989 TREND ASSESSMENT

The trend for browse is slightly down. Serviceberry density decreased from 700 plants/acre (1,729 plants/ha) to 265 plants/acre (655 plants/ha), although it is believed that serviceberry density was underestimated in 1989. The population remained mostly mature, however, recruitment decreased and decadence increased. All of the sampled plants were vigorous. Mountain big sagebrush density decreased from 732 plants/acre (1,808 plants/ha) to 466 plants/acre (1,151 plants/ha). The age structure indicated a stable population, with approximately 30% young plants and 30% decadence. Plants displaying poor vigor increased from 9% to 14% of the population. Cliffrose density was low, but increased from 66 plants/acre (163 plants/ha) to 99 plants/acre (245 plants/ha). Decadence also increased, and no young plants were sampled, but vigor was good. All of the preferred browse species showed moderate use. The trend for grass is up. The sum of nested frequency for perennial grasses increased 74%. Both bluebunch wheatgrass and Sandberg bluegrass increased significantly in nested frequency. The trend for forbs is up. The sum of nested frequency for perennial forbs increased nearly two-fold. Although the frequencies of grasses and forbs increased, diversity was low.

browse - slightly down (-1)

grass - up (+2)

forb - up (+2)

#### 1997 TREND ASSESSMENT

The trend for browse is slightly up. The total density of preferred browse species increased, although this increase was partly attributed to the lengthening of the baseline. Serviceberry density increased substantially. Decadence decreased, while young recruitment increased from 12% to 41% of the population. Mountain big sagebrush density decreased 23%, and all of the sampled plants were young or mature and displayed good vigor. Cliffrose increased in density by 82%. Decadence decreased from 33% to 22%, but there continued to be no reproduction or recruitment of this species. Plants displaying poor vigor increased to 11% of the population. Mountain mahogany, black sagebrush, and fourwing saltbush were sampled in low frequencies. All of the preferred browse species displayed moderate-heavy use. The trend for grass is down. The sum of nested frequency for perennial grasses decreased almost 30%, and Sandberg bluegrass decreased significantly in nested frequency. The trend for forbs is slightly down. The sum of nested frequency for perennial forbs decreased 26%. The Desirable Components Index (DCI) was rated as poor due to low preferred browse cover and an understory dominated by annual species.

winter range condition (DCI) - poor (42) Mid-level potential scale

browse - slightly up (+1)

grass - down (-2)

forb - slightly down (-1)

#### 2002 TREND ASSESSMENT

The trend for browse is stable. The fire that burned in 2001 eliminated the majority of the shrubs. Sagebrush density was estimated at only 80 plants/acre (198 plants/ha). Seventy-five percent of the sampled plants were decadent, and 50% were classified as dying. Half of the plants displayed poor vigor and heavy use. Cliffrose density decreased to 60 plants/acre (148 plants/ha), with 33% decadence. All of the plants were vigorous and heavily hedged. Serviceberry resprouted at a density of 1,300 plants/acre (3,211 plants/ha). Ninety-five percent of these plants were young and vigorous, and use was mostly light. This increase in the recruitment of serviceberry helped to improve the sustainability of the winter range on the study. The trend for grass is slightly down. The sum of nested frequency for perennial grasses decreased 18%. Bluebunch wheatgrass decreased significantly in nested frequency. Cheatgrass cover increased from 6% to 10%. The trend for forbs

is slightly up. The sum of nested frequency for perennial forbs increased 53%, but these species were still rare. Pale alyssum decreased significantly in nested frequency. The DCI rating declined to very poor, mainly due to the decrease in preferred browse cover caused by the fire.

winter range condition (DCI) - very poor (10) Mid-level potential scale  
browse - stable (0)                      grass - slightly down (-1)                      forb - slightly up (+1)

2007 TREND ASSESSMENT

The trend for browse is down. Serviceberry density decreased 29%, and the majority of the population was young, with 35% mature plants. Most individuals were vigorous, and 37% of the sampled plants showed moderate-heavy use. Mountain big sagebrush was not sampled. Cliffrose, mahogany, and black sagebrush were sampled in low densities. Despite the low densities of preferred browse species, serviceberry, mahogany, and cliffrose all increased slightly in cover. Black sagebrush was mostly decadent and displayed poor vigor, while cliffrose and mahogany were vigorous and showed moderate-heavy use. The trend for grass is stable. The sum of nested frequency for perennial grasses changed little. Perennial grass cover increased from 6% to 12%, which was attributed to an increase in bluebunch wheatgrass cover. However, cheatgrass increased significantly in nested frequency, and increased in average cover from 10% to 17%. The trend for forbs is stable. The sum of nested frequency for perennial forbs did not change substantially. The DCI rating increased to poor-fair due to the increase in preferred browse and perennial grass cover.

winter range condition (DCI) - poor-fair (52) Mid-level potential scale  
browse - down (-2)                      grass - stable (0)                      forb - stable (0)

HERBACEOUS TRENDS --  
Management unit 16A, Study no: 9

Type	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
G	Agropyron spicatum	bc188	d259	cd215	a141	ab173	7.00	4.87	11.01
G	Bromus japonicus (a)	-	-	-	b45	a3	-	.15	.00
G	Bromus tectorum (a)	-	-	a292	a276	b315	6.13	9.72	17.10
G	Poa secunda	a4	c75	ab23	bc54	a25	.14	.63	.52
G	Vulpia octoflora (a)	-	-	-	-	7	-	-	.18
Total for Annual Grasses		0	0	292	321	325	6.13	9.88	17.28
Total for Perennial Grasses		192	334	238	195	198	7.14	5.50	11.53
Total for Grasses		192	334	530	516	523	13.27	15.39	28.82
F	Alyssum alyssoides (a)	-	-	b237	a190	a193	2.66	1.20	1.30
F	Allium sp.	-	-	-	3	-	-	.03	-
F	Arabis sp.	-	-	1	-	-	.00	-	-
F	Artemisia ludoviciana	a2	-	a3	a3	a3	.03	.03	.03
F	Castilleja linariaefolia	-	-	3	-	-	.00	-	-
F	Camelina microcarpa (a)	-	-	-	a3	a10	-	.00	.02
F	Calochortus nuttallii	a3	-	a2	a1	-	.00	.00	-
F	Cirsium sp.	-	-	6	-	-	.01	-	-

T y p e	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
F	Comandra pallida	-	7	-	-	-	-	-	-
F	Collinsia parviflora (a)	-	-	-	<sub>a</sub> 3	<sub>a</sub> 4	-	.00	.03
F	Descurainia pinnata (a)	-	-	<sub>a</sub> 9	<sub>a</sub> 20	<sub>a</sub> 24	.02	.10	.51
F	Epilobium brachycarpum (a)	-	-	-	1	-	-	.00	-
F	Eriogonum brevicaulle	-	<sub>a</sub> 2	<sub>a</sub> 8	<sub>a</sub> 10	<sub>a</sub> 6	.73	.48	.39
F	Erodium cicutarium (a)	-	-	<sub>a</sub> 23	<sub>a</sub> 42	<sub>b</sub> 91	.09	1.39	2.64
F	Galium aparine (a)	-	-	<sub>a</sub> 57	<sub>a</sub> 57	<sub>a</sub> 32	.83	.22	.38
F	Gilia sp. (a)	-	-	<sub>a</sub> 9	<sub>b</sub> 19	<sub>a</sub> -	.01	.11	.00
F	Hackelia patens	<sub>a</sub> 2	<sub>a</sub> 6	-	-	-	-	-	-
F	Hedysarum boreale	<sub>c</sub> 27	<sub>c</sub> 31	<sub>bc</sub> 21	<sub>a</sub> 2	<sub>ab</sub> 8	.77	.18	.59
F	Holosteum umbellatum (a)	-	-	-	<sub>a</sub> 9	<sub>b</sub> 55	-	.02	.21
F	Lappula occidentalis (a)	-	-	<sub>a</sub> 6	<sub>a</sub> 7	<sub>a</sub> 6	.01	.04	.01
F	Lactuca serriola	-	-	-	<sub>a</sub> 2	<sub>b</sub> 43	-	.03	.34
F	Lygodesmia grandiflora	<sub>a</sub> 7	<sub>a</sub> 18	-	-	-	-	-	-
F	Machaeranthera canescens	-	<sub>a</sub> 9	<sub>a</sub> 10	-	<sub>a</sub> 4	.04	-	.06
F	Phacelia linearis	-	-	-	<sub>b</sub> 68	<sub>a</sub> 8	-	.52	.01
F	Phlox longifolia	-	<sub>a</sub> 11	<sub>a</sub> 2	<sub>a</sub> 5	<sub>a</sub> 10	.00	.06	.03
F	Ranunculus testiculatus (a)	-	-	-	5	-	-	.01	-
F	Sisymbrium altissimum (a)	-	-	-	-	4	-	-	.22
F	Streptanthus cordatus	-	-	<sub>a</sub> 5	<sub>a</sub> 1	<sub>a</sub> 3	.15	.00	.03
F	Tragopogon dubius	<sub>a</sub> 2	-	<sub>a</sub> 1	-	<sub>a</sub> 8	.00	-	.10
F	Unknown forb-annual (a)	-	-	33	-	-	.08	-	-
Total for Annual Forbs		0	0	374	356	419	3.73	3.14	5.35
Total for Perennial Forbs		43	84	62	95	93	1.78	1.35	1.61
Total for Forbs		43	84	436	451	512	5.51	4.49	6.96

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

BROWSE TRENDS --

Management unit 16A, Study no: 9

Type	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	Amelanchier utahensis	16	16	16	1.91	1.05	1.65
B	Artemisia nova	5	0	4	-	-	-
B	Artemisia tridentata vaseyana	15	4	0	.89	.03	-
B	Atriplex canescens	1	0	0	-	-	-
B	Brickellia californica	2	0	1	.85	-	-
B	Cercocarpus montanus	2	1	2	1.00	.15	1.03
B	Chrysothamnus viscidiflorus stenophyllus	3	3	3	.00	.03	.18
B	Cowania mexicana stansburiana	8	3	2	3.01	1.06	2.16
B	Gutierrezia sarothrae	7	2	4	-	-	.18
B	Juniperus osteosperma	2	0	0	2.89	-	-
B	Rhus glabra cismontana	0	2	2	-	-	1.64
Total for Browse		61	31	34	10.57	2.32	6.85

CANOPY COVER, LINE INTERCEPT --

Management unit 16A, Study no: 9

Species	Percent Cover	
	'02	'07
Amelanchier utahensis	-	2.90
Brickellia californica	-	.18
Cercocarpus montanus	-	1.43
Chrysothamnus viscidiflorus stenophyllus	-	1.20
Cowania mexicana stansburiana	-	1.78
Gutierrezia sarothrae	-	.11
Rhus glabra cismontana	-	2.00

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 16A, Study no: 9

Species	Average leader growth (in)	
	'02	'07
Amelanchier utahensis	-	1.1
Cercocarpus montanus	-	1.2
Cowania mexicana stansburiana	-	1.3

BASIC COVER --

Management unit 16A, Study no: 9

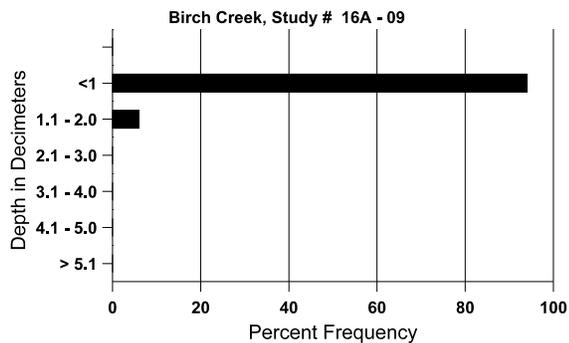
Cover Type	Average Cover %				
	'83	'89	'97	'02	'07
Vegetation	2.00	8.50	26.68	22.07	43.54
Rock	26.25	41.25	48.14	51.06	37.57
Pavement	25.50	3.25	9.28	9.39	6.91
Litter	44.50	42.25	26.36	19.13	21.97
Cryptogams	.25	1.50	.88	.00	.01
Bare Ground	1.50	3.25	7.58	13.19	5.55

SOIL ANALYSIS DATA --

Herd Unit 16A, Study no: 09, Birch Creek

Effective rooting depth (in)	Temp °F (depth)	pH	Sandy loam			%OM	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
13.8	55.5 (12.9)	7.1	54.4	30.1	15.6	3.1	9.7	80.0	.7

### Stoniness Index



PELLET GROUP DATA --

Management unit 16A, Study no: 9

Type	Quadrat Frequency		
	'97	'02	'07
Rabbit	-	-	1
Elk	30	12	8
Deer	15	25	14

Days use per acre (ha)	
'02	'07
-	-
20 (50)	38 (94)
44 (109)	39 (96)

BROWSE CHARACTERISTICS --  
Management unit 16A, Study no: 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)
<b>Amelanchier utahensis</b>												
83	<b>700</b>	-	200	500	-	-	81	0	0	-	10	34/37
89	<b>265</b>	-	33	166	66	-	63	13	25	-	0	46/31
97	<b>640</b>	160	260	360	20	20	50	34	3	-	0	52/62
02	<b>1300</b>	-	1240	40	20	660	0	5	2	-	0	42/53
07	<b>920</b>	100	540	320	60	-	17	20	7	4	4	26/35
<b>Artemisia nova</b>												
83	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
89	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
97	<b>120</b>	-	-	100	20	-	50	17	17	17	17	15/27
02	<b>0</b>	-	-	-	-	60	0	0	0	-	0	6/28
07	<b>80</b>	-	-	20	60	40	25	0	75	75	75	9/20
<b>Artemisia tridentata vaseyana</b>												
83	<b>732</b>	-	66	400	266	-	59	0	36	-	9	22/25
89	<b>466</b>	-	133	200	133	-	50	7	29	7	14	17/29
97	<b>360</b>	-	60	300	-	20	50	33	0	-	0	27/47
02	<b>80</b>	-	-	20	60	60	0	50	75	50	50	19/30
07	<b>0</b>	-	-	-	-	-	0	0	0	-	0	18/30
<b>Atriplex canescens</b>												
83	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
89	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
97	<b>20</b>	-	-	20	-	-	0	100	-	-	0	22/37
02	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
07	<b>0</b>	-	-	-	-	-	0	0	-	-	0	42/59
<b>Brickellia californica</b>												
83	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
89	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
97	<b>100</b>	-	-	100	-	20	0	0	-	-	0	21/28
02	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
07	<b>40</b>	-	-	40	-	-	0	0	-	-	0	14/25

		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)
<b>Cercocarpus montanus</b>												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	40	-	-	40	-	-	0	100	-	-	0	55/50
02	20	20	-	20	-	-	0	100	-	-	0	71/56
07	40	-	-	40	-	-	100	0	-	-	0	58/57
<b>Chrysothamnus nauseosus albicaulis</b>												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	60/94
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	35/52
<b>Chrysothamnus viscidiflorus stenophyllus</b>												
83	133	-	-	133	-	-	0	0	0	-	0	19/33
89	199	-	-	166	33	-	0	0	17	-	0	15/27
97	60	20	-	60	-	-	0	0	0	-	0	16/33
02	60	-	20	20	20	-	0	0	33	-	0	11/18
07	80	-	-	60	20	-	0	0	25	-	0	12/26
<b>Cowania mexicana stansburiana</b>												
83	66	33	-	66	-	-	50	50	0	-	50	67/69
89	99	-	-	66	33	-	100	0	33	-	0	75/45
97	180	-	-	140	40	-	44	44	22	11	11	65/77
02	60	-	-	40	20	160	0	100	33	-	0	44/64
07	40	-	20	20	-	20	50	50	0	-	0	55/57
<b>Gutierrezia sarothrae</b>												
83	66	-	-	66	-	-	0	0	0	-	0	11/10
89	33	-	-	-	33	-	0	0	100	-	0	-/-
97	160	20	60	100	-	20	0	0	0	-	0	8/12
02	60	-	-	40	20	40	0	0	33	33	33	6/10
07	140	20	60	80	-	-	0	0	0	-	0	7/12
<b>Juniperus osteosperma</b>												
83	33	-	-	33	-	-	0	0	-	-	0	67/81
89	33	-	-	33	-	-	0	0	-	-	0	108/79
97	40	-	-	40	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	40	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)
<b>Rhus glabra cismontana</b>												
83	<b>33</b>	-	33	-	-	-	0	0	-	-	0	-/-
89	<b>300</b>	-	-	300	-	-	33	0	-	-	0	39/35
97	<b>0</b>	-	-	-	-	-	0	0	-	-	0	35/17
02	<b>40</b>	-	40	-	-	40	0	0	-	-	0	-/-
07	<b>60</b>	20	-	60	-	-	0	0	-	-	0	39/50
<b>Rhus trilobata</b>												
83	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
89	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
97	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
02	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
07	<b>0</b>	-	-	-	-	-	0	0	-	-	0	74/154