

Trend Study 15-12-04

Study site name: Quaking Aspen Spring .

Vegetation type: Chained, Seeded P-J .

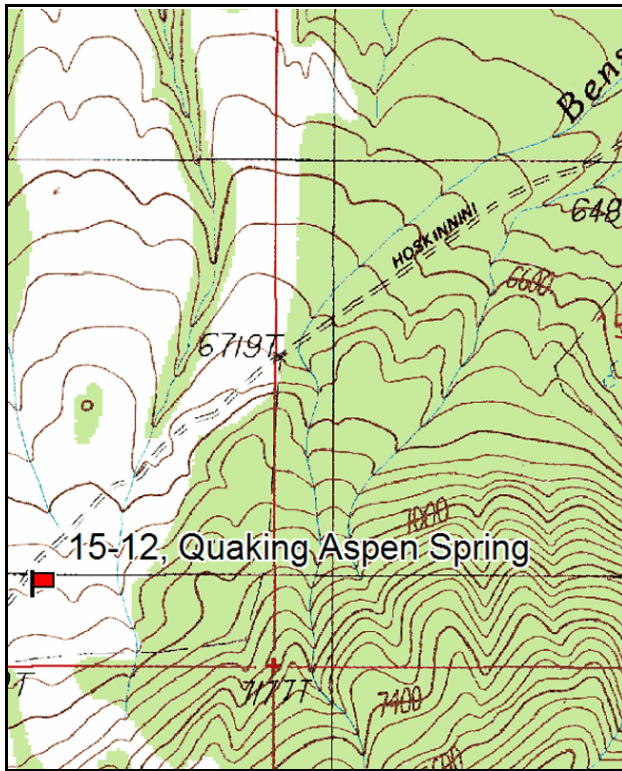
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

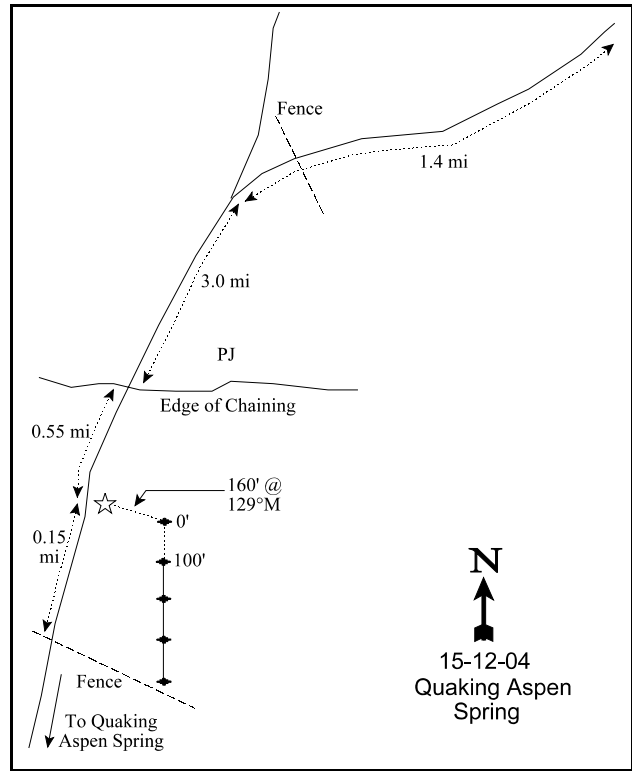
From the intersection of highways 95 and 276, go 4.7 miles south down SR 276 to a gravel road. Turn right and travel 3.1 miles to an abandoned cabin near the creek. Continue 0.6 miles to a fork. Stay right, cross the creek and go 0.8 miles to some mining cabins. Keep left on the main road. Continue 1.2 miles to a fence. Continue 0.2 miles to a fork. Take the left fork towards Quaking Aspen Spring. Go 3 miles to the edge of a chaining. Continue 0.55 miles to a witness post on the left side of the road. The 0-foot baseline stake, a 1 ½ foot tall fence post, is 160 feet southeast of witness post and is marked by a red browse tag #7135.

\*\*\*Alternate route- From study number 15-13, go 2.2 miles to a fork. Stay left and continue 1.6 miles to another fork. Stay left again and go 1.2 miles (you will go through Stanton Pass and pass Quaking Aspen Spring) passing through a fence to a witness post on the right.\*\*\*



Map Name: Cass Creek Peak

Township 33S , Range 11E , Section 21



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4197939 N, 526282 E

## DISCUSSION

### Quaking Aspen Spring - Trend Study No. 15-12

The Quaking Aspen Spring study is located in the foothills on the north slope of Mt. Hillars and about 2/3 of a mile from Quaking Aspen Spring. The site is at an elevation of 6,900 ft and located on a bench that slopes to the northwest with a slope of 8%. The area has historically been a pinyon-juniper vegetation type. It was chained years ago and trees were regaining their dominance of the area, until the Bulldog fire of 2003 burned all trees and browse on the site. The area was chained and seeded after the fire for fire rehabilitation. Water is available for wildlife and livestock at Quaking Aspen Spring and Quaking Aspen Creek. This is thought to be a key use area for mule deer which use the area year-round. Pellet group data from 1999 indicated light use by wildlife and livestock with an estimated 18 deer and 3 cow days use/acre (44 ddu/ha and 7 cdu/ha). After the fire, data from 2004 estimated 1 deer day use/acre (3 ddu/ha)

The soil is a rocky, sandy clay loam with a slightly alkaline pH (7.5). Nutrient levels are low with phosphorus and potassium both below the minimum levels determined necessary for normal plant development. Organic matter is fairly low overall. Soil depth is fairly shallow with an estimated effective rooting depth of just over 12 inches. A calcium carbonate layer exists about four inches down in the profile. Although the soil is quite shallow, there are sufficient breaks in the rocky layers to permit more deep rooted shrubs, such as true mountain mahogany, to do well. Erosion was rated as only slight in 2004.

Prior to burning in 2003 pinyon and juniper trees were abundant. The average height of pinyon and juniper trees in the chaining during the 1987 reading was about five feet and the stand was composed of mostly young trees. Point quarter data from 1994 estimated 266 pinyon and 116 juniper trees/acre. Average basal diameter of pinyon was just over 2 inches, while that of juniper was 1.6 inches. In 1999, point quarter data estimated 252 pinyon and 128 juniper trees/acre. The average basal diameter increased for both species, pinyon was estimated at just over 3 inches while juniper was just over 2 inches. Canopy cover of pinyon and juniper trees was estimated at 13% in 1999. One-third of the trees inventoried were knockdown trees from the chaining. There was a high density of seedling and young trees present throughout the site. In 2003 all trees were burned by the Bulldog fire and no live trees were sampled in 2004.

Wyoming big sagebrush was seeded as part of the fire rehabilitation and a few seedlings were sampled in 2004. The key browse species were black sagebrush and true mountain mahogany. Black sagebrush was the most abundant shrub, but was destroyed by the fire. In 1994, it accounted for 69% of the browse cover, and the population was estimated at 14,160 plants/acre. In 1999, estimated density was 12,600 plants/acre, with the majority being mature. Utilization was mostly light and vigor generally good over all sampling years. Percent decadency increased from 12% in 1987, to 21% by 1994, and was 22% in 1999, but this was still relatively low compared to many other sites. Mountain mahogany density was approximately 400 plants/acre in 1999, a slight decrease from 440 plants/acre estimated in 1994. The 1994 and 1999 estimates were half of the 1987 estimate, however this was due largely to the much larger shrub sample size taken in 1994 and 1999 which gives a more representative sample. During the 1987 reading, 67% of the mahogany were heavily hedged (>60% of twigs browsed). By 1994, the proportion of plants showing heavy use had decreased to 18%, and those with moderate use had increased from 25% to 45%. In 1999, 25% of the mahogany displayed moderate use with 55% showing heavy use. In 2004, 160 plants/acre were sampled that had resprouted after the fire.

The herbaceous species on the site have been diverse, but most occurred infrequently. Most perennial grasses had decreased in frequency since the initial reading in 1987, with the exception of Indian ricegrass which had increased in 1999. Crested wheatgrass showed moderate to heavy utilization in 1999. The increase in pinyon-juniper canopy cover may have caused the continued decreases in herbaceous understory abundance from 1987 to 1999 (Tausch and West 1994). Cheatgrass increased significantly in 1999, but after the fire in 2003 and subsequent rehabilitation there was a significant decrease in abundance. After fire rehabilitation, crested

wheatgrass increased significantly. Other species that were seeded and sampled in 2004 include: intermediate wheatgrass, slender wheatgrass, mountain brome, orchard grass, and Russian wildrye. Arizona fescue and prairie Junegrass were seeded but not sampled. Other species found with lower in abundance after the fire were: blue grama, Indian ricegrass, mutton bluegrass, and bottlebrush squirreltail. After the fire, perennial grass cover increased from 3% to 5% and annual grass cover decreased from 3% to 1%. Forbs have also been diverse with 23 species sampled in 1994, 21 in 1999, and 28 in 2004. Perennial forb cover doubled after the fire (3.2% to 6.3%). Seeded forbs include: alfalfa, blue flax, Rocky Mountain beeplant, sainfoin, and small burnet. Alfalfa was found in 48% of the quadrats and had 1.4% cover in 2004. Annual forb cover was almost non-existent prior to the fire, but was nearly 8% in 2004. This would be a typical response to fire and should decrease with competition from the perennial herbaceous species.

#### 1994 TREND ASSESSMENT

Ground cover characteristics are very similar to those of the 1987 reading. Percent bare ground cover has declined slightly and erosion does not appear to be a problem on this site. Trend for soil is stable. Trend for browse is stable with healthy populations of black sagebrush and mountain mahogany. The herbaceous understory is in a state of decline. Sum of nested frequencies for perennial grasses and forbs have declined significantly since 1987.

##### TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly down (2)

winter range condition (DC index) - 54 (fair) Mountain big sagebrush/chaining type

#### 1999 TREND ASSESSMENT

Trend for soil is stable with ground cover characteristics similar to those in 1994. Trend for the key browse, black sagebrush and true mountain mahogany, is stable. Although densities for both slightly decreased from 1994 estimates, percent decadency for black sagebrush did not increase and the proportion of decadent plants that are dying is very low at 4%. No decadent plants were sampled for mahogany. Vigor was good for both species even with moderate to heavy use on mahogany which is tolerant to high levels of browsing. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses and forbs increased in 1999. One negative aspect in the understory is the increase in nested and quadrat frequency values for cheatgrass.

##### TREND ASSESSMENT

soil- stable (3)

browse- stable (3)

herbaceous understory- stable (3)

winter range condition (DC index) - 52 (fair) Mountain big sagebrush/chaining type

#### 2004 TREND ASSESSMENT

The site burned in 2003. Trend for soil would be considered downward because of the loss of vegetative cover, litter cover, and the large increase in bare soil. Trend for the key browse, black sagebrush and true mountain mahogany, is downward because of the losses to fire. True mountain mahogany should be able to recover from the fire along with serviceberry. Black sagebrush does not resprout after fire. It can only come back through a seed source, and the fire has not left many sources. There is also the possibility that rabbitbrush could increase rapidly into the open sites left by the wildfire as it is an excellent pioneering species. Currently, browse cover is less than three-tenths of one percent. It will take the shrubs much longer to recover from the effects of the fire. Trend for the herbaceous understory is slightly improving with perennial grass nested frequency almost unchanged since 1999, while perennial forb nested frequency has

increased greatly since the fire. Overall, sum of nested frequency for perennial grasses and forbs has increased for 2003.

TREND ASSESSMENT

soil- down due to fire (1)

browse- down due to fire (1)

herbaceous understory- slightly up (4)

winter range condition (DC index) - 49 (fair-poor) Mountain big sagebrush/chaining type, that has burned and lost its browse component, but the herbaceous component has improved.

HERBACEOUS TRENDS --

Management unit 15 , Study no: 12

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	<sub>b</sub> 63	<sub>a</sub> 9	<sub>b</sub> 46	<sub>c</sub> 98	.19	.66	2.43
G	Agropyron intermedium	<sub>a</sub> -	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 85	-	-	1.44
G	Agropyron trachycaulum	-	-	-	7	-	-	.04
G	Bouteloua gracilis	<sub>c</sub> 174	<sub>b</sub> 118	<sub>b</sub> 97	<sub>a</sub> -	1.62	.93	-
G	Bromus carinatus	<sub>a</sub> -	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 35	-	-	.70
G	Bromus tectorum (a)	-	<sub>a</sub> 23	<sub>c</sub> 177	<sub>b</sub> 54	.08	3.40	1.33
G	Dactylis glomerata	-	-	-	9	-	-	.04
G	Elymus junceus	-	-	-	7	-	-	.19
G	Koeleria cristata	-	-	1	-	-	.00	-
G	Oryzopsis hymenoides	<sub>a</sub> -	<sub>a</sub> 1	<sub>b</sub> 57	<sub>a</sub> 8	.03	.46	.01
G	Poa fendleriana	<sub>c</sub> 101	<sub>c</sub> 95	<sub>b</sub> 61	<sub>a</sub> 8	1.25	.88	.10
G	Sitanion hystrix	<sub>c</sub> 163	<sub>b</sub> 113	<sub>a</sub> 14	<sub>a</sub> 12	.43	.17	.12
G	Stipa comata	4	-	3	-	-	.00	-
Total for Annual Grasses		0	23	177	54	0.08	3.40	1.33
Total for Perennial Grasses		505	336	279	269	3.54	3.14	5.10
Total for Grasses		505	359	456	323	3.63	6.54	6.44
F	Achillea millefolium	<sub>a</sub> -	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 24	-	-	.11
F	Agoseris glauca	<sub>a</sub> -	<sub>a</sub> 3	<sub>b</sub> 14	<sub>a</sub> -	.03	.10	-
F	Allium spp.	2	-	-	-	-	-	-
F	Arabis demissa	<sub>b</sub> 31	<sub>a</sub> 8	<sub>ab</sub> 25	<sub>a</sub> 3	.02	.09	.03
F	Astragalus moencopensis	<sub>a</sub> -	<sub>b</sub> 12	<sub>a</sub> -	<sub>a</sub> -	.03	-	-
F	Aster spp.	-	4	-	-	.01	-	-
F	Astragalus spp.	<sub>b</sub> 16	<sub>a</sub> 6	<sub>a</sub> 6	<sub>a</sub> -	.04	.12	-
F	Astragalus utahensis	<sub>a</sub> -	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 47	-	-	.44
F	Castilleja chromosa	<sub>b</sub> 40	<sub>a</sub> 9	<sub>ab</sub> 23	<sub>a</sub> -	.05	.70	-
F	Calochortus nuttallii	<sub>a</sub> -	<sub>b</sub> 6	<sub>a</sub> 8	<sub>a</sub> 3	.02	.01	.00
F	Chenopodium fremontii (a)	-	-	-	3	-	-	.63

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
F	<i>Chenopodium leptophyllum</i> (a)	-	a-	a-	b24	-	-	3.62
F	<i>Cleome</i> spp. (a)	-	-	-	4	-	-	.06
F	<i>Comandra pallida</i>	a-	b14	a-	ab6	.11	-	.07
F	<i>Crepis acuminata</i>	-	2	1	-	.00	.01	-
F	<i>Cryptantha</i> spp.	-	-	3	-	-	.03	-
F	<i>Descurainia pinnata</i> (a)	-	2	-	2	.01	-	.00
F	<i>Erigeron eatonii</i>	-	-	-	3	-	-	.00
F	<i>Eriogonum</i> spp.	-	-	3	-	-	.00	-
F	<i>Erigeron pumilus</i>	19	19	19	14	.22	.09	.05
F	<i>Eriogonum umbellatum</i>	7	-	2	-	-	.00	-
F	<i>Gayophytum ramosissimum</i> (a)	-	b28	a-	b27	.07	-	.72
F	<i>Gilia</i> spp. (a)	-	-	-	3	-	-	.03
F	<i>Haplopappus acaulis</i>	-	-	1	-	-	.00	.00
F	<i>Hymenoxys acaulis</i>	b44	b29	b29	a2	.10	.15	.00
F	<i>Lappula occidentalis</i> (a)	-	b20	a-	b16	.12	-	.25
F	<i>Lesquerella kingii</i>	b40	b16	c86	a-	.04	.54	-
F	<i>Linum lewisii</i>	bc51	ab43	a21	c71	.13	.34	.57
F	<i>Lomatium</i> spp.	-	-	1	-	-	.00	-
F	<i>Lygodesmia spinosa</i>	b20	ab14	a3	ab7	.17	.01	.33
F	<i>Machaeranthera canescens</i>	3	-	-	-	-	-	.00
F	<i>Medicago sativa</i>	a-	a-	a-	b107	-	-	1.42
F	<i>Nicotiana attenuata</i> (a)	-	-	-	6	-	-	.07
F	<i>Onobrychis viciaefolia</i>	a-	a-	a-	b26	-	-	.38
F	<i>Penstemon comarrhenus</i>	2	6	3	-	.18	.01	-
F	<i>Phlox longifolia</i>	b167	a116	a119	a88	.33	.66	1.50
F	<i>Physaria</i> spp.	a-	a-	a-	b21	-	-	.15
F	<i>Polygonum douglasii</i> (a)	-	b47	a8	b59	.10	.02	2.10
F	<i>Sanguisorba minor</i>	a-	a-	a-	b67	-	-	1.06
F	<i>Senecio multilobatus</i>	b21	a1	b25	a7	.00	.25	.02
F	<i>Sphaeralcea coccinea</i>	1	2	-	9	.00	-	.10
F	Unknown forb-perennial	3	-	-	-	-	-	-
F	<i>Zigadenus paniculatus</i>	2	1	2	-	.00	.03	-
Total for Annual Forbs		0	97	8	144	0.30	0.01	7.51
Total for Perennial Forbs		469	311	394	505	1.53	3.21	6.29
Total for Forbs		469	408	402	649	1.83	3.23	13.81

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

BROWSE TRENDS --

Management unit 15 , Study no: 12

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Amelanchier utahensis	4	3	0	.03	.03	-
B	Artemisia nova	96	94	0	18.32	16.84	-
B	Artemisia tridentata wyomingensis	0	0	3	-	-	.08
B	Atriplex canescens	0	0	1	-	-	.03
B	Cercocarpus montanus	17	13	4	1.15	2.04	.03
B	Chrysothamnus depressus	15	19	0	.39	.31	-
B	Chrysothamnus nauseosus	5	0	0	.18	-	-
B	Coryphantha vivipara arizonica	0	0	0	-	.01	-
B	Eriogonum microthecum	63	26	3	.64	.59	.03
B	Gutierrezia sarothrae	12	4	16	.01	.04	.11
B	Juniperus osteosperma	0	18	0	2.73	6.50	-
B	Opuntia spp.	4	1	0	-	-	-
B	Pinus edulis	0	12	0	3.24	7.62	-
B	Tetradymia canescens	1	0	0	-	-	-
Total for Browse		217	190	27	26.71	34.00	0.29

CANOPY COVER, LINE INTERCEPT --

Management unit 15 , Study no: 12

Species	Percent Cover	
	'99	'04
Eriogonum microthecum	-	.03
Gutierrezia sarothrae	-	.01
Juniperus osteosperma	4.80	-
Pinus edulis	8.39	-

POINT-QUARTER TREE DATA --

Management unit 15 , Study no: 12

Species	Trees per Acre	
	'99	'04
Juniperus osteosperma	128	-
Pinus edulis	252	-

Average diameter (in)	
'99	'04
2.1	-
3.2	-

BASIC COVER --

Management unit 15 , Study no: 12

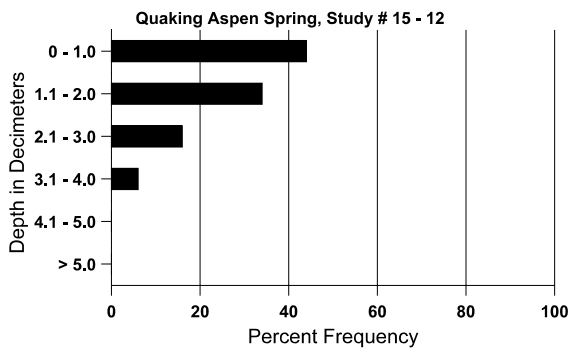
Cover Type	Average Cover %			
	'87	'94	'99	'04
Vegetation	7.75	33.40	39.97	18.57
Rock	18.50	22.14	24.27	29.15
Pavement	2.25	2.52	6.59	7.19
Litter	57.00	30.12	35.56	25.75
Cryptogams	.25	.00	1.26	0
Bare Ground	14.25	12.17	12.61	31.50

SOIL ANALYSIS DATA --

Management unit 15, Study no: 12, Study Name: Quaking Aspen Spring

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
12.3	64.4 (10.8)	7.5	51.3	22.2	26.6	2.1	6.6	44.8	.6

**Stoniness Index**



PELLET GROUP DATA --

Management unit 15 , Study no: 12

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	17	28	16
Elk	-	-	2
Deer	9	16	2
Cattle	-	3	-
Buffalo	1	-	-

Days use per acre (ha)	
'99	'04
-	-
-	-
18 (44)	1 (3)
3 (7)	-
-	-

BROWSE CHARACTERISTICS --  
Management unit 15 , Study no: 12

		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>												
87	<b>66</b>	200	66	-	-	-	100	0	-	-	0	-/-
94	<b>80</b>	-	20	60	-	-	0	0	-	-	0	32/51
99	<b>60</b>	-	-	60	-	-	0	100	-	-	0	37/48
04	<b>0</b>	-	-	-	-	-	0	0	-	-	0	29/36
<b>Artemisia nova</b>												
87	<b>12332</b>	4333	2866	7933	1533	-	28	9	12	.64	2	9/10
94	<b>14160</b>	360	700	10420	3040	-	0	.42	21	6	17	11/18
99	<b>12600</b>	60	780	9060	2760	1040	18	.63	22	.79	.79	12/19
04	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
<b>Artemisia tridentata wyomingensis</b>												
87	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
94	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
99	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
04	<b>60</b>	840	60	-	-	-	0	0	-	-	0	8/6
<b>Atriplex canescens</b>												
87	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
94	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
99	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
04	<b>20</b>	-	-	20	-	-	0	0	-	-	0	5/7
<b>Cercocarpus montanus</b>												
87	<b>799</b>	66	133	666	-	-	25	67	-	-	0	22/30
94	<b>440</b>	20	100	340	-	-	45	18	-	-	0	33/26
99	<b>400</b>	-	60	340	-	-	25	55	-	-	0	36/41
04	<b>160</b>	140	-	160	-	40	0	0	-	-	0	17/12
<b>Chrysothamnus depressus</b>												
87	<b>1466</b>	333	200	1133	133	-	9	14	9	-	0	6/6
94	<b>580</b>	120	80	480	20	-	0	0	3	-	0	4/7
99	<b>660</b>	40	80	520	60	-	9	0	9	6	6	4/9
04	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
<b>Chrysothamnus nauseosus</b>												
87	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
94	<b>120</b>	-	-	120	-	-	0	0	-	-	0	3/7
99	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
04	<b>0</b>	-	-	-	-	-	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>Coryphantha vivipara arizonica</i>												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	0	40	-	-	-	-	0	0	-	-	0	3/4
04	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Eriogonum microthecum</i>												
87	1933	800	600	1333	-	-	28	0	0	-	0	5/4
94	3380	80	360	2980	40	-	0	0	1	-	2	5/6
99	1640	-	180	980	480	-	38	2	29	2	2	3/5
04	120	-	-	120	-	-	0	0	0	-	0	4/9
<i>Gutierrezia sarothrae</i>												
87	999	200	133	800	66	-	0	0	7	2	7	7/6
94	320	-	20	200	100	-	0	0	31	-	6	8/7
99	120	60	60	40	20	-	0	0	17	-	0	5/5
04	360	20	140	220	-	-	0	0	0	-	0	6/5
<i>Juniperus osteosperma</i>												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	400	40	240	160	-	-	0	0	-	-	0	-/-
04	0	-	-	-	-	20	0	0	-	-	0	-/-
<i>Opuntia spp.</i>												
87	400	-	-	400	-	-	0	0	-	-	0	6/9
94	80	-	20	60	-	-	0	0	-	-	0	-/-
99	20	-	-	20	-	-	0	0	-	-	0	6/15
04	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Pinus edulis</i>												
87	532	-	466	66	-	-	0	0	-	4	0	55/43
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	280	20	60	220	-	20	0	0	-	-	0	-/-
04	0	-	-	-	-	20	0	0	-	-	0	-/-
<i>Tetradymia canescens</i>												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
94	20	-	-	20	-	-	0	0	-	-	0	1/99
99	0	-	-	-	-	-	0	0	-	-	0	-/-
04	0	-	-	-	-	-	0	0	-	-	0	-/-