

Trend Study 21B-10-08

Study site name: Wide Canyon DWR .

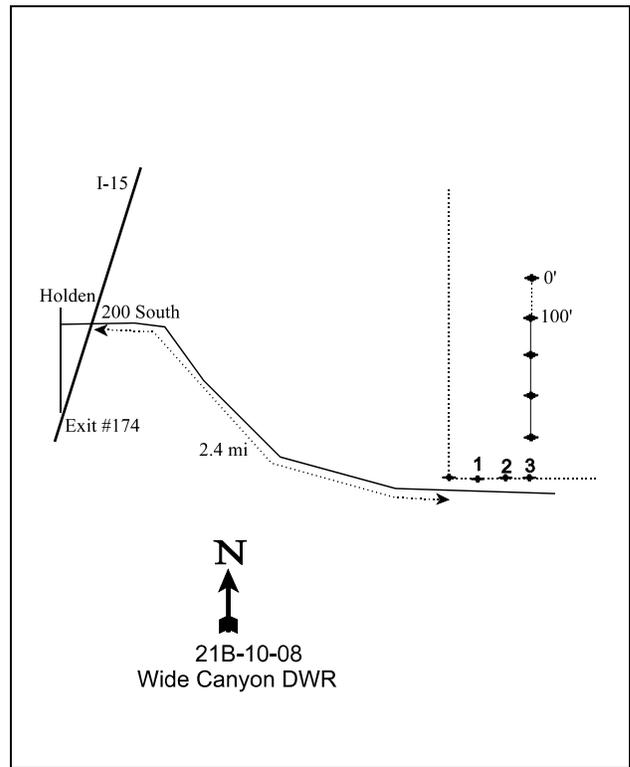
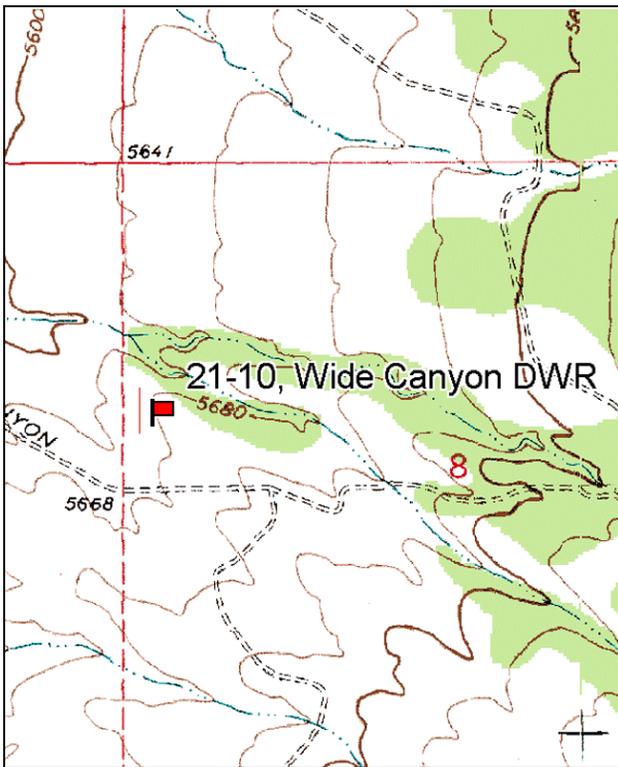
Vegetation type: Cliffrose Chaining .

Compass bearing: frequency baseline 180 degrees magnetic.

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

LOCATION DESCRIPTION

From the south Holden exit off I-15, go north into town and turn right at 200 South. Follow the road 1 block east, then north a few yards, then immediately east again up the hill to an overpass. From the overpass go 2.4 miles east to the fence corner of DWR property. Not including the corner posts, count to the third wooden post to the east. Measure 100 feet due north of the fence to the 400-foot stake. The 0-foot stake is a 2 foot tall fencepost marked by browse tag #7070. The other stakes are rebar.



Map Name: Coffee Peak

Diagrammatic Sketch

Township 20S , Range 3W , Section 8

GPS: NAD 83, UTM 12S 394374 E, 4327487 N

## DISCUSSION

### Wide Canyon DWR - Trend Study No. 21B-10

#### Study Information

This study samples important deer winter range on land owned and managed by the DWR [elevation: 5,710 feet (1,740 m), slope: 5%-10%, aspect: northwest]. The area was cabled, chained and/or bulldozed in the late 1950s, like much of the area along the west side of the Pahvant Range. The range type is currently an association of Utah juniper (*Juniperus osteosperma*), big sagebrush, and Stansbury cliffrose (*Cowania mexicana* ssp. *stansburiana*) with a perennial grass understory. This site is important wintering habitat for big game, primarily mule deer. The DWR Wide Canyon deer pellet group transect, located approximately 1 mile (1.6 km) to the east of the trend study, showed a five-year average of 56 deer days use/acre (138 ddu/ha) between 1981 and 1985 (Jense et al. 1985). Between 1985 and 1991, the average decreased slightly to 52 deer days use/acre (128 ddu/ha) (Jense et al. 1991). Pellet group data taken along the study baseline estimated 122 deer days use/acre (301 ddu/ha) in 1998, 165 days use/acre (407 ddu/ha) in 2003, and 297 days use/acre (734 ddu/ha) in 2008. Elk use was estimated at 5 days use/acre (12 edu/ha) in 1998. Cattle use was estimated at 9 days use/acre (22 cdu/ha) in 1998, 2 days use/acre (4 cdu/ha) in 2003, and 9 days use/acre (22 cdu/ha) in 2008.

#### Soil

The soil is classified as a Borvant-Pahvant complex (USDA-NRCS 2008). The Borvant series consists of well-drained soils that are shallow over a petrocalcic horizon. These soils formed in alluvium or colluvium derived from limestone and sandstone. The Pahvant series consists of well-drained soils that are shallow to a calcium carbonate cemented hardpan. The soil on the study is a loam with a neutral reaction (pH 7.0). Relative combined vegetation and litter cover has been 83%-91% since 1998. Relative combined rock and pavement cover has been 2%-7%, and relative bare ground cover has been 6%-10% since 1998. The soil erosion condition was classified as stable in 2003 and 2008. The soil was very compacted with thick cracks in 2008.

#### Browse

Preferred browse consists of big sagebrush (*Artemisia tridentata* spp.), Stansbury cliffrose, and antelope bitterbrush (*Purshia tridentata*). The sagebrush appears to be a hybrid between Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), but was all classified as Wyoming big sagebrush. Quadrat cover decreased from 9% in 1998 to 5% in 2003, and 4% in 2008. Sagebrush density has steadily decreased from 2,180 plants/acre in 1998 to 920 plants/acre in 2008. Decadent plants comprised 33%-36% of the population in 1985 and 1991, and 52%-57% in 1998-2008. Young recruitment decreased from 18% of the population in 1985 to 0% by 2003, and increased slightly to 2% in 2008. Vigor has been declining steadily. Plants exhibiting poor vigor increased from 3% of the population in 1985 to 46% in 2008. Browse use was mostly light-moderate in all sample years. Average annual leader growth was 1.3 inches (3.3 cm) in 2003 and 1.0 inches (2.6 cm) in 2008.

Cliffrose quadrat cover has been 1%-3% since 1998, and Density has fluctuated between 200 plants/acre and 260 plants/acre. Decadence increased from 50% of the population in 1985 to 100% in 1991, decreased to 10% by 2003, and increased to 42% in 2008. Young plants were only sampled in 1998 and 2008, and comprised 8% and 17% of the population, respectively. Plant vigor was excellent from 1985 to 1998, and plants displaying poor vigor made up 10% of the population in 2003 and 8% in 2008. Annual leader growth averaged 2.8 inches (7.1 cm) in 2003 and 1.0 inches (2.7 cm) in 2008.

Bitterbrush was sampled for the first time in 1998 when the baseline was extended. It provided 2%-3% quadrat cover in 2003 and 2008. Bitterbrush density was 40 plants/acre in 1998, 140 plants/acre in 2003, and 100 plants/acre in 2008. Vigor was excellent on all sampled plants since 1998. Browse use was moderate-heavy in 1998 and varied between light and heavy in 2003 and 2008. Annual leader growth averaged 3.1

inches (7.9 cm) in 2003 and 0.7 inches (1.9 cm) in 2008.

Juniper provided 3% canopy cover in 1998 and 2003, and 6% in 2008. Point-centered quarter data estimated tree density at 53-54 trees/acre in 2003 and 2008. Average trunk diameter was 4.0 inches (10.2 cm) in 2003 and 4.7 (11.9) inches in 2008. The majority of the sampled trees were 1-8 feet (0.3-2.4 m) in height in 2003 and 2008.

#### Herbaceous Understory

Total grass cover was 21% in 1998, 31% in 2003, and 35% in 2008. Perennial species provided 97%-99% of this cover. Bluebunch wheatgrass (*Agropyron spicatum*) was the most abundant grass from 1985 to 1998. Bulbous bluegrass (*Poa bulbosa*) was the most abundant grass in 2003 and 2008. Intermediate wheatgrass (*Agropyron intermedium*) and Sandberg bluegrass (*Poa secunda*) were also abundant in all sample years. In earlier readings, utilization was light-moderate on the majority of the grasses, with the exception of Sandberg bluegrass which was heavily utilized in 1985. Use on grasses was light in 2003. Cheatgrass was present but provided little cover.

Total forb cover was less than 1% from 1998 to 2008. Commonly sampled forb species included pale alyssum (*Alyssum alyssoides*), blue-eyed Mary (*Collinsia parviflora*), slender phlox (*Microsteris gracilis*), rock goldenrod (*Petradoria pumila*), and bur buttercup (*Ranunculus testiculatus*).

#### 1991 TREND ASSESSMENT

The trend for browse is slightly down. Sagebrush density decreased 8%, and decadence increased slightly from 33% of the population to 36%. Young recruitment decreased from 18% of the population to 6%, and plants displaying poor vigor increased from 3% of the population to 17%. Cliffrose density remained similar to 1985 at 133 plants/acre. Decadence increased, and young recruitment remained at 0% of the population. The trend for grass is slightly up. The sum of nested frequency for perennial grasses, excluding bulbous bluegrass, increased 16%. The trend for forbs is slightly up. The sum of nested frequency for perennial forbs increased slightly, and the number of species sampled increased from four to seven.

browse - slightly down (-1)      grass - slightly up (+1)      forb - slightly up (+1)

#### 1998 TREND ASSESSMENT

The trend for browse is slightly down. Density changes may have been related to the larger sample area in 1998, therefore, the trend was determined using other parameters. Sagebrush decadence increased from 36% of the population to 57%, and young recruitment decreased from 6% of the population to 1%. Plants with poor vigor increased slightly from 17% of the population to 20%. Cliffrose decadence decreased, but remained high at 31% of the population. Young plants were sampled for the first time, and comprised 8% of the population. Vigor remained excellent on all sampled plants. The trend for grass is stable. The sum of nested frequency for perennial grasses, excluding bulbous bluegrass, increased slightly. Intermediate wheatgrass decreased significantly in nested frequency and bulbous bluegrass increased significantly in nested frequency. The trend for forbs is slightly down. The sum of nested frequency for perennial forbs decreased slightly. The winter range condition, determined by the Desirable Components Index (DCI), was rated as fair-good due to moderate preferred browse cover with high decadence and low young recruitment, as well as high perennial grass and low perennial forb cover.

winter range condition (DCI) - fair-good (44) Low potential scale  
browse - slightly down (-1)      grass - stable (0)      forb - slightly down (-1)

#### 2003 TREND ASSESSMENT

The trend for browse is slightly down. Sagebrush density decreased 51%, and decadence remained high at 52% of the population. No young plants were sampled. Vigor remained stable, with 20% of the population

showing poor vigor. Cliffrose density decreased 23%. Decadence decreased from 31% of the population to 10%, and young recruitment decreased from 8% of the population to 0%. Plants displaying poor vigor increased from 0% of the population to 10%. Bitterbrush density increased, but remained low at 140 plants/acre. Decadence decreased from 100% of the population to 0%, and young recruitment increased from 0% of the population to 14%. Vigor remained excellent. The trend for grass is slightly down. The sum of nested frequency for perennial grasses, excluding bulbous bluegrass, decreased 17%. Intermediate wheatgrass decreased significantly in nested frequency, while bulbous bluegrass increased significantly in nested frequency. The trend for forbs is stable. The sum of nested frequency for perennial forbs changed little, and bur buttercup increased significantly in nested frequency. The DCI rating increased slightly to good due to an increase in cover of both cliffrose and bitterbrush and a decrease in decadence of preferred browse.

winter range condition (DCI) - good (52) Low potential scale  
browse - slightly down (-1)      grass - slightly down (-1)      forb - stable (0)

**2008 TREND ASSESSMENT**

The trend for browse is slightly down. Sagebrush density decreased 15%, and decadence remained high at 54% of the population. Young recruitment slightly increased from 0% of the population to 2%. Vigor declined, from 20% of the population displaying poor vigor to 46%. Cliffrose density increased slightly, but decadence increased from 10% of the population to 42%. Young recruitment increased from 0% of the population to 17%, and plants displaying poor vigor decreased slightly from 10% of the population to 8%. Bitterbrush density decreased slightly, and decadence remained stable at 0% of the population. Young recruitment decreased from 14% of the population to 0%, and vigor remained good on all sampled plants. The trend for grass is stable. The sum of nested frequency for perennial grasses, excluding bulbous bluegrass, remained stable. Sandberg bluegrass decreased significantly in nested frequency, while that for intermediate wheatgrass increased significantly. However, cheatgrass also increased significantly in nested frequency. The trend for forbs is stable. The sum of nested frequency for perennial forbs changed little. Blue-eyed Mary decreased significantly in nested frequency. The DCI rating declined slightly to fair-good due to a decrease in preferred browse cover and an increase in browse decadence.

winter range condition (DCI) - fair-good (45) Low potential scale  
browse - slightly down (-1)      grass - stable (0)      forb - stable (0)

**HERBACEOUS TRENDS --**

Management unit 21B, Study no: 10

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'98	'03	'08	'98	'03	'08
G	Agropyron cristatum	<sub>b</sub> 24	<sub>b</sub> 24	<sub>ab</sub> 18	<sub>a</sub> 1	<sub>ab</sub> 7	.29	.06	.19
G	Agropyron intermedium	<sub>a</sub> 67	<sub>a</sub> 66	<sub>b</sub> 144	<sub>a</sub> 92	<sub>b</sub> 128	5.27	4.63	5.95
G	Agropyron spicatum	<sub>a</sub> 140	<sub>ab</sub> 181	<sub>a</sub> 172	<sub>ab</sub> 188	<sub>b</sub> 221	6.10	9.59	12.09
G	Bromus tectorum (a)	-	-	<sub>a</sub> 40	<sub>a</sub> 52	<sub>b</sub> 82	.17	.82	1.14
G	Oryzopsis hymenoides	-	3	-	-	-	-	-	-
G	Poa bulbosa	<sub>a</sub> -	<sub>b</sub> 99	<sub>c</sub> 158	<sub>d</sub> 271	<sub>d</sub> 298	5.06	13.61	15.67
G	Poa secunda	<sub>bc</sub> 135	<sub>c</sub> 157	<sub>bc</sub> 129	<sub>b</sub> 106	<sub>a</sub> 34	4.01	2.42	.25
G	Sitanion hystrix	6	2	10	5	4	.04	.03	.15
Total for Annual Grasses		0	0	40	52	82	0.17	0.81	1.14

T y p e	Species	Nested Frequency					Average Cover %		
		'85	'91	'98	'03	'08	'98	'03	'08
	Total for Perennial Grasses	372	532	631	663	692	20.80	30.36	34.31
	Total for Grasses	372	532	671	715	774	20.97	31.18	35.45
F	<i>Alyssum alyssoides</i> (a)	-	-	47	25	42	.20	.06	.16
F	<i>Astragalus calycosus</i>	-	-	3	2	-	.03	.03	-
F	<i>Astragalus</i> sp.	-	6	-	2	1	-	.03	.03
F	<i>Castilleja chromosa</i>	-	2	-	-	-	-	-	-
F	<i>Calochortus nuttallii</i>	ab <sup>2</sup>	b <sup>7</sup>	a <sup>-</sup>	a <sup>-</sup>	ab <sup>3</sup>	-	.00	.00
F	<i>Collinsia parviflora</i> (a)	-	-	ab <sup>10</sup>	b <sup>23</sup>	a <sup>2</sup>	.02	.19	.00
F	<i>Crepis acuminata</i>	3	-	-	-	-	-	-	-
F	<i>Cryptantha</i> sp.	2	2	-	-	-	-	-	-
F	<i>Descurainia pinnata</i> (a)	-	-	-	5	-	-	.01	-
F	<i>Holosteum umbellatum</i> (a)	-	-	-	3	-	-	.01	-
F	<i>Lactuca serriola</i>	-	1	-	-	-	-	-	-
F	<i>Microsteris gracilis</i> (a)	-	-	3	11	6	.00	.02	.01
F	<i>Petradoria pumila</i>	-	-	5	3	1	.18	.15	.03
F	<i>Ranunculus testiculatus</i> (a)	-	-	a <sup>8</sup>	b <sup>27</sup>	a <sup>-</sup>	.01	.10	-
F	<i>Streptanthus cordatus</i>	-	6	-	3	-	-	.00	-
F	<i>Tragopogon dubius</i>	-	1	-	-	-	.00	-	-
F	<i>Zigadenus paniculatus</i>	2	-	-	4	-	-	.01	-
	Total for Annual Forbs	0	0	68	94	50	0.24	0.40	0.17
	Total for Perennial Forbs	9	25	8	14	5	0.21	0.23	0.06
	Total for Forbs	9	25	76	108	55	0.46	0.64	0.23

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

BROWSE TRENDS --

Management unit 21B, Study no: 10

Type	Species	Strip Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
B	<i>Artemisia tridentata wyomingensis</i>	71	44	37	9.01	4.99	4.01
B	<i>Chrysothamnus nauseosus</i>	1	0	0	.00	-	-
B	<i>Cowania mexicana stansburiana</i>	13	10	11	1.46	2.71	1.92
B	<i>Gutierrezia sarothrae</i>	31	4	11	1.19	.00	.15
B	<i>Juniperus osteosperma</i>	5	3	4	3.94	1.96	3.07
B	<i>Leptodactylon pungens</i>	3	2	3	.00	.00	.00
B	<i>Opuntia sp.</i>	1	1	1	.00	.00	.00
B	<i>Purshia tridentata</i>	2	6	4	.00	2.54	1.59
B	<i>Ribes sp.</i>	1	0	0	.00	-	-
Total for Browse		128	70	71	15.62	12.22	10.77

CANOPY COVER, LINE INTERCEPT --

Management unit 21B, Study no: 10

Species	Percent Cover		
	'98	'03	'08
<i>Artemisia tridentata wyomingensis</i>	-	6.15	6.44
<i>Cowania mexicana stansburiana</i>	-	2.73	2.34
<i>Gutierrezia sarothrae</i>	-	-	.36
<i>Juniperus osteosperma</i>	2.79	3.31	5.51
<i>Leptodactylon pungens</i>	-	-	.03
<i>Purshia tridentata</i>	-	2.31	2.13

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 21B, Study no: 10

Species	Average leader growth (in)	
	'03	'08
<i>Artemisia tridentata wyomingensis</i>	1.3	1.0
<i>Cowania mexicana stansburiana</i>	2.8	1.0
<i>Purshia tridentata</i>	3.1	0.7

POINT-QUARTER TREE DATA --  
Management unit 21B, Study no: 10

Species	Trees per Acre		
	'98	'03	'08
Juniperus osteosperma	76	54	53

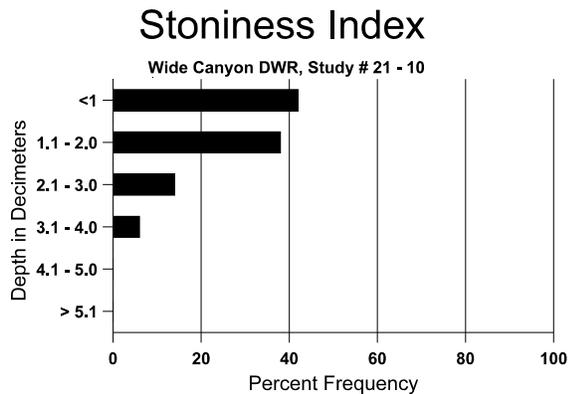
Average diameter (in)		
'98	'03	'08
4.7	4.0	4.7

BASIC COVER --  
Management unit 21B, Study no: 10

Cover Type	Average Cover %				
	'85	'91	'98	'03	'08
Vegetation	7.75	5.00	43.12	48.72	53.05
Rock	3.50	3.00	2.75	3.05	1.31
Pavement	12.50	3.75	2.53	4.41	1.12
Litter	62.00	66.25	57.06	48.25	49.25
Cryptogams	0	.25	1.15	1.19	1.15
Bare Ground	14.25	21.75	10.89	11.63	6.98

SOIL ANALYSIS DATA --  
Management unit 21, Study no: 10, Study Name: Wide Canyon DWR

Effective rooting depth (in)	Temp °F (depth)	pH	clay loam			%0M	PPM P	PPM K	ds/m
			%sand	%silt	%clay				
10.4	70.0 (14.6)	7.0	36.7	34.7	28.6	2.6	9.7	92.8	1.0



PELLET GROUP DATA --  
 Management unit 21B, Study no: 10

Type	Quadrat Frequency		
	'98	'03	'08
Rabbit	52	23	32
Elk	1	1	-
Deer	53	45	71
Cattle	4	1	3

Days use per acre (ha)		
'98	'03	'08
-	-	-
3 (7)	-	-
122 (301)	165 (407)	297 (734)
9 (22)	1 (4)	9 (22)

BROWSE CHARACTERISTICS --  
 Management unit 21B, Study no: 10

		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>												
85	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
91	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
98	<b>0</b>	-	-	-	-	20	0	0	-	-	0	-/-
03	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
08	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
<b>Artemisia tridentata wyomingensis</b>												
85	<b>2598</b>	-	466	1266	866	-	13	3	33	-	3	21/23
91	<b>2398</b>	-	133	1399	866	-	22	8	36	4	17	24/30
98	<b>2180</b>	-	20	920	1240	900	40	5	57	19	20	28/35
03	<b>1080</b>	-	-	520	560	800	41	15	52	20	20	30/34
08	<b>920</b>	-	20	400	500	860	33	9	54	37	46	32/39
<b>Chrysothamnus nauseosus</b>												
85	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
91	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
98	<b>20</b>	-	-	-	20	20	0	100	100	-	0	17/47
03	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
08	<b>0</b>	-	-	-	-	-	0	0	0	-	0	15/21
<b>Chrysothamnus viscidiflorus stenophyllus</b>												
85	<b>66</b>	-	-	66	-	-	0	0	-	-	0	11/12
91	<b>266</b>	-	133	133	-	-	25	0	-	-	0	12/14
98	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
03	<b>0</b>	-	-	-	-	-	0	0	-	-	0	23/22
08	<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>Cowania mexicana stansburiana</i>												
85	<b>132</b>	-	-	66	66	-	100	0	50	-	0	22/18
91	<b>133</b>	-	-	-	133	-	100	0	100	-	0	-/-
98	<b>260</b>	20	20	160	80	40	38	15	31	-	0	56/64
03	<b>200</b>	-	-	180	20	40	20	60	10	10	10	49/50
08	<b>240</b>	-	40	100	100	40	0	8	42	8	8	57/56
<i>Gutierrezia sarothrae</i>												
85	<b>3464</b>	-	799	2266	399	-	0	0	12	-	2	9/8
91	<b>799</b>	66	-	799	-	-	0	0	0	-	0	10/7
98	<b>1960</b>	20	120	1820	20	-	0	0	1	-	0	11/12
03	<b>100</b>	-	20	60	20	20	0	0	20	-	0	9/7
08	<b>360</b>	60	-	360	-	20	0	0	0	-	0	8/12
<i>Juniperus osteosperma</i>												
85	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
91	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
98	<b>100</b>	20	20	60	20	100	0	0	20	-	0	-/-
03	<b>60</b>	20	60	-	-	-	0	0	0	-	0	-/-
08	<b>80</b>	-	60	20	-	20	0	0	0	-	0	-/-
<i>Leptodactylon pungens</i>												
85	<b>132</b>	-	66	66	-	-	0	0	0	-	0	9/7
91	<b>66</b>	-	-	66	-	-	0	0	0	-	0	11/7
98	<b>140</b>	-	-	-	140	-	0	0	100	86	86	8/9
03	<b>80</b>	-	-	80	-	-	0	0	0	-	0	2/4
08	<b>120</b>	-	20	80	20	-	0	0	17	-	100	-/-
<i>Opuntia sp.</i>												
85	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
91	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
98	<b>20</b>	-	-	20	-	-	0	0	0	-	0	6/9
03	<b>20</b>	-	-	20	-	-	0	0	0	-	0	8/13
08	<b>20</b>	-	-	-	20	-	0	0	100	-	0	6/14
<i>Purshia tridentata</i>												
85	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
91	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
98	<b>40</b>	-	-	-	40	-	50	50	100	-	0	30/41
03	<b>140</b>	-	20	120	-	-	29	43	0	-	0	34/57
08	<b>100</b>	-	-	100	-	-	20	40	0	-	0	34/56

		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)
Ribes sp.												
85	0	-	-	-	-	-	0	0	-	-	0	-/-
91	0	-	-	-	-	-	0	0	-	-	0	-/-
98	20	-	-	20	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	-/-
08	0	-	-	-	-	-	0	0	-	-	0	-/-