

Trend Study 17-11-07

Study site name: Wallsburg Turn .

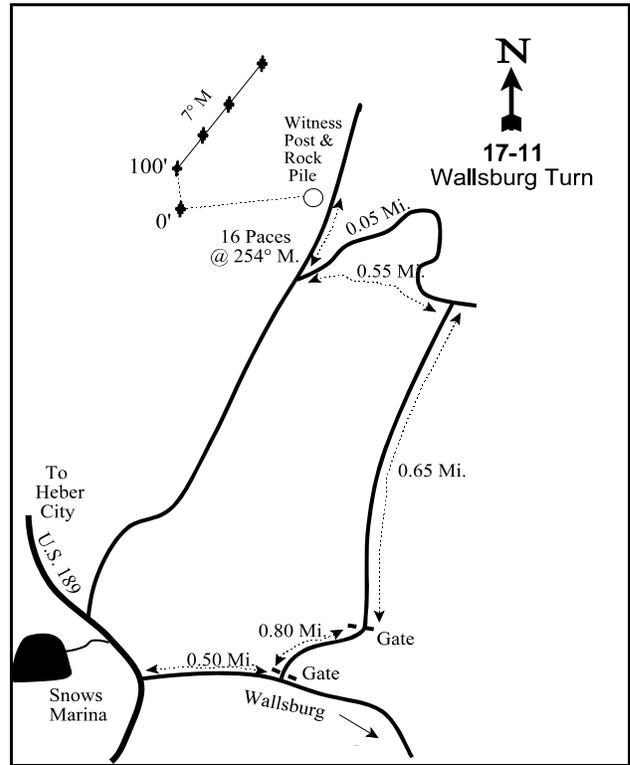
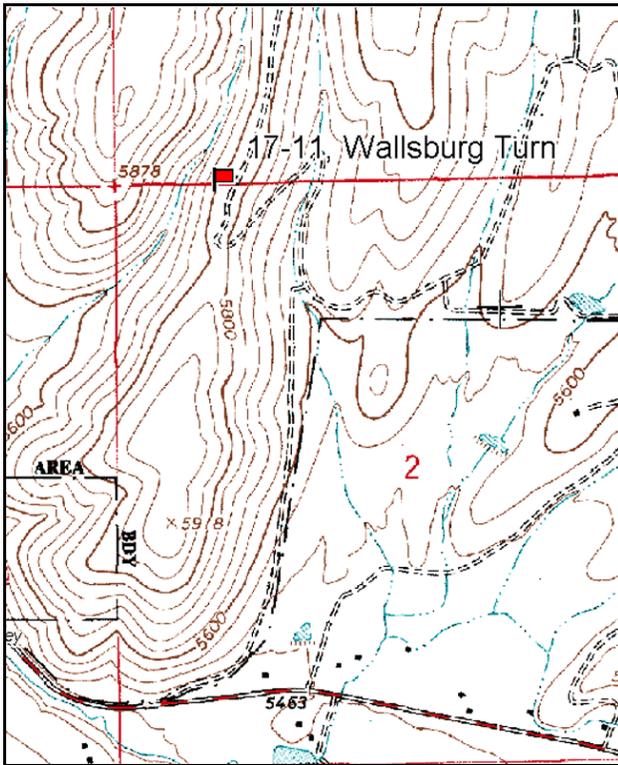
Vegetation type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 338 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 5 on 1ft., belt 4 on 2ft.

LOCATION DESCRIPTION

Beginning at the intersection of U.S. 189 and the Wallsburg turnoff, proceed 0.50 miles towards Wallsburg to an intersection. Turn left at the intersection and proceed northerly for 0.8 miles passing through two DWR gates. Continue on this road for 0.65 miles to an intersection. Take a left at the intersection and go 0.55 miles to another intersection. Go right for 0.05 miles to a small rock pile on the left (east) side of the road. From the rock monument, walk 16 paces at an azimuth of 264 degrees magnetic to the 0-foot baseline stake. The frequency baseline is marked by green steel "T" fenceposts approximately 12 to 18 inches in height.



Map Name: Charleston

Diagrammatic Sketch

Township 5S, Range 4E, Section 2

GPS: NAD 83, UTM 12T 460271 E 4474422 N

## DISCUSSION

### Wallsburg Turn - Trend Study No. 17-11

#### Study Information

This study is on critical deer winter range located approximately 0.75 miles (1.2 km) northeast of the junction of highways US-189 and SR-222. It is on land owned by the Utah Division of Wildlife Resources near a broad ridge top [elevation: 5,800 feet (1,768 m), slope: 25%, aspect: west]. In August 1976, an exceptionally hot wildfire destroyed virtually all the vegetation. A seeding effort conducted immediately after the fire appears to have been successful, resulting in fair grass cover and a resurgent sagebrush population. An ephemeral stream is located 300 feet (91 m) to the west, and Main Creek is located 0.85 miles (1.4 km) to the south. Aside from terrain features, the area is devoid of thermal or escape cover. Use by deer is moderate, while elk use is light. From the pellet group transect, there were an estimated 54 deer days use/acre (134 ddu/ha) in 2002 and 52 deer days use/acre (129 ddu/ha) in 2007. Elk use was estimated at 17 days use/acre (43 edu/ha) in 2002 and 35 days use/acre (86 edu/ha) in 2007. Deer and elk pellets were from the fall of 2006 and winter of 2007. Cattle use was estimated at 6 days use/acre (14 cdu/ha) in 2007.

#### Soil

The soil is classified in the Henefer series and consists of very deep, well-drained, slowly permeable soils. Soils in this series formed in alluvium and colluvium from quartzite and sandstone on fan remnants, mountain toeslopes and mountain slopes. Soil depths may reach 49 inches (124 cm) (USDA-NRCS 2007). Specifically at the study, the soil has a silty clay loam texture and is slightly alkaline in reactivity (pH of 7.6). Considerable erosion occurred after the fire because of insufficient ground cover. Since 1996, the relative bare ground cover has decreased slightly from 10% to 6%. Vegetation and litter have provided the majority of the ground cover. The erosion condition was classified as the upper threshold of stable in 2002 and was stable in 2007. Pedestalling at the base of sagebrush and bunchgrass stems is abundant and provides the most evidence of past erosion.

#### Browse

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) canopy cover was 14% in 2002 and 15% in 2007. The density increased from 1,366 plants/acre (3,381 plants/ha) in 1983 to 2,320 plants/acre (5,743 plants/ha) by 1996, then decreased to 1,780 plants/acre (4,406 plants/ha) by 2007. Some of the change in the estimated density between 1989 and 1996 was due to an increase in sample area. Few seedlings have been sampled, and young plants peaked at 30% of the population in 1989 and decreased to 0% in 2007. Decadence has steadily increased from 0% of the population in 1983 and 1989 to 53% in 2007. There were no dead plants in 1983 or 1989, but the density of dead plants has also increased since 1996. Vigor has been mostly good; plants with poor vigor have accounted for 0% to 14% of the population. The average annual leader growth was 1.4 inches (3.6 cm) in 2002 and 2007. Browse use has been light, moderate, and moderate-heavy.

Broom snakeweed (*Gutierrezia sarothrae*) and stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) are also present, but have had widely varying densities. The density of snakeweed has fluctuated from 100 plants/acre (248 plants/ha) to 2,600 plants/acre (6,436 plants/ha) and the density of rabbitbrush has ranged from 66 plants/acre (163 plants/ha) to 1,360 plants/acre (3,366 plants/ha). Antelope bitterbrush (*Purshia tridentata*) was sampled only in 1983 and 1989. Bitterbrush plants are scattered across the landscape in low numbers and have been severely hedged.

#### Herbaceous Understory

The herbaceous understory dominates the vegetative component. Perennial grass cover was 16% in 1996, 22% in 2002, and 20% in 2007. Crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*Agropyron intermedium*), and Sandberg bluegrass (*Poa secunda*) are the most abundant perennial species. Since 1996, these three species have comprised an average 91% of the grass cover. Bulbous bluegrass, a

perennial with a phenology similar to annual grasses (Stewart and Hull 1949) was first sampled in 2007, in 3% of the quadrats. Cheatgrass (*Bromus tectorum*) and Japanese brome (*Bromus japonicus*) are present, but in lower frequencies than the perennial species. Cheatgrass cover was less than 1% in 1996 and 2002, and 3% in 2007. However, cheatgrass quadrat frequency increased from 9% in 1996 to 13% in 2002, and 53% in 2007.

There has been a moderately diverse community of forbs, including seeded species. Between four and 13 perennial species were sampled since 1983. Perennial forb cover increased from 13% in 1996 to 19% in 2002, and decreased to 10% in 2007. The dominant perennial species is alfalfa (*Medicago sativa*), which has comprised an average 89% of the perennial forb cover since 1996. Annual forb cover was relatively high in 2002 (9%) and 2007 (6%). The dominant annual forb was blue-eyed Mary. Bur buttercup (*Ranunculus testiculatus*), an allelopathic annual (Buchanan et al. 1978), has increased in quadrat frequency from 12% in 1996 to 26% in 2007.

#### 1989 TREND ASSESSMENT

The browse trend is slightly up. The density of mountain big sagebrush increased 12%. The density of young plants increased two-fold and they comprised 30% of the population. There were no decadent plants, and none of the plants were classified as dying or having poor vigor. Browse use shifted from light to light-moderate. The density of bitterbrush also increased 23%, and the population was all healthy mature and young plants. The grass trend is up. Even though there were two fewer species sampled, the sum of nested frequency of perennial species increased 74%. There was a significant increase in the nested frequency of Sandberg bluegrass. The forb trend is slightly up. The sum of nested frequency of perennial forbs increased 81%, but forbs were still relatively infrequent. There were significant increases in annual sunflower (*Helianthus annuus*) and alfalfa.

browse - slightly up (+1)

grass - up (+2)

forb - slightly up (+1)

#### 1996 TREND ASSESSMENT

The browse trend is slightly up. The density of sagebrush increased 51%. However, this increase was attributed to the larger sample area used in 1996. The increase in density was still a factor of trend, but other parameters were also given strong consideration. For example, the density of young plants decreased and they accounted for 8% of the population. Decadence and the proportion of plants exhibiting poor vigor remained low. Browse use shifted from light-moderate to moderate. There were no bitterbrush plants sampled, but this could also be the result of the change in sample area. The grass trend is down. The sum of nested frequency of perennial grasses decreased 22%, including a significant decrease in Sandberg bluegrass. Cheatgrass was sampled in 9% of the quadrats. The forb trend is up. The sum of nested frequency increased more than two-fold, and the number of perennial species increased from four to 13. The Desirable Components Index (DCI) score was good due to the moderate browse cover with low decadence, and high perennial grass and forb cover.

winter range condition (DCI) - good (71) Mid-level potential scale

browse - slightly up (+1)

grass - down (-2)

forb - up (+2)

#### 2002 TREND ASSESSMENT

The browse trend is slightly down. The density of sagebrush decreased 7%, which would usually correspond to a stable trend. However, young plants decreased to 2% of the population, and decadence increased from 1% to 26%. The density of dead plants increased from 20 plants/acre (50 plants/ha) to 160 plants/acre (396 plants/ha). The proportion of plants exhibiting poor vigor increased from 4% to 14%. Browse use shifted from moderate to moderate-heavy, and heavily browsed plants increased from 17% of the population to 44%. The grass trend is stable. The sum of nested frequency of perennial grasses increased 5%, and there was a significant increase in the nested frequency of intermediate wheatgrass. Cheatgrass frequency and cover remained stable. The forb trend is down. The sum of nested frequency of perennial forbs decreased 27%, and

the number of perennial species decreased from 13 to eight. There were significant increases and decreases in the nested frequencies of four annual species, and a significant increase in wild onion (*Allium* sp.). The DCI score decreased to fair-good due to an increase in browse decadence.

winter range condition (DCI) - fair-good (64) Mid-level potential scale  
browse - slightly down (-1)      grass - stable (0)      forb - down (-2)

**2007 TREND ASSESSMENT**

The browse trend is down. The density of sagebrush decreased 18%, and decadence increased from 26% to 53% of the population. Few seedling and no young plants were sampled. The density of dead plants increased to 220 plants/acre (545 plants/ha). The sagebrush defoliator moth (*Aroga websteri*) had infested 56% of the sampled plants. Plants exhibiting poor vigor decreased to 11%, and it was noted that sagebrush had good flower production. Browse use shifted to light-moderate. The grass trend is slightly down. Excluding bulbous bluegrass, the sum of nested frequency of perennial grasses increased 9%. There was a significant increase in Sandberg bluegrass. However, bulbous bluegrass was sampled for the first time, and there was a significant increase in the nested frequency of cheatgrass. Cheatgrass quadrat frequency increased from 13% to 53%. The forb trend is down. The sum of nested frequency of perennial forbs decreased 31%. There were significant decreases in the nested frequencies of wild onion and alfalfa, and there was a significant increase in that of bur buttercup. The DCI score decreased to fair due to increases in browse decadence and annual grass cover.

winter range condition (DCI) - fair (53) Mid-level potential scale  
browse - down (-2)      grass - slightly down (-1)      forb - down (-2)

**HERBACEOUS TRENDS --**

Management unit 17 , Study no: 11

T y p e	Species	Nested Frequency					Average Cover %		
		'83	'89	'96	'02	'07	'96	'02	'07
G	<i>Agropyron cristatum</i>	<sub>a</sub> 169	<sub>ab</sub> 195	<sub>b</sub> 220	<sub>ab</sub> 196	<sub>ab</sub> 200	8.60	11.37	8.46
G	<i>Agropyron intermedium</i>	<sub>a</sub> 84	<sub>ab</sub> 260	<sub>bc</sub> 138	<sub>d</sub> 191	<sub>cd</sub> 158	4.97	7.65	6.93
G	<i>Agropyron spicatum</i>	<sub>b</sub> 53	-	<sub>a</sub> 7	<sub>a</sub> 3	<sub>a</sub> 16	.53	.38	.54
G	<i>Bromus japonicus</i> (a)	-	-	-	<sub>a</sub> 3	<sub>a</sub> 10	-	.01	.07
G	<i>Bromus tectorum</i> (a)	-	-	<sub>a</sub> 28	<sub>a</sub> 36	<sub>b</sub> 156	.57	.62	3.26
G	<i>Festuca ovina</i>	3	-	-	-	-	-	-	-
G	<i>Poa bulbosa</i>	-	-	-	-	5	-	-	.01
G	<i>Poa secunda</i>	<sub>a</sub> 54	<sub>c</sub> 178	<sub>b</sub> 126	<sub>b</sub> 127	<sub>c</sub> 188	1.93	2.11	4.49
G	<i>Vulpia octoflora</i> (a)	-	-	-	2	-	-	.00	-
Total for Annual Grasses		0	0	28	41	166	0.56	0.63	3.33
Total for Perennial Grasses		363	633	491	517	567	16.04	21.52	20.44
Total for Grasses		363	633	519	558	733	16.61	22.16	23.78
F	<i>Agoseris glauca</i>	-	-	<sub>a</sub> 12	<sub>a</sub> 8	<sub>a</sub> 7	.08	.04	.04
F	<i>Alyssum alyssoides</i> (a)	-	-	<sub>b</sub> 124	<sub>a</sub> 11	<sub>b</sub> 93	.33	.03	.23
F	<i>Allium</i> sp.	<sub>a</sub> 1	<sub>a</sub> 2	<sub>a</sub> 1	<sub>b</sub> 23	<sub>a</sub> 3	.00	.17	.01

Type	Species	Nested Frequency					Average Cover %		
		'83	'89	'96	'02	'07	'96	'02	'07
F	<i>Artemisia ludoviciana</i>	-	1	-	-	-	-	-	-
F	<i>Astragalus miser</i>	-	-	<sub>a</sub> 40	<sub>a</sub> 20	<sub>a</sub> 26	1.05	.16	.30
F	<i>Castilleja linariaefolia</i>	-	-	<sub>a</sub> 8	<sub>a</sub> 8	<sub>a</sub> 1	.01	.22	.03
F	<i>Calochortus nuttallii</i>	<sub>a</sub> 1	-	-	<sub>a</sub> 2	<sub>a</sub> 4	-	.01	.01
F	<i>Castilleja sp.</i>	-	-	8	-	-	.04	-	-
F	<i>Cirsium sp.</i>	-	-	3	-	-	.00	-	-
F	<i>Collomia linearis (a)</i>	-	-	<sub>b</sub> 82	<sub>a</sub> 6	<sub>a</sub> 1	.18	.01	.00
F	<i>Collinsia parviflora (a)</i>	-	-	<sub>a</sub> 146	<sub>b</sub> 245	<sub>b</sub> 252	1.02	8.10	3.74
F	<i>Cymopterus sp.</i>	-	-	<sub>a</sub> 17	<sub>a</sub> 8	<sub>a</sub> 9	.09	.07	.07
F	<i>Delphinium nuttallianum</i>	-	-	1	-	-	.00	-	-
F	<i>Descurainia pinnata (a)</i>	-	-	-	-	3	-	-	.00
F	<i>Draba sp. (a)</i>	-	-	<sub>a</sub> 30	<sub>a</sub> 28	<sub>b</sub> 125	.22	.05	.46
F	<i>Erigeron divergens</i>	-	-	45	-	-	.13	-	-
F	<i>Eriogonum racemosum</i>	<sub>a</sub> 8	<sub>a</sub> 16	<sub>a</sub> 22	<sub>a</sub> 15	<sub>a</sub> 12	.27	.18	.10
F	<i>Gayophytum ramosissimum(a)</i>	-	-	3	-	-	.01	-	-
F	<i>Helianthus annuus (a)</i>	<sub>a</sub> 3	<sub>b</sub> 23	-	<sub>a</sub> 3	-	-	.00	-
F	<i>Holosteum umbellatum (a)</i>	-	-	<sub>b</sub> 194	<sub>a</sub> 97	<sub>b</sub> 173	.53	.56	.77
F	<i>Lactuca serriola</i>	<sub>b</sub> 16	-	<sub>a</sub> 6	-	-	.01	-	-
F	<i>Medicago sativa</i>	<sub>a</sub> 22	<sub>bc</sub> 77	<sub>bc</sub> 78	<sub>c</sub> 95	<sub>b</sub> 61	10.93	8.77	4.33
F	<i>Microsteris gracilis (a)</i>	-	-	-	<sub>a</sub> 11	<sub>a</sub> 10	-	.02	.02
F	<i>Polygonum douglasii (a)</i>	-	-	<sub>a</sub> 2	<sub>a</sub> 2	<sub>a</sub> 2	.01	.00	.00
F	<i>Ranunculus testiculatus (a)</i>	-	-	<sub>a</sub> 29	<sub>a</sub> 36	<sub>b</sub> 59	.06	.12	.30
F	<i>Sanguisorba minor</i>	2	-	-	-	-	-	-	-
F	<i>Sphaeralcea coccinea</i>	<sub>a</sub> 3	-	<sub>a</sub> 2	-	-	.03	-	-
F	<i>Tragopogon dubius</i>	-	-	2	-	-	.01	-	-
Total for Annual Forbs		3	23	610	439	718	2.38	8.92	5.56
Total for Perennial Forbs		53	96	245	179	123	12.69	9.63	4.90
Total for Forbs		56	119	855	618	841	15.08	18.55	10.47

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

BROWSE TRENDS --

Management unit 17 , Study no: 11

Type	Species	Strip Frequency			Average Cover %		
		'96	'02	'07	'96	'02	'07
B	Artemisia tridentata vaseyana	62	64	64	10.17	12.65	12.85
B	Chrysothamnus viscidiflorus viscidiflorus	8	28	25	.52	.61	1.25
B	Gutierrezia sarothrae	42	10	4	1.18	.05	.03
B	Opuntia sp.	6	5	6	.16	.30	.15
Total for Browse		118	107	99	12.04	13.61	14.28

CANOPY COVER, LINE INTERCEPT --

Management unit 17 , Study no: 11

Species	Percent Cover	
	'02	'07
Artemisia tridentata vaseyana	13.66	14.81
Chrysothamnus viscidiflorus viscidiflorus	.66	.90
Gutierrezia sarothrae	.05	-
Opuntia sp.	.18	.11

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 17 , Study no: 11

Species	Average leader growth (in)	
	'02	'07
Artemisia tridentata vaseyana	1.4	1.4

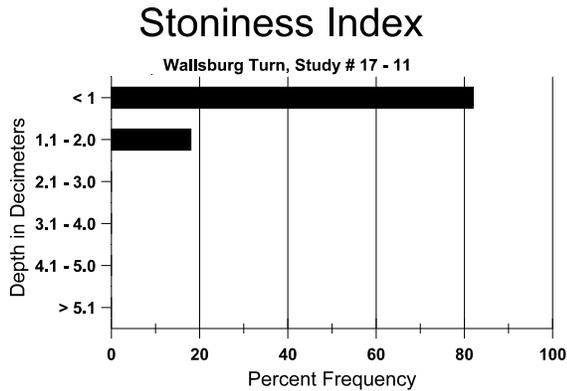
BASIC COVER --

Management unit 17 , Study no: 11

Cover Type	Average Cover %				
	'83	'89	'96	'02	'07
Vegetation	5.75	18.75	44.34	48.84	53.00
Rock	10.75	15.50	11.94	8.77	6.86
Pavement	19.00	32.00	9.28	7.74	8.35
Litter	39.25	27.00	41.57	44.34	37.93
Cryptogams	18.50	1.50	2.24	1.72	.69
Bare Ground	6.75	5.25	11.85	8.97	7.08

SOIL ANALYSIS DATA --  
Herd Unit 17, Study no: 11, Wallsburg Turn

Effective rooting depth (in)	Temp °F (depth)	pH	Silty clay loam			%OM	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
8.9	52.4 (10.7)	7.6	18.9	53.0	28.0	3.1	16.3	156.8	.5



PELLET GROUP DATA --

Management unit 17, Study no: 11

Type	Quadrat Frequency		
	'96	'02	'07
Sheep	-	1	-
Rabbit	2	5	14
Elk	7	6	6
Deer	12	20	20
Cattle	2	-	-

Days use per acre (ha)	
'02	'07
-	-
-	-
17 (43)	35 (86)
54 (134)	52 (129)
-	6 (14)

BROWSE CHARACTERISTICS --  
Management unit 17, Study no: 11

		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>												
83	<b>1366</b>	33	233	1133	-	-	0	0	0	-	0	14/13
89	<b>1532</b>	-	466	1066	-	-	48	4	0	-	0	18/19
96	<b>2320</b>	40	180	2120	20	20	66	17	1	-	4	20/36
02	<b>2160</b>	-	40	1560	560	160	41	44	26	6	14	25/35
07	<b>1780</b>	20	-	840	940	220	29	1	53	8	11	31/43

		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>Chrysothamnus viscidiflorus viscidiflorus</b>												
83	<b>66</b>	-	33	33	-	-	0	0	0	-	0	10/17
89	<b>266</b>	-	200	33	33	-	0	0	12	-	0	5/5
96	<b>200</b>	80	80	120	-	-	0	0	0	-	0	10/17
02	<b>1360</b>	-	20	1220	120	60	0	0	9	-	0	7/11
07	<b>1200</b>	-	-	1180	20	-	0	0	2	-	13	10/12
<b>Gutierrezia sarothrae</b>												
83	<b>133</b>	-	-	133	-	-	0	0	0	-	0	10/13
89	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
96	<b>2600</b>	440	320	2280	-	-	0	0	0	-	0	8/12
02	<b>400</b>	-	-	320	80	20	0	0	20	-	0	7/5
07	<b>100</b>	-	-	100	-	-	0	0	0	-	0	9/10
<b>Opuntia sp.</b>												
83	<b>100</b>	-	-	100	-	-	0	0	0	-	0	6/8
89	<b>100</b>	-	-	100	-	-	0	0	0	-	0	6/14
96	<b>120</b>	20	-	120	-	-	0	0	0	-	0	5/19
02	<b>140</b>	-	-	140	-	-	0	0	0	-	0	5/36
07	<b>120</b>	-	-	80	40	-	0	0	33	-	17	6/19
<b>Purshia tridentata</b>												
83	<b>566</b>	-	-	566	-	-	94	0	-	-	0	16/20
89	<b>733</b>	-	100	633	-	-	27	23	-	-	0	15/32
96	<b>0</b>	-	-	-	-	-	0	0	-	-	0	18/69
02	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
07	<b>0</b>	-	-	-	-	-	0	0	-	-	0	14/36