

Trend Study 5-8-06

Study site name: Barnard Creek .

Vegetation type: Bitterbrush .

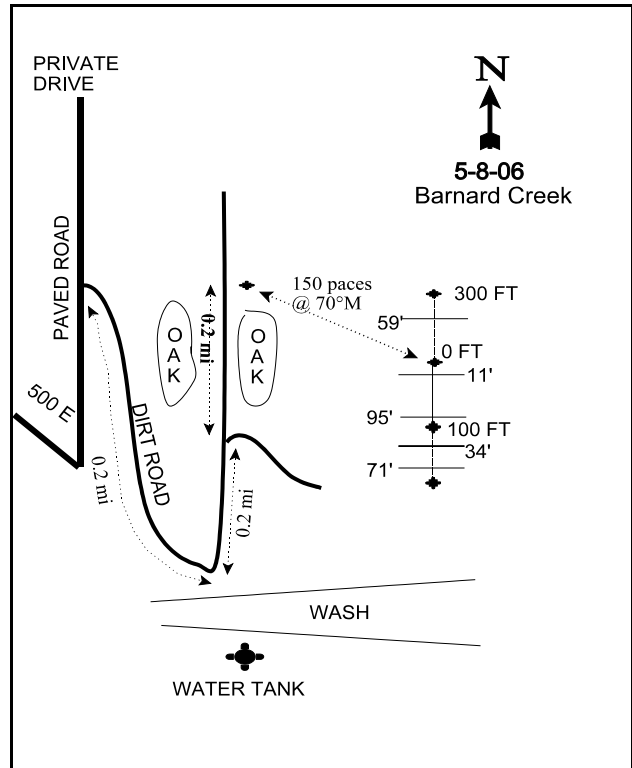
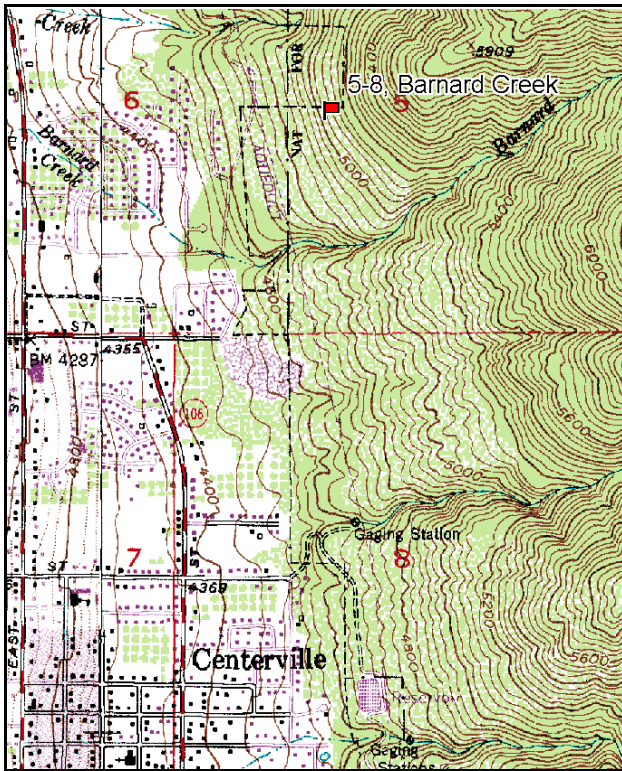
Compass bearing: frequency baseline 166 degrees magnetic.

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

No rebar on belts 4 and 5

LOCATION DESCRIPTION

From U-106 in Centerville (400 East) take Barnard Street (1200 North) east to Oak Ridge Drive. Turn left on Oak Ridge to 500 East and stop. Take a bearing of 53 degrees magnetic from the northwest corner of this intersection to locate the transect up the first hill below a band of oak and boulders. Continue along Oak Ridge Drive for 0.2 miles, take a hairpin turn to the right and go 0.2 miles along the Weber Basin Pipeline to a fork in the road. Take the left fork and go 0.2 miles around a bend to a fork. Continue left on a two track 0.2 miles to a witness post on the right just after a patch of oak. The transect is 150 paces up the slope at a bearing of 70 degrees magnetic. The 0-foot baseline has browse tag #58 attached. The baseline runs 166 degrees magnetic. The 300 foot line runs off the 0-foot baseline stake at a bearing of 360 degrees magnetic.



Map Name: Bountiful Peak

Diagrammatic Sketch

Township 2N, Range 1E, Section 5

UTM NAD 27, UTM 12T 4531803 N 427123 E

## DISCUSSION

### Barnard Creek - Trend Study No. 5-8

#### Study Information

This study is located within an isolated bitterbrush population on critical deer winter range on the Wasatch Face above Centerville (elevation: 5,000 feet, slope: 52%, aspect: west). The transect is about 1,000 feet from the nearest residence. The transect is located on private land near the National Forest Service boundary. Deer use is heavy and the range has shown some signs of intense utilization during past readings. Some elk also appear to winter on this slope. In 2001, the pellet group transect estimates were 46 deer and 5 elk days use/acre (114 ddu/ha and 12 edu/ha). In 2006, the pellet group transect estimate was 27 deer days use/acre (68 ddu/ha).

#### Soil

The soil is part of the Kilburn-Francis series complex which consists of very deep, somewhat excessively drained, moderately rapidly permeable soils formed in alluvium, colluvium, and eolian sands derived from gneiss, schist, granite, and quartzite (USDA-NRCS, 2006). It is gravelly with an effective rooting depth of over 33 inches. A deep layer of litter and organic matter has built up under the shrubs. The soil is a neutral (7.0 pH) sandy loam. Phosphorus levels were low at 5.7 ppm, values below 6 ppm may limit normal plant growth and development (Tiedemann and Lopez 2004). The soil is easily disturbed and the erosion potential is high. Vegetation and litter cover are high and help limit most erosion. The erosion condition class was determined as stable in 2001 and 2006. There is easy access for ORVs and their frequent use has led to increased erosion and possibly harassment of wintering big game animals.

#### Browse

Antelope bitterbrush and mountain big sagebrush are the key browse species. Bitterbrush is the dominant browse species, and has provided the majority of browse cover since 1996. Bitterbrush densities were 600 plants/acre in 1996, 1,220 plants/acre in 2001, and 920 plants/acre in 2006. The bitterbrush plants are large and vigorous with an average height of nearly 4 feet and a crown of about 6 feet. The annual leader growth averaged 2.3 inches in 2001 and 4.6 inches in 2006. These plants were heavily hedged in 1985 and have shown moderate hedging since. No young or seedlings have been sampled since 1990. It is possible that the population is being sustained by layering.

Mountain big sagebrush provides less browse cover than bitterbrush. Sagebrush densities have remained fairly stable at 680 plants/acre in 1996 and 780 plants/acre in 2001 and 2006. Use has been light and vigor has been good. The average leader growth was 2.8 inches in 2001 and 2.3 inches in 2006. Sagebrush decadence has been moderate to low since 1996. However, reproduction has been poor since 1990 and the density of young individuals has slowly decreased to none. The sagebrush seedlings appear to be having difficulty establishing in the high density cheatgrass.

#### Herbaceous Understory

The study area is completely dominated by cheatgrass, which provided 37% cover in 1996, 31% in 2001, and 34% in 2005. This very high cheatgrass cover creates a substantial fire hazard and could potentially prevent the establishment of young browse individuals (Hall et al. 1999). The nested frequency of perennial grasses is low and they have provided less than 3% cover since 1996. Perennial grasses include bluebunch wheatgrass, purple threeawn, Sandberg bluegrass, and sand dropseed.

A variety of forbs have been sampled on the study, but are not abundant. Perennial forb cover has fluctuated from 5-6% in 1996 and 2001 to 3% in 2006. Annual forb cover has never been above 3%. Common species include pale alyssum, storksbill, hairy goldaster, Douglas knotweed, and Louisiana sage. The state listed noxious weed, dyer's woad, was first sampled in 1996 and has increased in nested frequency since. Dalmation toadflax, a noxious weed in Wasatch County, was also first sampled in 1996 and was sampled every year since.

### 1990 TREND ASSESSMENT

The mountain big sagebrush and bitterbrush populations appear relatively stable. An increased density of the moderately hedged, vigorous bitterbrush was measured, including several young plants. Mountain big sagebrush has declined in density, but 54% of the population were classified as young plants. The increase in bitterbrush counters the loss in sagebrush. The understory is dominated by cheatgrass and storksbill. Perennial grasses and forbs remain uncommon or scarce and perennial forbs have decreased.

browse - stable (0)

grass - stable (0)

forb - down (-2)

### 1996 TREND ASSESSMENT

The key browse species are antelope bitterbrush, which makes up 83% of the browse cover, and mountain big sagebrush, which contributes 16% of the browse cover. Bitterbrush utilization is light to moderate with apparently good vigor. There were no seedlings or young found but percent decadence is low at only 3%. The browse trend is stable. The grass trend is stable. Cheatgrass is the dominant grass and perennial grass abundance is similar to that of 1990. The forb trend is slightly down. The nested frequency of perennial forbs is relatively unchanged. Annual forb nested frequency increased, but none of the species were especially competitive and weedy. Unfortunately, Dyer's Woad, a state listed noxious weed, was sampled on the study for the first time. The Desirable Components Index score is very poor due to high annual grass cover, presence of a noxious weed, and little perennial grass cover.

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

browse - stable (0)

grass - stable (0)

forb - slightly down (-1)

### 2001 TREND ASSESSMENT

The trend for the key browse species, antelope bitterbrush and mountain big sagebrush, is up. The density of bitterbrush increased 51%, nearly all of which was in the mature population. Utilization was moderate to heavy, but vigor is normal and percent decadence low. Sagebrush density increased 13% and decadence was moderate. Use was light and vigor good. The grass trend is up. The nested frequency of perennial grasses increased substantially. As well, the nested frequency of cheatgrass decreased significantly. The forb trend is slightly down. The nested frequency of perennial forbs increased by 58% and cover increased slightly, but about one-third of that increase was an increase in Dyer's Woad. The nested frequency of annual forbs increased substantially as well. Most of the annual increase was due to a significant increase in storksbill. The Desirable Components Index score improved to poor due to an increase in browse cover.

winter range condition (DC Index) - poor (35) Mid-level potential scale

browse - up (+2)

grass - up (+2)

forb - slightly down (-1)

### 2006 TREND ASSESSMENT

The browse trend is slightly down. The antelope bitterbrush density decreased by 25%, the percentage of decadent individuals increased slightly, and the number of individuals classified as dying increased slightly. However, the mountain big sagebrush, also an import browse species, density remained unchanged and decadence decreased substantially. Sagebrush vigor improved and the number of plants classified as dying decreased. The grass trend is stable. Very little change in the nested frequency of perennial and annual grasses occurred. The forb trend is down. The nested frequency of perennial forbs decreased by 30% and cover also decreased. The nested frequency of annual forbs decreased substantially as well. The nested frequency of Dyer's Woad also increased slightly. The Desirable Components Index score declined to very poor due to a decrease in perennial forb cover.

winter range condition (DC Index) - very poor (31) Mid-level potential scale

browse - slightly down (-1)

grass - stable (0)

forb - down (-2)

HERBACEOUS TRENDS --  
Management unit 05 , Study no: 8

| T<br>y<br>p<br>e            | Species                    | Nested Frequency |      |      |      |      | Average Cover % |       |       |
|-----------------------------|----------------------------|------------------|------|------|------|------|-----------------|-------|-------|
|                             |                            | '85              | '90  | '96  | '01  | '06  | '96             | '01   | '06   |
| G                           | Agropyron spicatum         | a8               | a3   | ab15 | ab14 | b23  | .67             | .90   | 1.18  |
| G                           | Aristida purpurea          | -                | 2    | 5    | 9    | 2    | .09             | .36   | .30   |
| G                           | Bromus tectorum (a)        | -                | -    | b392 | a378 | a373 | 36.54           | 30.96 | 34.23 |
| G                           | Festuca myuros (a)         | -                | -    | -    | 5    | 5    | -               | .03   | .31   |
| G                           | Poa bulbosa                | ab3              | a-   | a-   | c18  | bc16 | -               | .20   | .43   |
| G                           | Poa fendleriana            | 3                | 3    | -    | -    | 3    | -               | -     | .00   |
| G                           | Poa secunda                | a-               | a-   | b12  | bc32 | c30  | .10             | .66   | .51   |
| G                           | Secale cereale (a)         | -                | -    | a-   | a-   | b17  | -               | -     | .54   |
| G                           | Sporobolus cryptandrus     | a-               | ab12 | ab4  | b8   | b13  | .30             | .27   | .42   |
| G                           | Stipa comata               | -                | 2    | -    | -    | -    | -               | -     | -     |
| Total for Annual Grasses    |                            | 0                | 0    | 392  | 383  | 395  | 36.54           | 30.99 | 35.09 |
| Total for Perennial Grasses |                            | 14               | 22   | 36   | 81   | 87   | 1.16            | 2.40  | 2.86  |
| Total for Grasses           |                            | 14               | 22   | 428  | 464  | 482  | 37.70           | 33.39 | 37.95 |
| F                           | Agoseris glauca            | -                | -    | -    | 1    | -    | -               | .03   | -     |
| F                           | Alyssum alyssoides (a)     | -                | -    | b29  | a8   | a3   | .10             | .06   | .03   |
| F                           | Allium sp.                 | a11              | a-   | a2   | b52  | a18  | .00             | .38   | .07   |
| F                           | Ambrosia psilostachya      | -                | -    | 9    | 1    | -    | .27             | .00   | -     |
| F                           | Artemisia ludoviciana      | b49              | a21  | a11  | a11  | a14  | .36             | .33   | .50   |
| F                           | Aster chilensis            | c63              | a-   | a-   | b8   | a-   | -               | .03   | -     |
| F                           | Chenopodium album (a)      | -                | 6    | -    | -    | -    | -               | -     | -     |
| F                           | Comandra pallida           | -                | -    | -    | -    | 2    | -               | -     | .00   |
| F                           | Cynoglossum officinale     | -                | -    | 3    | -    | 3    | .00             | -     | .01   |
| F                           | Descurainia pinnata (a)    | -                | -    | -    | 2    | 1    | -               | .01   | .00   |
| F                           | Draba sp. (a)              | -                | -    | a-   | c59  | b25  | -               | .26   | .13   |
| F                           | Epilobium brachycarpum (a) | b24              | a-   | a4   | a11  | a5   | .01             | .12   | .01   |
| F                           | Erodium cicutarium (a)     | b18              | a-   | a-   | c79  | a-   | -               | 1.77  | -     |
| F                           | Erigeron sp.               | 5                | 3    | -    | -    | -    | -               | -     | .00   |
| F                           | Eriogonum umbellatum       | -                | -    | -    | -    | 1    | -               | -     | .03   |
| F                           | Euphorbia sp.              | -                | -    | 3    | 1    | -    | .00             | .00   | -     |
| F                           | Gilia sp. (a)              | -                | -    | -    | 5    | -    | -               | .03   | -     |
| F                           | Helianthus annuus (a)      | -                | 6    | -    | 7    | -    | -               | .02   | -     |
| F                           | Heterotheca villosa        | ab40             | b46  | ab38 | ab38 | a21  | 3.22            | 3.36  | 1.21  |
| F                           | Holosteum umbellatum (a)   | -                | -    | a-   | b18  | b24  | -               | .41   | .06   |
| F                           | Isatis tinctoria           | a-               | a-   | b9   | c31  | c41  | .31             | 1.13  | .78   |
| F                           | Lactuca serriola           | b-               | c28  | b2   | b-   | b3   | .00             | -     | .00   |

| Type                      | Species                         | Nested Frequency |                |                 |                |                | Average Cover % |      |      |
|---------------------------|---------------------------------|------------------|----------------|-----------------|----------------|----------------|-----------------|------|------|
|                           |                                 | '85              | '90            | '96             | '01            | '06            | '96             | '01  | '06  |
| F                         | <i>Linaria dalmatica</i>        | -                | -              | 1               | 6              | 3              | .15             | .36  | .13  |
| F                         | <i>Machaeranthera canescens</i> | -                | -              | 1               | -              | 2              | .00             | -    | .00  |
| F                         | <i>Phlox longifolia</i>         | -                | -              | -               | 4              | -              | -               | .01  | -    |
| F                         | <i>Polygonum douglasii</i> (a)  | -                | -              | <sub>b</sub> 28 | <sub>a</sub> - | <sub>a</sub> - | .14             | -    | -    |
| F                         | <i>Portulaca oleracea</i> (a)   | -                | 3              | -               | -              | -              | -               | -    | -    |
| F                         | <i>Salsola iberica</i> (a)      | -                | 8              | -               | 2              | -              | -               | .03  | -    |
| F                         | <i>Tragopogon dubius</i>        | <sub>a</sub> -   | <sub>a</sub> 1 | <sub>b</sub> 17 | <sub>a</sub> 2 | <sub>a</sub> - | .17             | .06  | -    |
| F                         | Unknown forb-perennial          | 3                | -              | -               | -              | -              | -               | -    | -    |
| F                         | <i>Verbascum blattaria</i>      | -                | -              | 2               | -              | -              | .00             | -    | -    |
| Total for Annual Forbs    |                                 | 42               | 23             | 61              | 191            | 58             | 0.26            | 2.74 | 0.23 |
| Total for Perennial Forbs |                                 | 171              | 99             | 98              | 155            | 108            | 4.52            | 5.72 | 2.75 |
| Total for Forbs           |                                 | 213              | 122            | 159             | 346            | 166            | 4.79            | 8.46 | 3.00 |

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

#### BROWSE TRENDS --

Management unit 05 , Study no: 8

| Type             | Species                              | Strip Frequency |     |     | Average Cover % |       |       |
|------------------|--------------------------------------|-----------------|-----|-----|-----------------|-------|-------|
|                  |                                      | '96             | '01 | '06 | '96             | '01   | '06   |
| B                | <i>Artemisia tridentata vaseyana</i> | 25              | 27  | 28  | 2.73            | 5.09  | 9.18  |
| B                | <i>Gutierrezia sarothrae</i>         | 8               | 2   | 2   | .06             | -     | .38   |
| B                | <i>Opuntia</i> sp.                   | 2               | 2   | 1   | -               | -     | -     |
| B                | <i>Purshia tridentata</i>            | 27              | 36  | 30  | 14.06           | 16.55 | 17.37 |
| Total for Browse |                                      | 62              | 67  | 61  | 16.86           | 21.65 | 26.93 |

#### CANOPY COVER, LINE INTERCEPT --

Management unit 05 , Study no: 8

| Species                              | Percent Cover |
|--------------------------------------|---------------|
|                                      | '06           |
| <i>Artemisia tridentata vaseyana</i> | 11.68         |
| <i>Purshia tridentata</i>            | 27.93         |

KEY BROWSE ANNUAL LEADER GROWTH --  
Management unit 05 , Study no: 8

| Species                       | Average leader growth (in) |     |
|-------------------------------|----------------------------|-----|
|                               | '01                        | '06 |
| Artemisia tridentata vaseyana | 2.8                        | 2.3 |
| Purshia tridentata            | 4.4                        | 4.6 |

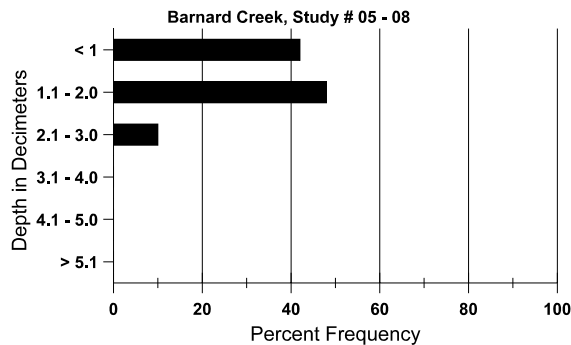
BASIC COVER --  
Management unit 05 , Study no: 8

| Cover Type  | Average Cover % |       |       |       |       |
|-------------|-----------------|-------|-------|-------|-------|
|             | '85             | '90   | '96   | '01   | '06   |
| Vegetation  | 7.25            | 4.75  | 55.25 | 60.27 | 65.84 |
| Rock        | 5.00            | 6.50  | 5.85  | 5.56  | 4.69  |
| Pavement    | 12.50           | 13.25 | 3.92  | 4.43  | 3.58  |
| Litter      | 38.00           | 61.25 | 55.74 | 48.18 | 53.77 |
| Cryptogams  | 0               | 0     | .12   | .06   | .04   |
| Bare Ground | 37.25           | 14.25 | .56   | 6.14  | 1.91  |

SOIL ANALYSIS DATA --  
Herd Unit 05, Study no: 08, Barnard Creek

| Effective rooting depth (in) | Temp °F (depth) | PH  | Sandy clay loam |       |       | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-----------------|-------|-------|-----|-------|-------|------|
|                              |                 |     | %sand           | %silt | %clay |     |       |       |      |
| 33.5                         | 53.0 (18.1)     | 7.0 | 60.9            | 19.1  | 20.0  | 1.1 | 5.7   | 118.4 | 0.3  |

Stoniness Index



PELLET GROUP DATA --  
Management unit 05 , Study no: 8

| Type   | Quadrat Frequency |     |     |
|--------|-------------------|-----|-----|
|        | '96               | '01 | '06 |
| Elk    | -                 | -   | -   |
| Rabbit | -                 | -   | 1   |
| Deer   | 20                | 19  | 14  |

| Days use per acre (ha) |         |
|------------------------|---------|
| '01                    | '06     |
| 5 (12)                 | -       |
| -                      | -       |
| 46 (114)               | 27 (68) |

BROWSE CHARACTERISTICS --  
Management unit 05 , Study no: 8

|                                      |                                       | 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> |                                       |  |       |        |          |      |             |         |            |         |              |                           |
| 85                                   | <b>1332</b>                           | 200                                      | 66    | 1066   | 200      | -    | 65          | 10      | 15         | -       | 10           | 26/40                     |
| 90                                   | <b>865</b>                            | -  | 466   | 133    | 266      | -    | 23          | 0       | 31         | -       | 0            | 13/22                     |
| 96                                   | <b>680</b>                            | -  | 20    | 540    | 120      | 440  | 18          | 0       | 18         | 3       | 3            | 19/35                     |
| 01                                   | <b>780</b>                            | -  | 20    | 580    | 180      | 500  | 0           | 0       | 23         | 3       | 3            | 27/40                     |
| 06                                   | <b>780</b>                            | -  | -     | 760    | 20       | 660  | 21          | 0       | 3          | -       | 0            | 28/49                     |
| <i>Gutierrezia sarothrae</i>         |                                       |  |       |        |          |      |             |         |            |         |              |                           |
| 85                                   | <b>0</b>                              | -  | -     | -      | -        | -    | 0           | 0       | -          | -       | 0            | -/-                       |
| 90                                   | <b>0</b>                              | -  | -     | -      | -        | -    | 0           | 0       | -          | -       | 0            | -/-                       |
| 96                                   | <b>200</b>                            | -  | 60    | 140    | -        | -    | 0           | 0       | -          | -       | 0            | 13/19                     |
| 01                                   | <b>80</b>                             | -  | -     | 80     | -        | 20   | 0           | 0       | -          | -       | 0            | 11/14                     |
| 06                                   | <b>40</b>                             | -  | -     | 40     | -        | -    | 0           | 0       | -          | -       | 0            | 12/19                     |
| <i>Opuntia sp.</i>                   |                                       |  |       |        |          |      |             |         |            |         |              |                           |
| 85                                   | <b>66</b>                             | -  | -     | 66     | -        | -    | 0           | 0       | -          | -       | 0            | 7/17                      |
| 90                                   | <b>0</b>                              | -  | -     | -      | -        | -    | 0           | 0       | -          | -       | 0            | -/-                       |
| 96                                   | <b>40</b>                             | -  | -     | 40     | -        | -    | 0           | 0       | -          | -       | 0            | 6/12                      |
| 01                                   | <b>40</b>                             | -  | -     | 40     | -        | -    | 0           | 0       | -          | -       | 0            | 10/17                     |
| 06                                   | <b>20</b>                             | -  | -     | 20     | -        | -    | 0           | 0       | -          | -       | 0            | 9/23                      |
| <i>Purshia tridentata</i>            |                                       |  |       |        |          |      |             |         |            |         |              |                           |
| 85                                   | <b>66</b>                             | -  | -     | 66     | -        | -    | 0           | 100     | 0          | -       | 0            | 36/51                     |
| 90                                   | <b>399</b>                            | -  | 66    | 333    | -        | -    | 50          | 0       | 0          | -       | 0            | 50/66                     |
| 96                                   | <b>600</b>                            | -  | -     | 580    | 20       | 40   | 70          | 0       | 3          | -       | 0            | 43/73                     |
| 01                                   | <b>1220</b>                           | -  | -     | 1180   | 40       | 80   | 56          | 21      | 3          | -       | 0            | 40/67                     |
| 06                                   | <b>920</b>                            | -  | -     | 860    | 60       | 40   | 37          | 26      | 7          | 7       | 7            | 41/72                     |