Trend Study 18A-25-07

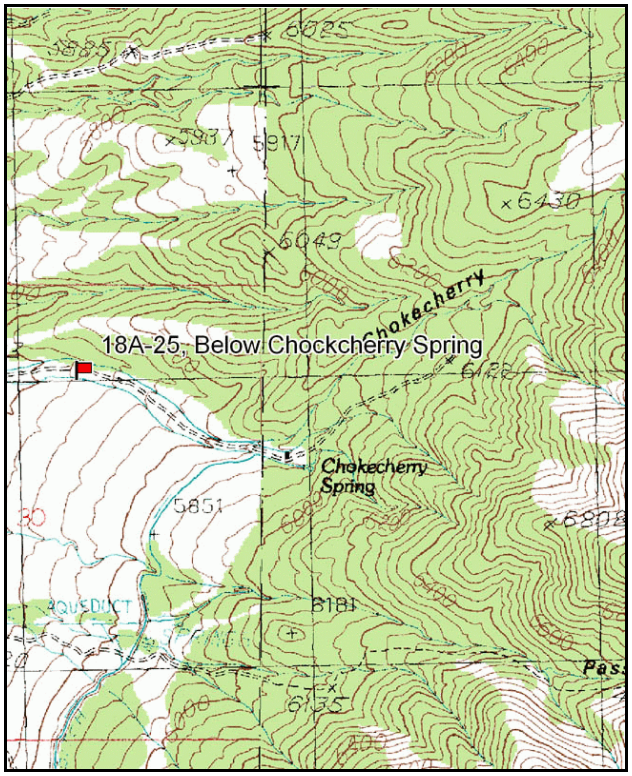
Study site name: Below Chokecherry Spring . Vegetation type: Big Sagebrush-Grass .

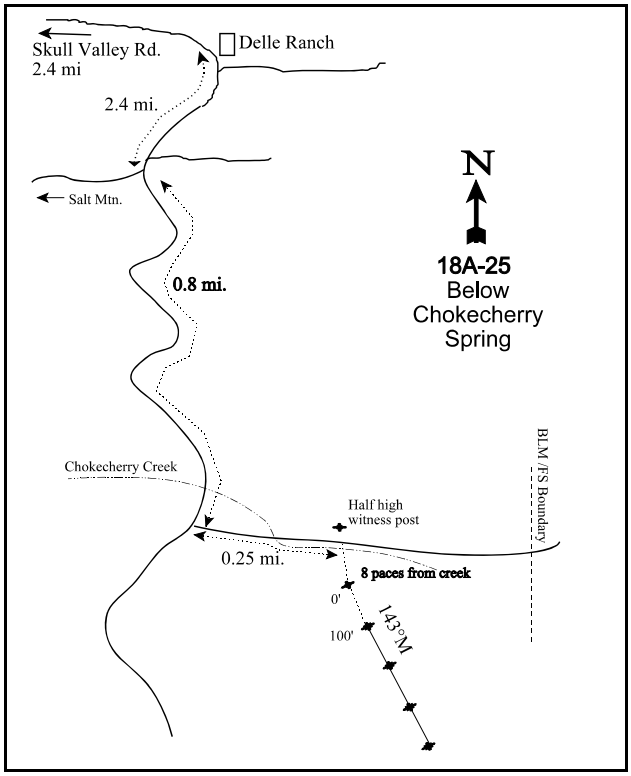
Compass bearing: frequency baseline 143 degrees magnetic.

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

LOCATION DESCRIPTION

Turn off the Skull Valley Road between mile mark 24 and 25 on a gravel road heading east. Go 2.4 miles staying right on the main road to Delle Ranch ponds and trees. The road then turns south. From Delle Ranch, proceed south for 2.4 miles to an intersection to the right (west) heading to Salt Mountain. There will be a red post on the east side of this intersection. Stay to the left (south) and continue for 0.8 miles to another intersection. Turn left (east) and go 0.25 miles along Chokecherry Creek. From this point, walk south across the creek bed into the chaining where the study is located. The 0-foot baseline is 33 paces from the witness post at 141 degrees magnetic. Browse tag number 3924 is attached to the 0-foot marker of the baseline.




Map Name: Salt Mountain

Township 3S , Range 7W , Section 30

Diagrammatic Sketch

GPS: NAD 83, UTM 12T 358137 E 4488204 N

## DISCUSSION

### Below Chokecherry Spring - Trend Study No. 18A-25

#### Study Information

This study is located one-half mile (0.8 km) west of Chokecherry Spring on a low-lying alluvial site near an intermittent drainage channel [elevation: 5,600 feet (1,707 m), slope: 5-10%, aspect: west]. There is a moderately-incised perennial stream 40 feet (13 m) to the north of the study. The stream banks and corridor were being grazed by cattle while the study was sampled in 2007. The study monitors a large mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) community surrounded by pinyon-juniper woodland. The woodland was apparently chained and seeded in the past, and some of the pinyon-juniper trees on the periphery of the study had been bullhogged just prior to the 2007 sampling. Summer cattle grazing was noted as heavy in 1983, although little succulent forage was available due to a dense understory of cheatgrass (*Bromus tectorum*). According to the local conservation officer in 1983, 400-500 deer customarily wintered in this area. However, in 1997, sagebrush had been lightly used, and deer pellet groups were only found in 11% of the quadrats. In 2002, grazing was less intense than in the past, and increased in 2007. Deer use was estimated at 29 deer days use/acre (73 ddu/ha) in 2002 and 11 deer days use/acre (26 ddu/ha) in 2007. Elk use was only noted in 2007, at an estimated 21 elk days use/acre (53 edu/ha). Additionally, cattle use was estimated at 14 cattle days use/acre (34 cdu/ha) in 2002 and 66 cattle days use/acre (163 cdu/ha) in 2007.

#### Soil

The soil is classified within the Kapod series (USDA-NRCS 2007). Soils in this series were alluvially deposited, derived mainly from sandstone and limestone. They are very deep and well-drained. The soil texture is a loam with a neutral to mildly alkaline reaction (pH 7.3). The soil phosphorus is relatively low at 6.3 ppm. Vegetation and litter cover are moderately high, and there is little exposed bare ground. Erosion is not a significant problem because of the gentle slope and protective herbaceous cover. The erosion condition class was determined as stable in 2002 and 2007.

#### Browse

Mountain big sagebrush density was relatively stable until 2007, when density declined 42%, from 10,920 plants/acre (26,972 plants/ha) to 6,320 plants/acre (15,617 plants/ha). This decrease correlates with the statewide sagebrush die-off that occurred through the winter and spring of 2002-2003. Average cover increased from 15% in 1997 to 20% in 2007. Over two-thirds of the plants were classified as mature in all sample years, except in 1997 when the population was mostly young. Decadence increased from 3% in 1997 to 17% in 2007. Utilization of sagebrush has been mostly light since 1983. The average annual leader growth was 2 inches (5 cm) in 2002 and 1.3 inches (3.3 cm) in 2007. In 2007, 34% of the plants sampled were infested with black insects.

Broom snakeweed (*Gutierrezia sarothrae*) was abundant in 1983, with a density of 15,556 plants/acre (38,438 plants/ha). The population decreased to only 2,900 plants/acre (7,166 plants/ha) by 1997, and was not sampled in 2007. Other browse that occur infrequently are white rubber rabbitbrush (*Chrysothamnus nauseosus* ssp. *albicaulis*), stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*), and antelope bitterbrush (*Purshia tridentata*).

#### Herbaceous Understory

There is a moderate-high abundance of perennial grasses, and forage production has increased since 1983. Vigor was somewhat suppressed as a result of heavy grazing use by cattle in early samplings. Crested wheatgrass (*Agropyron cristatum*), Sandberg bluegrass (*Poa secunda*), and cheatgrass are the most abundant grasses. Crested wheatgrass and Sandberg bluegrass cover have fluctuated since 1997, however, cheatgrass cover has steadily declined from 9% to 4%. Grasses constituted 55% of the vegetation cover in 1997, 51% in 2002, and 42% in 2007.

Forbs have a diverse composition, yet most species only occur occasionally. Forb cover has been moderately high at 5% to 7% since 1997. The most abundant species are Bonneville pea (*Lathyrus brachycalyx*) and holosteum (*Holosteum umbellatum*), which provided 43% and 34% of the total forb cover in 2007, respectively. Forb cover increased from 18% of the total herbaceous cover in 2002 to 31% in 2007, due to substantial increases in annual forb cover.

1989 TREND ASSESSMENT

The trend for browse is up. The sagebrush density increased from 966 plants/acre (2,387 plants/ha) to 1,332 plants/acre (3,291 plants/ha). Seventy-three percent of the plants were classified as mature. There were a few young plants (10%), and although not sampled on the density plots, many large sagebrush were observed to have a high number of seedlings nearby. Decadence increased from 0% to 17%. Vigor was good, and use was light. The trend for grass is up. The sum of nested frequency for perennial grasses increased 67%, and there was a significant increase in the nested frequency of Sandberg bluegrass. The trend for forbs is up. The sum of nested frequency of perennial forbs increased by 44%. Several forb species significantly increased in nested frequency, and forb cover increased from 5% to approximately 7%.

browse - up (+2) grass - up (+2) forb - up (+2)

1997 TREND ASSESSMENT

The trend for browse is up. Sagebrush density increased from 1,332 plants/acre (3,290 plants/ha) to 10,840 plants/acre (26,785 plants/ha). However, this increase is most likely reflective of the larger area sampled in 1997. Decadence decreased from 17% to 3%, and young plants increased from 10% to 68% of the population. Additionally, there was an increase in sagebrush reproduction. The density of seedlings increased from 0 plants/acre to 2,420 plants/acre (5,990 plants/ha). Vigor remained good, and use was mostly light. The trend for grass is stable. Crested wheatgrass increased significantly in nested frequency and provided 44% of the total grass cover. Sandberg bluegrass and mutton bluegrass (*Poa fendleriana*) decreased significantly in nested frequency. Cheatgrass was still abundant and provided 9% cover, or 32% of the total grass cover. The trend for forbs is stable. The sum of nested frequency for perennial forbs changed little, and perennial forb cover was 5%. The Desirable Components Index (DCI) was rated as good-excellent due to an abundant young age class and good browse cover, as well as a diverse understory primarily composed of perennial grasses.

winter range condition (DCI) - good-excellent (82) Mid-level potential scale
browse - up (+2) grass - stable (0) forb - stable (0)

2002 TREND ASSESSMENT

The trend for browse is stable. Density remained moderately high at 10,920 plants/acre (26,983 plants/ha), and cover increased from 15% to 18%. Decadence remained low at 4% of the population, but the percent of young plants in the population decreased from 68% in 1997 to 27% in 2002. It appears as though many of the plants classified as young in 1997 were classified as mature in 2002. Utilization remained light, and vigor was good. The trend for grass is stable. The nested frequency of Sandberg bluegrass decreased significantly, while the nested frequency of crested wheatgrass increased significantly. Crested wheatgrass provided 62% of the total grass cover, an increase from 44% in 1997. Cheatgrass was still abundant, and although its cover decreased from 9% to 7%, the nested frequency did not change significantly. The trend for forbs is down. The sum of nested frequency for perennial forbs decreased 36%. Forbs were diverse, but few were common. Twenty-three forb species were sampled in 1997, but due to drought conditions, only 11 species were sampled in 2002. The nested frequency of Bonneville pea did not change significantly, and this species provided 78% of the total forb cover. The DCI increased to excellent due to a slight increase in preferred browse cover.

winter range condition (DCI) - excellent (85) Mid-level potential scale
browse - stable (0) grass - stable (0) forb - down (-2)

2007 TREND ASSESSMENT

The trend for browse is slightly down. The average quadrat cover of sagebrush increased from 18% to 20%, and average canopy cover increased from 19% to 22%. Average plant height and crown width increased 5 inches (12.7 cm) and 6 inches (15.2 cm), respectively. However, density decreased from 10,920 plants/acre (26,983 plants/ha) to 6,320 plants/acre (15,617 plants/ha). This decrease was most likely due to self-thinning, as young plants competed for more resources as they matured and increased in size. The young plants in the population decreased from 27% to 2%, while decadence increased from 4% to 17%. The number of plants showing moderate and heavy use also increased slightly, but vigor remained good. The trend for grass is up. The sum of nested frequency for perennial grasses increased 33%. There was a significant increase in the nested frequency of Sandberg bluegrass. The nested frequencies of cheatgrass and Japanese brome (*Bromus japonicus*) remained stable, but cheatgrass cover decreased from 7% to 4%. Grass cover accounted for 42% of the total herbaceous cover, a slight decrease from 51% in 2002. The trend for forbs is up. The sum of nested frequency for perennial forbs increased 44%. Four species increased significantly in nested frequency, including wild onion (*Allium* sp.). Forbs composed 19% of the total herbaceous cover, increasing from 12% in 2002. The DCI rating declined to good, due to an increase in sagebrush decadence and a decrease in young plants.

winter range condition (DCI) - good (72) Mid-level potential scale
browse - slightly down (-1) grass - up (+2) forb - up (+2)

HERBACEOUS TRENDS --
Management unit 18A, Study no: 25

| Type | Species | Nested Frequency | | | | | Average Cover % | | |
|---|---|---|---|---|---|---|---|---|---|
| | | '83 | '89 | '97 | '02 | '07 | '97 | '02 | '07 |
| G | Agropyron cristatum | a57 | a96 | b169 | c241 | c225 | 12.91 | 20.81 | 13.88 |
| G | Agropyron spicatum | a7 | a4 | a14 | - | b37 | .27 | - | 1.52 |
| G | Bromus japonicus (a) | - | - | a3 | ab9 | b14 | .00 | .01 | .05 |
| G | Bromus tectorum (a) | - | - | b261 | ab163 | 172 | 9.35 | 6.71 | 4.11 |
| G | Poa bulbosa | - | - | - | a45 | a28 | - | 2.37 | .41 |
| G | Poa fendleriana | - | b37 | a2 | - | - | .03 | - | - |
| G | Poa secunda | b184 | c281 | b214 | a131 | b233 | 6.39 | 3.82 | 7.41 |
| G | Sitanion hystrix | a7 | a6 | a2 | - | a1 | .03 | - | .03 |
| G | Sporobolus cryptandrus | - | a2 | a1 | - | - | .03 | - | - |
| Total for Annual Grasses | | 0 | 0 | 264 | 172 | 186 | 9.36 | 6.72 | 4.17 |
| Total for Perennial Grasses | | 255 | 426 | 402 | 417 | 524 | 19.69 | 27.00 | 23.26 |
| Total for Grasses | | 255 | 426 | 666 | 589 | 710 | 29.05 | 33.73 | 27.43 |
| F | Agoseris glauca | - | a4 | a- | a3 | a2 | .00 | .03 | .03 |
| F | Alyssum alyssoides (a) | - | - | - | a3 | a4 | - | .00 | .03 |
| F | Allium sp. | a8 | b81 | b73 | a3 | b71 | .61 | .01 | .33 |
| F | Antennaria rosea | - | 3 | - | - | - | - | - | - |
| F | Artemisia ludoviciana | a3 | a1 | - | - | - | - | - | - |
| F | Astragalus sp. | - | - | a7 | - | a3 | .04 | - | .06 |
| F | Astragalus utahensis | - | - | 3 | - | - | .03 | - | - |

| Type | Species | Nested Frequency | | | | | Average Cover % | | |
|---|---|---|---|---|---|---|---|---|---|
| | | '83 | '89 | '97 | '02 | '07 | '97 | '02 | '07 |
| F | Calochortus nuttallii | $_{a}$7 | $_{a}$6 | $_{a}$6 | - | $_{a}$12 | .02 | - | .03 |
| F | Cirsium neomexicanum | $_{a}$3 | - | $_{a}$7 | - | - | .19 | - | - |
| F | Collinsia parviflora (a) | - | - | $_{a}$85 | $_{a}$97 | $_{a}$82 | .18 | .52 | .21 |
| F | Crepis acuminata | - | 2 | - | - | - | - | - | - |
| F | Descurainia pinnata (a) | - | - | - | - | 8 | - | - | .02 |
| F | Descurainia sp. (a) | - | - | 11 | - | - | .02 | - | - |
| F | Draba sp. (a) | - | - | $_{a}$22 | $_{a}$3 | $_{b}$173 | .05 | .00 | 1.35 |
| F | Epilobium brachycarpum (a) | - | - | 5 | - | - | .01 | - | - |
| F | Erodium cicutarium (a) | - | - | $_{a}$5 | $_{a}$8 | $_{a}$12 | .01 | .01 | .05 |
| F | Galium aparine (a) | - | - | - | - | 1 | - | - | .00 |
| F | Hackelia patens | $_{a}$4 | $_{a}$4 | $_{a}$10 | - | - | .35 | - | - |
| F | Helianthus sp. | - | 4 | - | - | - | - | - | - |
| F | Holosteum umbellatum (a) | - | - | $_{a}$55 | $_{a}$56 | $_{b}$267 | .13 | .33 | 4.27 |
| F | Lathyrus brachycalyx | $_{b}$207 | $_{a}$149 | $_{a}$139 | $_{a}$150 | $_{ab}$163 | 3.36 | 5.82 | 5.32 |
| F | Lactuca serriola | - | $_{b}$26 | - | - | $_{a}$5 | - | - | .01 |
| F | Lomatium sp. | - | - | $_{a}$- | $_{b}$31 | $_{b}$15 | .00 | .57 | .09 |
| F | Lygodesmia sp. | - | - | 2 | - | - | .00 | - | - |
| F | Microsteris gracilis (a) | - | - | $_{a}$2 | $_{a}$3 | $_{b}$19 | .00 | .01 | .05 |
| F | Montia perfoliata (a) | - | - | - | - | 3 | - | - | .03 |
| F | Phlox longifolia | $_{a}$13 | $_{b}$55 | $_{b}$54 | $_{ab}$37 | $_{b}$52 | .40 | .14 | .46 |
| F | Polygonum douglasii (a) | - | - | 3 | - | - | .01 | - | - |
| F | Ranunculus testiculatus (a) | - | - | $_{a}$19 | - | $_{a}$27 | .03 | - | .08 |
| F | Taraxacum officinale | $_{a}$3 | $_{a}$4 | $_{a}$14 | - | - | .05 | - | - |
| F | Tragopogon dubius | $_{a}$3 | $_{b}$23 | $_{b}$33 | - | - | .17 | - | - |
| F | Veronica biloba (a) | - | - | 19 | - | - | .05 | - | - |
| Total for Annual Forbs | | 0 | 0 | 226 | 170 | 596 | 0.51 | 0.88 | 6.11 |
| Total for Perennial Forbs | | 251 | 362 | 348 | 224 | 323 | 5.25 | 6.58 | 6.36 |
| Total for Forbs | | 251 | 362 | 574 | 394 | 919 | 5.77 | 7.46 | 12.47 |

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

BROWSE TRENDS --
Management unit 18A, Study no: 25

| Type | Species | Strip Frequency | | | Average Cover % | | |
|---|---|---|---|---|---|---|---|
| | | '97 | '02 | '07 | '97 | '02 | '07 |
| B | Artemisia tridentata vaseyana | 85 | 89 | 83 | 15.28 | 18.18 | 19.63 |
| B | Chrysothamnus nauseosus albicaulis | 10 | 8 | 4 | .40 | .36 | - |
| B | Chrysothamnus viscidiflorus viscidiflorus | 26 | 17 | 24 | 1.98 | 1.09 | 1.75 |
| B | Gutierrezia sarothrae | 50 | 41 | 0 | .79 | 1.90 | - |
| B | Juniperus osteosperma | 2 | 0 | 2 | - | .56 | 3.62 |
| Total for Browse | | 173 | 155 | 113 | 18.47 | 22.11 | 25.02 |

CANOPY COVER, LINE INTERCEPT --
Management unit 18A, Study no: 25

| Species | Percent Cover | | |
|---|---|---|---|
| | '97 | '02 | '07 |
| Artemisia tridentata vaseyana | - | 18.56 | 22.38 |
| Chrysothamnus nauseosus albicaulis | - | .30 | - |
| Chrysothamnus viscidiflorus viscidiflorus | - | 1.06 | 2.06 |
| Gutierrezia sarothrae | - | 1.89 | - |
| Juniperus osteosperma | 7.80 | 2.31 | 6.31 |

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 18A, Study no: 25

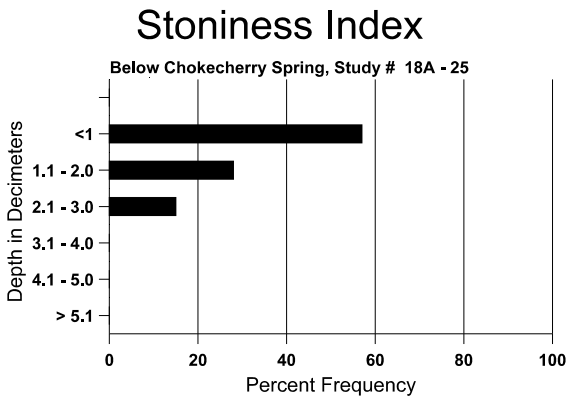
| Species | Average leader growth (in) | |
|---|---|---|
| | '02 | '07 |
| Artemisia tridentata vaseyana | 2.0 | 1.3 |

BASIC COVER --
Management unit 18A, Study no: 25

| Cover Type | Average Cover % | | | | |
|---|---|---|---|---|---|
| | '83 | '89 | '97 | '02 | '07 |
| Vegetation | .25 | 10.25 | 53.84 | 60.31 | 67.05 |
| Rock | 1.75 | 3.00 | 2.17 | 3.63 | 3.26 |
| Pavement | 1.75 | 1.50 | 1.57 | 1.81 | 2.23 |
| Litter | 70.00 | 71.75 | 54.59 | 50.27 | 35.90 |
| Cryptogams | 0 | 3.25 | 6.73 | 2.73 | .99 |
| Bare Ground | 26.25 | 10.25 | 2.66 | 2.91 | 8.03 |

SOIL ANALYSIS DATA --
Herd Unit 18A, Study no: 25, Below Chokecherry Spring

| Effective rooting depth (in) | Temp °F (depth) | pH | Loam | | | %0M | ppm P | ppm K | dS/m |
|---|---|---|---|---|---|---|---|---|---|
| | | | %sand | %silt | %clay | | | | |
| 12.5 | 60.5 (10.5) | 7.3 | 44.0 | 31.4 | 24.6 | 3.2 | 6.3 | 236.8 | .6 |




PELLET GROUP DATA --
Management unit 18A, Study no: 25

| Type | Quadrat Frequency | | |
|---|---|---|---|
| | '97 | '02 | '07 |
| Rabbit | 44 | 31 | 31 |
| Elk | 1 | 1 | - |
| Deer | 11 | 16 | 16 |
| Cattle | 11 | 4 | 10 |

| Days use per acre (ha) | |
|---|---|
| '02 | '07 |
| - | - |
| - | 21 (53) |
| 29 (73) | 11 (26) |
| 14 (34) | 66 (163) |

BROWSE CHARACTERISTICS --
Management unit 18A, Study no: 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) |
| Artemisia tridentata vaseyana | | | | | | | | | | | | |
| 83 | **966** | - | 333 | 633 | - | - | 0 | 0 | 0 | - | 0 | 29/37 |
| 89 | **1332** | - | 133 | 966 | 233 | - | 20 | 3 | 17 | - | 0 | 27/38 |
| 97 | **10840** | 2420 | 7340 | 3220 | 280 | 140 | 20 | .36 | 3 | .73 | 2 | 26/41 |
| 02 | **10920** | - | 2940 | 7560 | 420 | 420 | 8 | .54 | 4 | 2 | 2 | 20/23 |
| 07 | **6320** | - | 140 | 5120 | 1060 | 280 | 23 | 13 | 17 | 8 | 9 | 25/29 |

| | | 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) |
| Chrysothamnus nauseosus albicaulis | | | | | | | | | | | | |
| 83 | **66** | - | 33 | 33 | - | - | 0 | 0 | 0 | - | 0 | 39/77 |
| 89 | **133** | - | 33 | 100 | - | - | 0 | 0 | 0 | - | 0 | 41/63 |
| 97 | **460** | 20 | 260 | 180 | 20 | - | 0 | 0 | 4 | - | 0 | 21/23 |
| 02 | **160** | - | 20 | 80 | 60 | 40 | 13 | 13 | 38 | 13 | 13 | 25/31 |
| 07 | **80** | - | 40 | 20 | 20 | 20 | 0 | 25 | 25 | 25 | 50 | 23/28 |
| Chrysothamnus viscidiflorus viscidiflorus | | | | | | | | | | | | |
| 83 | **66** | - | - | 66 | - | - | 0 | 0 | 0 | - | 0 | 16/14 |
| 89 | **166** | - | 100 | 66 | - | - | 0 | 0 | 0 | - | 0 | 15/23 |
| 97 | **1320** | - | 160 | 1140 | 20 | - | 2 | 0 | 2 | - | 0 | 16/25 |
| 02 | **840** | - | 20 | 680 | 140 | 40 | 0 | 0 | 17 | 10 | 19 | 18/22 |
| 07 | **1100** | 40 | 20 | 880 | 200 | - | 5 | 0 | 18 | 2 | 18 | 15/21 |
| Gutierrezia sarothrae | | | | | | | | | | | | |
| 83 | **15566** | 1733 | 13500 | 2066 | - | - | 0 | 0 | 0 | - | 0 | 13/13 |
| 89 | **12999** | 800 | 2333 | 7733 | 2933 | - | 0 | 0 | 23 | 10 | 11 | 13/11 |
| 97 | **2900** | - | 300 | 2520 | 80 | 20 | 0 | 0 | 3 | - | 0 | 10/10 |
| 02 | **2120** | - | 20 | 1440 | 660 | 280 | .94 | 0 | 31 | 8 | 18 | 9/10 |
| 07 | **0** | - | - | - | - | - | 0 | 0 | 0 | - | 0 | 8/12 |
| Juniperus osteosperma | | | | | | | | | | | | |
| 83 | **0** | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 89 | **0** | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 97 | **40** | - | 20 | 20 | - | 80 | 0 | 0 | - | - | 50 | -/- |
| 02 | **0** | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 07 | **40** | - | - | 40 | - | - | 100 | 0 | - | - | 0 | -/- |
| Purshia tridentata | | | | | | | | | | | | |
| 83 | **66** | - | - | 66 | - | - | 0 | 100 | 0 | - | 50 | 14/24 |
| 89 | **33** | - | - | - | 33 | - | 0 | 100 | 100 | 100 | 100 | -/- |
| 97 | **0** | - | - | - | - | - | 0 | 0 | 0 | - | 0 | 15/55 |
| 02 | **0** | - | - | - | - | - | 0 | 0 | 0 | - | 0 | -/- |
| 07 | **0** | - | - | - | - | - | 0 | 0 | 0 | - | 0 | 22/49 |