

Trend Study 24R-1-08

Study site name: Sanford .

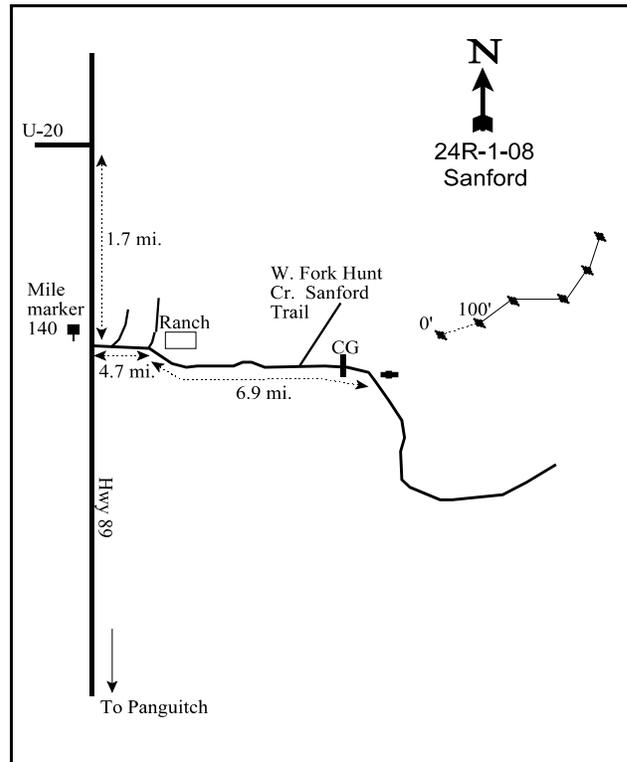
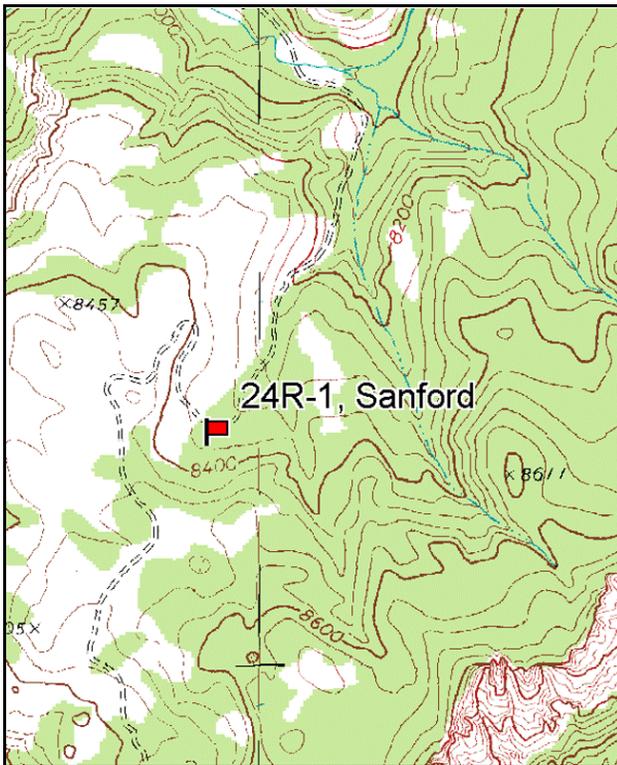
Vegetation type: Aspen-Conifer Burn .

Compass bearing: frequency baseline 87 degrees magnetic (line 2, 74°M, line 3, 93°M, line 4, 68°M, line 5, 7°M).

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

LOCATION DESCRIPTION

From the junction of highway 89 and U-20, travel south on highway 89 for 1.7 miles to a left turn. Travel 4.7 miles east keeping right at all forks until you come to a fork with a sign to Sanford Creek. Turn right at the fork. Travel 6.9 miles up Sanford Creek Canyon to the witness post on the left side of the road. You will cross the creek several times as you go up the canyon. Stay right at the fork part way up the canyon. The 0' stake is 27 paces at 185 degrees magnetic from the witness post. The 0' stake is a half-high steel post marked by browse tag #167 and the other stakes are rebar.



Map Name: Blind Spring Mtn

Diagrammatic Sketch

Township 33S, unsurveyed

GPS: NAD 83, UTM 12S 389938 E, 4197851 N

DISCUSSION

Sanford - Trend Study 24R-1

Study Information

This study was established in 1998 up the right fork of Sanford Creek to monitor a prescribed burn which occurred in 2002 [elevation: 8,390 (2,557 m), slope: 12%, aspect: north]. Prior to the burn the area was dominated by Douglas fir (*Pseudotsuga menziesii*) with small numbers of aspen (*Populus tremuloides*). After the burn, Douglas fir was only present in a few unburned areas and the density of aspen increased. This site would be considered summer range for deer and elk, but pellet group data shows only light use. Deer use was estimated to be light in 1998 (17 ddu/acre:41 ddu/ha), decreasing, after the burn, in 2003 (5 ddu/acre:12 ddu/ha), and increasing to light use again in 2008 (13 ddu/acre:33 ddu/ha). Elk use was estimated to be extremely light in 1998 and 2003 (at or less than 1 edu/acre:2 edu/ha) and increased slightly in 2008 (7 edu/acre:17 edu/ha). A few fresh cattle pats were seen in 2003, likely due to trespass livestock, but none occurred within the pellet group transect. Cattle use was estimated to be light in 2008 (7 cdu/acre:16 cdu/ha).

Soil

Soil at the site is deep with an effective rooting depth of 18.5 inches. There is little rock or pavement on the surface. Soil texture is a sandy loam which is strongly acidic (pH 5.4). Organic matter is high at nearly 5%. Prior to the burn, the relative combined vegetation and litter cover was abundant covering nearly 100% of the ground surface with most being in the form of conifer needles. Little bare ground was exposed. After the burn in the 2003 reading, relative cover of bare ground increased to 25% and relative combined vegetation and litter cover declined from 100% to 74%. In areas where the fire did not burn very hot, needle litter still covered the ground but soil is exposed in places where the fire burned hotter. The relative combined vegetation and litter cover increased in 2008 to 86% and the relative bareground decreased to 12%. With the increase in bareground after the burn, there is potential for erosion problems on this site, however, erosion appeared minimal and the erosion condition class was determined to be stable in 2003 and 2008.

Browse

The site was dominated by an overstory of Douglas fir prior to the burn. Shrub density strip data estimated a population of 1,440 trees/acre, 72% of which were young trees. Overhead canopy cover was estimated at 35%. Aspen was scattered through the site at a density of 680 trees/acre. Only 21%, or 140 trees/acre, were mature. Overhead canopy cover was variable but averaged 15% in 1998. Density of Douglas fir declined six-fold to only 240 trees/acre after the fire in 2003, and to 180 trees/acre in 2008. Dead Douglas fir was estimated at 1,140 trees/acre in 2003 with most of the surviving fir trees located in an unburned area. Line intercept canopy cover averaged 5.4% in 2003 and 4.5% in 2008. Aspen responded favorably to the fire with numerous aspen suckers sprouting after the burn. Density of aspen increased more than three-fold from 680 plants/acre in 1998 to 2,220 plants/acre in 2003, and increased a further 42% to 3,860 plants/acre in 2008. Suckers were mostly unutilized. A few Ponderosa pine (*Pinus edulis*) trees also occupy the site.

Understory shrubs included mountain common juniper (*Juniperus communis*), Oregon holly grape (*Mahonia repens*), Woods rose (*Rosa woodsii*), and snowberry (*Symphoricarpos oreophilus*). All of these shrubs combined produced approximately 13% cover in 1998, with common juniper providing 41% of the understory shrub cover and snowberry accounting for an additional 38%. All species declined substantially in cover and density after the fire with the exception of Woods rose which dropped in average cover but remained similar in density in the 2003 reading. Snowberry and Woods rose both increased in 2008 with densities of 1,360 plants/acre and 500 plants/acre, respectively. None of these shrubs appeared to be utilized during any reading. A few browse species, serviceberry (*Amelanchier alnifolia*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and an elder species (*Sambucus* sp.), were encountered for the first time in 2008 in low numbers.

Herbaceous Understory

The herbaceous understory was poor prior to the burn with perennial grasses providing only about 3% total cover. The most abundant species were mountain brome (*Bromus carinatus*), Kentucky bluegrass (*Poa pratensis*), and subalpine needlegrass (*Stipa columbiana*). The forb composition was moderately diverse but total forb production was poor with forb cover estimated at only about 6% in 1998. The more common species included columbine (*Aquilegia caerulea*), milkvetch (*Astragalus sp.*), western yarrow (*Achillea millefolium*), rose pussytoes (*Antennaria rosea*), and dandelion (*Taraxacum officinale*). In 2003, the first growing season after the burn, perennial grasses and forbs were lacking. Total grass cover declined to less than 1%. The most abundant species was subalpine needlegrass. Individual grass plants were large and robust but spotty in their distribution. Some seeded grasses were encountered in small numbers. Total forb cover was estimated at less than 2%, and perennial forb cover was estimated at less than 1%. The most abundant forb found on the site in 2003 was Fremont goosefoot (*Chenopodium fremontii*), an early seral annual, which made up 46% of the total forb cover. Herbaceous abundance and production increased in 2008 with perennial grass cover increasing to nearly 10% and perennial forb cover increasing to just over 14%.

2003 TREND ASSESSMENT

Trend for browse is slightly up with the improvement for aspen, the key species on this site. The goals of the prescribed burn treatment are being accomplished with the reduction of the Douglas fir overstory from an average cover value of 35% in 1998 to 5% in 2003. Remaining Douglas fir cover comes from an unburned area along the baseline. Total aspen cover declined from 15% in 1998 to about 5% in 2003, however, aspen density increased 69% after the fire from 680 plants/acre to 2,220 plants/acre due to a flush of aspen suckers. Understory shrubs, mountain common juniper, Oregon hollygrape, and snowberry declined but these species are not key species, especially on summer range. Trend for the grasses and forbs is down due to a substantial decline in the sum of nested frequency of both perennial grasses and forbs. Herbaceous plants are large and robust where found but are spotty in their distribution. The site was read during the first growing season after the fire and the herbaceous understory should improve in the future.

browse - slightly up (+1)

grass - down (-2)

forb - down (-2)

2008 TREND ASSESSMENT

Trend for browse is up with the continuing improvement for aspen and understory shrub species, including the identification of three previously un-encountered browse species on the site. The density of aspen increased by 42% from 2003 with a density of 3,860 plants/acre. Recruitment of aspen was still good with young plants comprising 15% of the population. Oregon grape and snowberry density both increased markedly, but mountain common juniper is no longer encountered on the site. Serviceberry, mountain big sagebrush, and an elder species, were all encountered on the site for the first time since the study was established. All three species had low densities. The trend for grasses is up with a 43% increase in the sum of nested frequency for perennial grasses. The sum of nested frequency for perennial grasses was also 75% higher than the pre-burn read done in 1998. Subalpine needlegrass and smooth brome are the dominant species comprising 48% of the grass cover. The trend for forbs is greatly increased. The total perennial forb cover increased dramatically from under 1% in 2003 to over 14% in 2008. The sum of nested frequency of perennial forbs is also 76% higher than the pre-burn sampling.

browse - up (+2)

grass - up (+2)

forb - up (+2)

HERBACEOUS TRENDS --
Management unit 24R, Study no: 1

| T y p e | Species | Nested Frequency | | | Average Cover % | | |
|-----------------------------|-------------------------------|------------------|------|-----|-----------------|------|-------|
| | | '98 | '03 | '08 | '98 | '03 | '08 |
| G | Agropyron cristatum | - | - | 5 | - | - | .03 |
| G | Agropyron intermedium | a- | a- | b14 | - | - | .28 |
| G | Bromus carinatus | 67 | - | - | 1.77 | - | - |
| G | Bromus inermis | a- | a2 | b61 | - | .03 | 1.82 |
| G | Bromus tectorum (a) | - | - | 14 | - | - | .36 |
| G | Carex sp. | 3 | - | 3 | .03 | - | .00 |
| G | Dactylis glomerata | b20 | a- | c46 | .28 | - | .78 |
| G | Festuca ovina | 8 | - | - | .03 | - | - |
| G | Poa fendleriana | a- | a6 | b43 | - | .01 | .91 |
| G | Poa pratensis | b36 | a2 | b31 | .32 | .03 | .96 |
| G | Secale montanum | a- | ab22 | b39 | - | .32 | 1.63 |
| G | Stipa columbiana | ab40 | a28 | b64 | .42 | .41 | 3.05 |
| G | Stipa lettermani | ab11 | a- | b17 | .01 | - | .21 |
| Total for Annual Grasses | | 0 | 0 | 14 | 0 | 0 | 0.35 |
| Total for Perennial Grasses | | 185 | 60 | 323 | 2.89 | 0.81 | 9.70 |
| Total for Grasses | | 185 | 60 | 337 | 2.89 | 0.81 | 10.06 |
| F | Achillea millefolium | b35 | a6 | b45 | .87 | .07 | .54 |
| F | Antennaria rosea | b35 | a3 | a4 | 1.25 | .06 | .03 |
| F | Androsace septentrionalis (a) | a4 | ab11 | b23 | .01 | .05 | .07 |
| F | Aquilegia caerulea | b52 | a- | a- | 1.48 | - | - |
| F | Arabis sp. | 3 | - | 10 | .00 | - | .01 |
| F | Arenaria fendleri | b14 | a- | ab2 | .10 | - | .00 |
| F | Astragalus sp. | b33 | a6 | a15 | .95 | .07 | .24 |
| F | Castilleja sp. | 2 | - | - | .03 | - | - |
| F | Chenopodium fremontii (a) | a- | c31 | b13 | - | .79 | .05 |
| F | Cirsium sp. | - | - | - | - | - | .03 |
| F | Clematis sp. | - | - | 1 | - | - | .15 |
| F | Collomia linearis (a) | a- | a7 | b29 | - | .04 | .10 |
| F | Erigeron eatonii | a21 | a11 | b35 | .22 | .07 | .61 |
| F | Erigeron flagellaris | a- | a- | b18 | - | - | 1.08 |
| F | Fragaria virginiana | a2 | a6 | b52 | .03 | .05 | 1.66 |
| F | Geranium sp. | 3 | - | 1 | .03 | - | .01 |
| F | Ipomopsis aggregata | - | - | 3 | - | - | .00 |
| F | Lappula occidentalis (a) | - | - | 10 | - | - | .07 |

| Type | Species | Nested Frequency | | | Average Cover % | | |
|---------------------------|--------------------------|------------------|-----------------|------------------|-----------------|------|-------|
| | | '98 | '03 | '08 | '98 | '03 | '08 |
| | | F | Lotus utahensis | 3 | - | - | .00 |
| F | Lupinus argenteus | _{ab} 3 | _a - | _b 8 | .03 | - | .07 |
| F | Microsteris gracilis (a) | - | - | 4 | - | - | .00 |
| F | Orthocarpus luteus (a) | 1 | - | - | .00 | - | - |
| F | Polygonum douglasii (a) | _a 5 | _a 13 | _b 32 | .01 | .10 | .50 |
| F | Potentilla sp. | 5 | - | - | .04 | - | - |
| F | Senecio multilobatus | - | - | 5 | - | - | .03 |
| F | Taraxacum officinale | _a 33 | _a 9 | _b 249 | .65 | .21 | 9.64 |
| F | Thalictrum fendleri | - | 2 | - | - | .15 | .00 |
| F | Tragopogon dubius | 4 | - | 3 | .03 | - | .00 |
| F | Viola sp. | 10 | 2 | 4 | .12 | .03 | .01 |
| Total for Annual Forbs | | 10 | 62 | 111 | 0.02 | 0.99 | 0.80 |
| Total for Perennial Forbs | | 258 | 45 | 455 | 5.88 | 0.72 | 14.17 |
| Total for Forbs | | 268 | 107 | 566 | 5.90 | 1.71 | 14.98 |

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

BROWSE TRENDS --

Management unit 24R, Study no: 1

| Type | Species | Strip Frequency | | | Average Cover % | | |
|------------------|--|-----------------|-----------------------|-----|-----------------|------|-------|
| | | '98 | '03 | '08 | '98 | '03 | '08 |
| | | B | Amelanchier alnifolia | 0 | 0 | 4 | - |
| B | Artemisia tridentata vaseyana | 0 | 0 | 1 | - | - | 0.0 |
| B | Chrysothamnus nauseosus | 0 | 0 | 2 | - | - | .03 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 0 | 0 | 1 | - | - | 0.0 |
| B | Juniperus communis | 13 | 0 | 0 | 5.31 | - | - |
| B | Mahonia repens | 25 | 12 | 28 | 2.38 | .36 | 7.28 |
| B | Pinus ponderosa | 2 | 1 | 2 | .15 | 0.0 | 0.0 |
| B | Populus tremuloides | 19 | 43 | 50 | .24 | 1.62 | 6.94 |
| B | Pseudotsuga menziesii | 48 | 5 | 6 | 9.44 | .64 | 1.39 |
| B | Rosa woodsii | 5 | 6 | 11 | .41 | .03 | .04 |
| B | Sambucus sp. | 0 | 0 | 8 | - | - | .34 |
| B | Symphoricarpos oreophilus | 75 | 21 | 30 | 4.86 | .84 | 3.72 |
| Total for Browse | | 187 | 88 | 143 | 22.81 | 3.49 | 19.75 |

CANOPY COVER, LINE INTERCEPT --
 Management unit 24R, Study no: 1

| Species | Percent Cover | | |
|-------------------------------|---------------|------|-------|
| | '98 | '03 | '08 |
| Artemisia tridentata vaseyana | - | - | .48 |
| Mahonia repens | - | .16 | 7.86 |
| Pinus ponderosa | - | 2.00 | 3.65 |
| Populus tremuloides | 15.19 | 4.81 | 17.03 |
| Pseudotsuga menziesii | 35.20 | 5.44 | 4.50 |
| Rosa woodsii | - | .08 | .73 |
| Sambucus sp. | - | - | .73 |
| Symphoricarpos oreophilus | - | .60 | 5.86 |

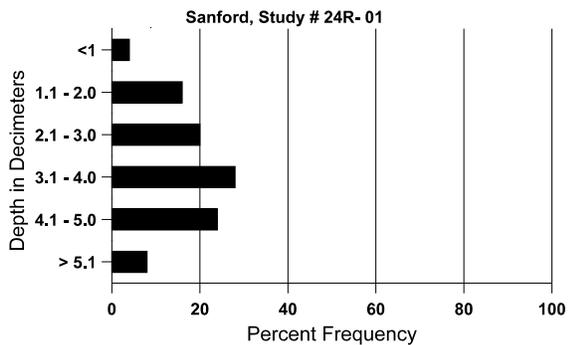
BASIC COVER --
 Management unit 24R, Study no: 1

| Cover Type | Average Cover % | | |
|-------------|-----------------|-------|-------|
| | '98 | '03 | '08 |
| Vegetation | 33.26 | 6.65 | 44.18 |
| Rock | .22 | .67 | .51 |
| Pavement | .01 | .01 | .40 |
| Litter | 94.35 | 69.68 | 54.25 |
| Cryptogams | .22 | .00 | 1.24 |
| Bare Ground | .19 | 26.14 | 13.94 |

SOIL ANALYSIS DATA --
 Management unit 24R, Study no: 1, Study Name: Sanford

| Effective rooting depth (in) | Temp °F (depth) | pH | sandy loam | | | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|------------|-------|-------|-----|-------|-------|------|
| | | | %sand | %silt | %clay | | | | |
| 18.5 | 56.3 (17.7) | 5.4 | 58.0 | 23.4 | 18.6 | 4.9 | 20.9 | 425.6 | 0.9 |

Stoniness Index



PELLET GROUP DATA --

Management unit 24R, Study no: 1

| Type | Quadrat Frequency | | |
|--------|-------------------|-----|-----|
| | '98 | '03 | '08 |
| Rabbit | - | - | 3 |
| Elk | - | - | 7 |
| Deer | 1 | 3 | 4 |
| Cattle | 2 | - | 2 |

| Days use per acre (ha) | | |
|------------------------|--------|---------|
| '98 | '03 | '08 |
| - | - | - |
| 1 (2) | 1 (2) | 7 (17) |
| 17 (42) | 5 (12) | 13 (33) |
| - | - | 7 (16) |

BROWSE CHARACTERISTICS --

Management unit 24R, Study no: 1

| | | 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>Amelanchier alnifolia</i> | | | | | | | | | | | | |
| 98 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 03 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 08 | 80 | - | 80 | - | - | - | 0 | 0 | - | - | 0 | 18/12 |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | |
| 98 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 03 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 08 | 20 | - | - | 20 | - | - | 0 | 0 | - | - | 0 | 19/28 |
| <i>Chrysothamnus nauseosus</i> | | | | | | | | | | | | |
| 98 | 0 | - | - | - | - | - | 0 | 0 | 0 | - | 0 | -/- |
| 03 | 0 | - | - | - | - | - | 0 | 0 | 0 | - | 0 | -/- |
| 08 | 40 | - | - | 20 | 20 | - | 0 | 0 | 50 | - | 0 | 16/16 |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | | | | | |
| 98 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 03 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 08 | 20 | - | - | 20 | - | - | 0 | 0 | - | - | 0 | 13/19 |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | |
| 98 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 03 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 08 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | 8/8 |
| <i>Juniperus communis</i> | | | | | | | | | | | | |
| 98 | 760 | - | 80 | 660 | 20 | - | 0 | 0 | 3 | 3 | 11 | 24/32 |
| 03 | 0 | - | - | - | - | - | 0 | 0 | 0 | - | 0 | -/- |
| 08 | 0 | - | - | - | - | - | 0 | 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) |
| Mahonia repens | | | | | | | | | | | | |
| 98 | 4740 | - | 620 | 4120 | - | - | 3 | 0 | 0 | - | 0 | 6/9 |
| 03 | 1820 | - | 920 | 900 | - | - | 0 | 0 | 0 | - | 0 | 4/6 |
| 08 | 11900 | 180 | 20 | 11720 | 160 | - | 0 | 0 | 1 | 1 | 1 | 6/10 |
| Pinus ponderosa | | | | | | | | | | | | |
| 98 | 60 | 20 | 40 | 20 | - | - | 0 | 0 | - | - | 0 | -/- |
| 03 | 20 | - | - | 20 | - | - | 0 | 0 | - | - | 0 | -/- |
| 08 | 40 | 60 | 20 | 20 | - | - | 0 | 0 | - | - | 0 | -/- |
| Populus tremuloides | | | | | | | | | | | | |
| 98 | 680 | - | 540 | 140 | - | 60 | 0 | 0 | 0 | - | 0 | -/- |
| 03 | 2220 | - | 2220 | - | - | 200 | 0 | 0 | 0 | - | 0 | 19/13 |
| 08 | 3860 | 20 | 560 | 3260 | 40 | 40 | 2 | 0 | 1 | 1 | 1 | -/- |
| Pseudotsuga menziesii | | | | | | | | | | | | |
| 98 | 1440 | 280 | 1040 | 400 | - | 120 | 0 | 0 | 0 | - | 0 | -/- |
| 03 | 240 | 20 | 180 | 40 | 20 | 1140 | 0 | 0 | 8 | - | 17 | -/- |
| 08 | 180 | 60 | 140 | 20 | 20 | - | 0 | 0 | 11 | 11 | 11 | -/- |
| Rosa woodsii | | | | | | | | | | | | |
| 98 | 220 | - | 160 | 60 | - | - | 0 | 0 | - | - | 0 | 20/23 |
| 03 | 240 | 20 | 140 | 100 | - | - | 0 | 0 | - | - | 0 | 4/4 |
| 08 | 500 | - | 140 | 360 | - | - | 0 | 0 | - | - | 0 | 12/15 |
| Sambucus sp. | | | | | | | | | | | | |
| 98 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 03 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 08 | 540 | 100 | 440 | 100 | - | - | 0 | 0 | - | - | 0 | 61/54 |
| Symphoricarpos oreophilus | | | | | | | | | | | | |
| 98 | 6060 | 260 | 2360 | 3700 | - | - | 0 | 0 | 0 | - | 0 | 14/15 |
| 03 | 940 | - | 720 | 220 | - | - | 0 | 0 | 0 | - | 0 | 11/19 |
| 08 | 1360 | 20 | 120 | 1220 | 20 | - | 7 | 0 | 1 | - | 0 | 15/29 |