

CEDAR MOUNTAIN - TREND STUDY NO. 16C-40-09

Vegetation Type: Chained, Seeded P-J

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 6,800 ft (2,073 m)

Aspect: Northwest

Slope: 15%

Transect bearing: 180 degrees magnetic

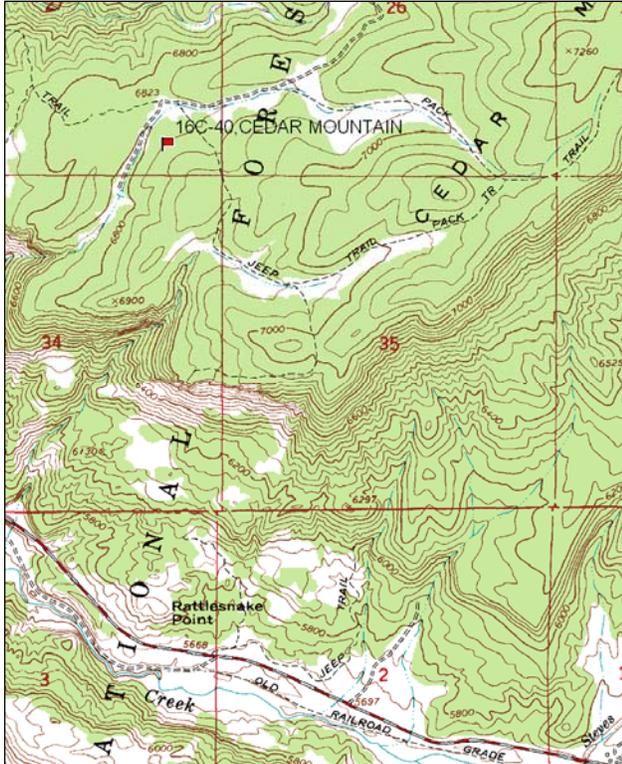
Belt placement: line 1 (11 & 95), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Site Notes: Rebar needed on belt 4

Directions:

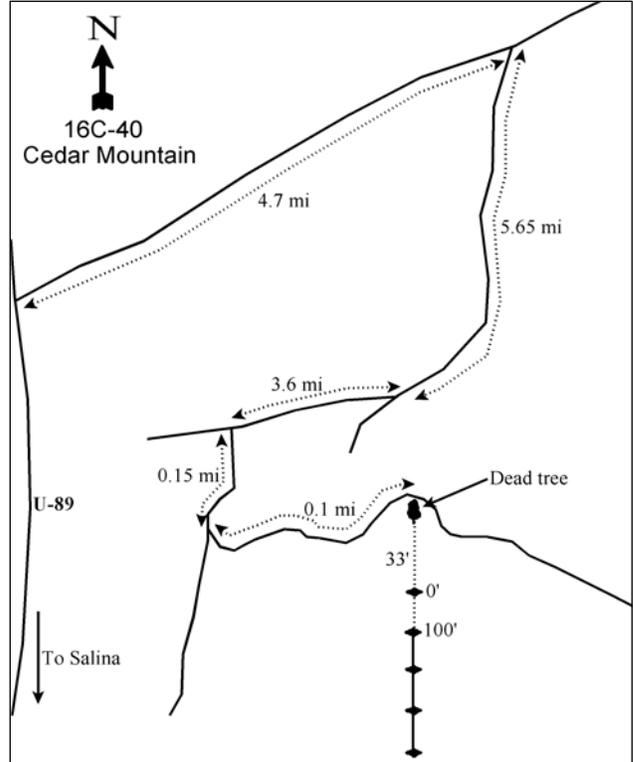
From mile marker 198 on U-89 north of Salina, take the Willow Creek Road east for 4.7 miles to a fork near a reservoir. Turn right and go south along the dike. Continue on this road for 5.65 miles up switchbacks to the top of the hill and southwest along the top until the road forks. Take the right fork through some oak and juniper and across a chained area, staying on the main road for 3.6 miles until coming to a fork. Turn left and proceed down the bottom of the draw 0.15 miles southwest to another fork. Turn left and go uphill 0.1 miles to the second bend to the right. The frequency baseline starts 33 feet south of the road beyond a large dead tree. The transect is marked by rebar approximately 2 feet tall. The 0-foot baseline stake has a red browse tag number 7039 attached.

Map Name: Salina, Utah



Township: 21S, Range: 1E, Section: 27

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 432517 E 4311188 N

CEDAR MOUNTAIN - TREND STUDY NO. 16C-40

Site Information

Site Description: The study is located on a high plateau east of Salina in an area that was chained in 1979-80 and seeded with a mixture of grasses, forbs, and browse species by the Forest Service. These Utah juniper (*Juniperus osteosperma*) and pinyon pine (*Pinus edulis*) slopes were heavily grazed by domestic sheep in the past. The area was retreated with a dixie harrow in 2004-2005 and again with a brush saw in 2005 and 2008 to remove any surviving pinyon and juniper trees. Pellet group data estimated moderate elk use in 1999 and 2004, but use was lighter in 2009. Estimated deer use has been light since 1999. Sign of light sheep use was also sampled in 2009 (Table - Pellet Group Data).

Browse: Browse species are limited on the site. Mature juniper and pinyon averaging 8 to 12 feet in height had reestablished on the site in 2004, prior to the treatment. Pinyon and juniper trees dominated the site in moderate density, but decreased substantially in 2009, following the treatments (Table - Point-Quarter Tree Data). There are a few black sagebrush (*Artemisia nova*), rabbitbrush (*Chrysothamnus spp.*), and Gambel oak (*Quercus gambelii*) on the site, but no species provides notable cover (Table - Browse Trends). Big sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*), and fourwing saltbush (*Atriplex canescens*) were supposedly seeded following the first chaining, but have not been sampled on the site.

Herbaceous Understory: Grasses are abundant on the site but are dominated by three seeded species; intermediate wheatgrass (*Agropyron intermedium*), crested wheatgrass (*A. cristatum*), and smooth brome (*Bromus inermis*). These three species provide almost all of the grass cover on the site. Forbs are rare, but increased somewhat following the juniper and pinyon removal. The site is a mixture of annual and perennial forbs (Table - Herbaceous Trends).

Soil: The soil texture is a clay loam with a slightly alkaline pH. Organic matter is relatively high at 5.4%, but phosphorus has limited availability for plant growth and development at only 5.1 ppm (Tiedemann and Lopez 2004) (Table - Soil Analysis Data). Bare ground cover is low due to a vigorous stand of sod-forming perennial grasses and an abundance of litter cover from the chaining and other treatments (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1985 to 1991 - stable (0):** There is little preferred browse and the site is dominated by pinyon and juniper trees.
- **1991 to 1999 - stable (0):** Browse remains sparse on the site.
- **1999 to 2004 - stable (0):** Browse changed little and remains rare on the site.
- **2004 to 2009 - slightly up (+1):** Preferred browse remains scarce on the site, but a treatment decreased the density of pinyon and juniper trees on the site.

Grass:

- **1985 to 1991 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 19%.
- **1991 to 1999 - stable (0):** Perennial grass sum of nested frequency changed little.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial grasses decreased by 25%, though cover increased from 12% to 13%. The nested frequency of crested wheatgrass and smooth brome decreased by two degrees of significance.
- **2004 to 2009 - slightly up (+1):** There was a 16% increase in the sum of nested frequency of perennial grasses and cover increased to 29%. Smooth brome increased significantly in nested frequency.

Forb:

- **1985 to 1991 - up (+2):** There was a three-fold increase in the sum of nested frequency of perennial forbs.
- **1991 to 1999 - down (-2):** Perennial forb sum of nested frequency decreased to 1985 levels.
- **1999 to 2004 - slightly up (+1):** The sum of nested frequency of perennial forbs increased 27%, but forbs are extremely rare and provide less than 1% cover.
- **2004 to 2009 - slightly up (+1):** There was a 24% increase in the sum of nested frequency of perennial forbs and cover increased to just over 1%. Annual forbs increased substantially on the site and provided more cover than perennial forbs. Forbs remain rare on the site.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

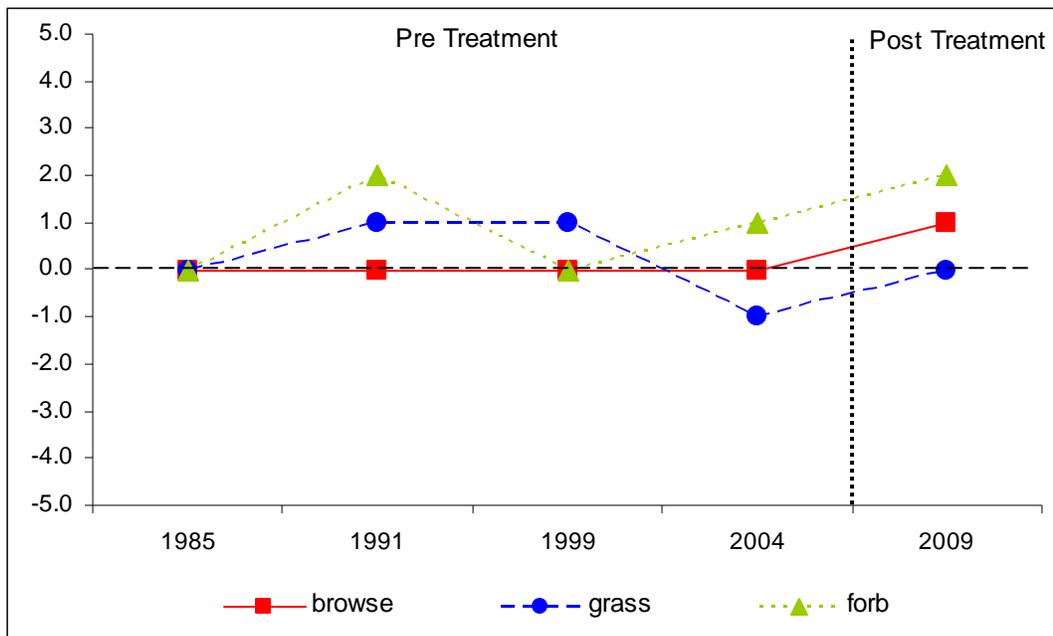
Management unit 16C, study no: 40

| Year | Preferred Browse Cover | Preferred Browse Decadence | Preferred Browse Young | Perennial Grass Cover | Annual Grass Cover | Perennial Forb Cover | Noxious Weeds | Total Score | Ranking |
|------|------------------------|----------------------------|------------------------|-----------------------|--------------------|----------------------|---------------|-------------|-----------|
| 99 | 0.0 | 0.0 | 0.0 | 25.0 | 0.0 | 1.5 | 0.0 | 26.5 | Poor-Fair |
| 04 | 0.0 | 0.0 | 0.0 | 28.5 | 0.0 | 1.0 | 0.0 | 29.5 | Fair |
| 09 | 0.0 | 0.0 | 0.0 | 30.0 | 0.0 | 2.2 | 0.0 | 32.2 | Fair |

Trend Summary

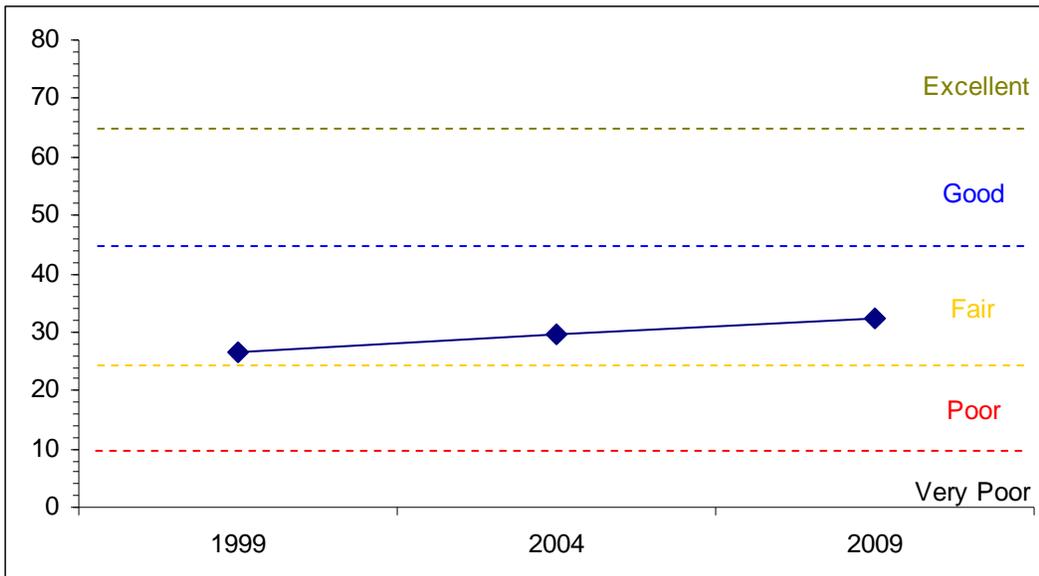
CUMULATIVE RANGE TREND ASSESSMENT--

Management unit 16C Study no: 40



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE

Management unit 16C, Study no: 40



HERBACEOUS TRENDS--

Management unit 16C, Study no: 40

| Type | Species | Nested Frequency | | | | | Average Cover % | | |
|-----------------------------|-------------------------|------------------|--------|------|-----|-------|-----------------|-------|-------|
| | | '85 | '91 | '99 | '04 | '09 | '99 | '04 | '09 |
| G | Agropyron cristatum | bc111 | bc116 | c144 | a63 | ab95 | 3.20 | 2.65 | 5.96 |
| G | Agropyron intermedium | 248 | 274 | 235 | 255 | 223 | 7.69 | 9.14 | 16.48 |
| G | Agropyron spicatum | - | 34 | 8 | 2 | 7 | .21 | .38 | .53 |
| G | Bromus inermis | ab113 | abc137 | c161 | a90 | bc148 | 1.31 | 1.72 | 5.96 |
| G | Elymus junceus | - | 1 | 2 | - | - | .03 | .00 | - |
| G | Elymus salina | 3 | - | - | - | - | - | - | - |
| G | Festuca ovina | 4 | - | - | - | - | - | - | - |
| G | Hordeum jubatum jubatum | 6 | - | - | - | - | - | - | - |
| G | Koeleria cristata | 7 | - | - | - | 1 | .00 | - | .03 |
| G | Oryzopsis hymenoides | 6 | 6 | - | - | - | - | - | - |
| G | Poa fendleriana | - | 2 | 7 | 5 | 3 | .02 | .18 | .15 |
| G | Poa secunda | - | 1 | 6 | 7 | 11 | .02 | .16 | .10 |
| G | Sitanion hystrix | a- | b22 | a1 | a- | a- | .00 | - | - |
| Total for Annual Grasses | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total for Perennial Grasses | | 498 | 593 | 564 | 422 | 488 | 12.51 | 14.26 | 29.22 |
| Total for Grasses | | 498 | 593 | 564 | 422 | 488 | 12.51 | 14.26 | 29.22 |
| F | Alyssum alyssoides (a) | - | - | b49 | a- | c226 | .09 | - | 1.97 |
| F | Arabis sp. | 5 | 2 | - | 3 | - | - | .00 | - |
| F | Astragalus marianus | 3 | 5 | - | 1 | - | - | .00 | - |
| F | Calochortus nuttallii | - | 9 | - | - | - | - | - | - |
| F | Carduus nutans (a) | 1 | 2 | - | - | - | - | - | - |
| F | Castilleja chromosa | a- | b9 | a- | a- | a- | - | - | - |
| F | Chaenactis douglasii | a- | b13 | a1 | a1 | ab5 | .00 | .00 | .01 |
| F | Cirsium sp. | - | - | - | 5 | 3 | - | .04 | .03 |

| Type | Species | Nested Frequency | | | | | Average Cover % | | |
|---------------------------|------------------------------------|------------------|------------------|-----------------|------------------|-----------------|-----------------|------|------|
| | | '85 | '91 | '99 | '04 | '09 | '99 | '04 | '09 |
| F | <i>Crepis acuminata</i> | - | 1 | - | - | - | - | - | - |
| F | <i>Cryptantha</i> sp. | _a 7 | _{bc} 30 | _{ab} 9 | _{ab} 24 | _c 43 | .04 | .21 | .76 |
| F | <i>Cynoglossum officinale</i> | - | 3 | 3 | - | - | .03 | - | - |
| F | <i>Erigeron pumilus</i> | - | 3 | - | - | - | - | - | - |
| F | <i>Eriogonum umbellatum</i> | 11 | - | 6 | - | - | .01 | - | - |
| F | <i>Gilia</i> sp. (a) | _a 1 | _b 30 | _a 3 | _a - | _a - | .01 | - | - |
| F | <i>Lepidium</i> sp. (a) | - | - | _a - | _b 96 | _a - | - | .33 | - |
| F | <i>Lomatium</i> sp. | - | 2 | - | - | 8 | - | - | .04 |
| F | <i>Medicago sativa</i> | - | - | 7 | - | - | .53 | - | - |
| F | <i>Penstemon humilis</i> | - | - | - | 2 | - | - | .00 | - |
| F | <i>Penstemon pachyphyllus</i> | _a 3 | _b 9 | _a - | _a - | _a - | - | - | - |
| F | <i>Phlox austromontana</i> | 19 | 23 | 11 | 15 | 8 | .05 | .16 | .07 |
| F | <i>Physaria acutifolia</i> | _a - | _b 36 | _b 12 | _b 14 | _b 11 | .06 | .04 | .02 |
| F | <i>Ranunculus testiculatus</i> (a) | - | - | - | 4 | 12 | - | .01 | .02 |
| F | <i>Senecio multilobatus</i> | _a - | _b 12 | _a - | _a - | _a - | - | - | - |
| F | <i>Taraxacum officinale</i> | - | 4 | - | - | - | - | - | - |
| F | <i>Tragopogon dubius</i> | 4 | - | 3 | 1 | 3 | .01 | .00 | .00 |
| F | Unknown forb-perennial | - | 3 | - | - | - | - | - | - |
| F | <i>Wyethia amplexicaulis</i> | - | - | - | - | 1 | - | - | .15 |
| Total for Annual Forbs | | 2 | 32 | 52 | 100 | 238 | 0.10 | 0.33 | 1.99 |
| Total for Perennial Forbs | | 52 | 164 | 52 | 66 | 82 | 0.75 | 0.50 | 1.10 |
| Total for Forbs | | 54 | 196 | 104 | 166 | 320 | 0.86 | 0.84 | 3.09 |

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

BROWSE TRENDS--

Management unit 16C, Study no: 40

| Type | Species | Strip Frequency | | | Average Cover % | | |
|------------------|------------------------------|-----------------|-----|-----|-----------------|------|------|
| | | '99 | '04 | '09 | '99 | '04 | '09 |
| B | <i>Artemisia nova</i> | 1 | 4 | 1 | .00 | .01 | .00 |
| B | <i>Gutierrezia sarothrae</i> | 0 | 0 | 1 | - | - | .00 |
| B | <i>Juniperus osteosperma</i> | 11 | 6 | 2 | 2.36 | 1.94 | .71 |
| B | <i>Pinus edulis</i> | 2 | 3 | 0 | 1.87 | 3.82 | - |
| B | <i>Quercus gambelii</i> | 1 | 0 | 0 | .00 | - | - |
| Total for Browse | | 15 | 13 | 4 | 4.24 | 5.77 | 0.71 |

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 40

| Species | Percent Cover | | |
|------------------------------|---------------|------|------|
| | '99 | '04 | '09 |
| <i>Artemisia nova</i> | - | - | .21 |
| <i>Juniperus osteosperma</i> | 1.39 | 7.58 | 1.00 |
| <i>Pinus edulis</i> | - | 2.75 | - |

POINT-QUARTER TREE DATA--
Management unit 16C, Study no: 40

| Species | Trees per Acre | | | Average diameter (in) | | |
|-----------------------|----------------|-----|-----|-----------------------|-----|-----|
| | '99 | '04 | '09 | '99 | '04 | '09 |
| Juniperus osteosperma | 90 | 84 | 31 | 4.8 | 4.5 | 3.3 |
| Pinus edulis | 44 | 46 | 19 | 3.7 | 3.4 | 6.5 |

BASIC COVER--
Management unit 16C, Study no: 40

| Cover Type | Average Cover % | | | | |
|-------------|-----------------|-------|-------|-------|-------|
| | '85 | '91 | '99 | '04 | '09 |
| Vegetation | 7.25 | 7.25 | 22.26 | 20.77 | 37.15 |
| Rock | 5.50 | 6.75 | 6.38 | 9.62 | 4.37 |
| Pavement | 9.25 | 6.75 | 6.41 | 13.06 | 4.95 |
| Litter | 63.25 | 61.00 | 49.76 | 37.80 | 55.45 |
| Cryptogams | .25 | 0 | .19 | .03 | 0 |
| Bare Ground | 14.50 | 18.25 | 9.80 | 32.28 | 11.05 |

SOIL ANALYSIS DATA --
Management unit 16C, Study no: 40, Study Name: Cedar Mountain

| Effective rooting depth (in) | pH | clay loam | | | %OM | PPM P | PPM K | ds/m |
|------------------------------|-----|-----------|-------|-------|-----|-------|-------|------|
| | | %sand | %silt | %clay | | | | |
| 14.2 | n/a | 31.3 | 32.2 | 36.6 | 5.4 | 5.1 | 217.6 | 0.7 |

PELLET GROUP DATA--
Management unit 16C, Study no: 40

| Type | Quadrat Frequency | | | Days use per acre (ha) | | |
|--------|-------------------|-----|-----|------------------------|---------|---------|
| | '99 | '04 | '09 | '99 | '04 | '09 |
| Rabbit | 27 | 62 | 16 | - | - | - |
| Elk | 15 | 40 | 7 | 34 (84) | 37 (93) | 16 (40) |
| Deer | 18 | 4 | 3 | 10 (25) | 4 (10) | 1 (2) |
| Cattle | 1 | - | - | - | - | - |
| Sheep | - | - | - | - | - | 10 (25) |

BROWSE CHARACTERISTICS--
Management unit 16C, Study no: 40

| Year | Plants per Acre (excluding seedlings) | Age class distribution | | | Seedling (plants/acre) | Utilization | | % poor vigor | Average Height Crown (in) |
|--------------------------------------|--|------------------------|----------|------------|---------------------------|-------------|---------|--------------|------------------------------|
| | | % Young | % Mature | % Decadent | | % moderate | % heavy | | |
| <i>Artemisia nova</i> | | | | | | | | | |
| 85 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | -/- |
| 91 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | -/- |
| 99 | 60 | 33 | 67 | 0 | 20 | 0 | 0 | 0 | 6/14 |
| 04 | 120 | 0 | 33 | 67 | - | 67 | 0 | 0 | 13/31 |
| 09 | 20 | 0 | 100 | 0 | - | 0 | 0 | 0 | 14/23 |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | |
| 85 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 91 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 99 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 04 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 11/10 |
| 09 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 31/40 |
| <i>Chrysothamnus viscidiflorus</i> | | | | | | | | | |
| 85 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 91 | 66 | 0 | 100 | - | - | 0 | 0 | 0 | 9/11 |
| 99 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 04 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 09 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 9/7 |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | |
| 85 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 91 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 99 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 04 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 09 | 20 | 0 | 100 | - | - | 0 | 0 | 0 | 9/12 |
| <i>Juniperus osteosperma</i> | | | | | | | | | |
| 85 | 132 | 0 | 50 | 50 | - | 0 | 0 | 0 | 47/43 |
| 91 | 132 | 50 | 50 | 0 | - | 0 | 0 | 0 | 69/67 |
| 99 | 300 | 33 | 67 | 0 | - | 0 | 0 | 0 | -/- |
| 04 | 120 | 17 | 83 | 0 | - | 0 | 0 | 0 | -/- |
| 09 | 60 | 0 | 67 | 33 | - | 0 | 33 | 33 | -/- |
| <i>Pinus edulis</i> | | | | | | | | | |
| 85 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 91 | 66 | 100 | 0 | - | - | 0 | 0 | 0 | -/- |
| 99 | 40 | 50 | 50 | - | - | 0 | 0 | 0 | -/- |
| 04 | 60 | 33 | 67 | - | - | 0 | 0 | 0 | -/- |
| 09 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |

| | | Age class distribution | | | | | Utilization | | | |
|---------------------------|--|------------------------|----------|------------|---------------------------|------------|-------------|--------------|------------------------------|--|
| Year | Plants per Acre (excluding seedlings) | % Young | % Mature | % Decadent | Seedling (plants/acre) | % moderate | % heavy | % poor vigor | Average Height Crown (in) | |
| <i>Purshia tridentata</i> | | | | | | | | | | |
| 85 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- | |
| 91 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- | |
| 99 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- | |
| 04 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- | |
| 09 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 33/57 | |
| <i>Quercus gambelii</i> | | | | | | | | | | |
| 85 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- | |
| 91 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- | |
| 99 | 40 | 100 | 0 | - | - | 0 | 0 | 0 | -/- | |
| 04 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 42/13 | |
| 09 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 51/48 | |
| <i>Sambucus sp.</i> | | | | | | | | | | |
| 85 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- | |
| 91 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- | |
| 99 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- | |
| 04 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- | |
| 09 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 15/16 | |