

TANK CANYON - TREND STUDY NO. 4-3-11

Vegetation Type: Mountain Big Sagebrush

Range Type: Crucial Deer Winter, Crucial Elk Winter

NRCS Ecological Site Description: [Mountain Loam \(Mountain Big Sagebrush\), R047XA461UT](#)

Land Ownership: DWR

Elevation: 6,100 ft (1,895 m)

Aspect: West

Slope: 23%

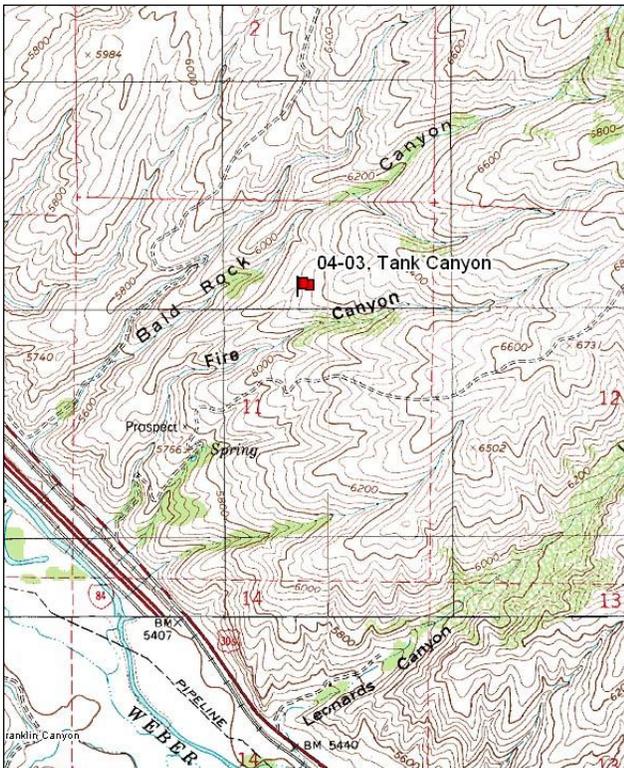
Transect bearing: 146° magnetic

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

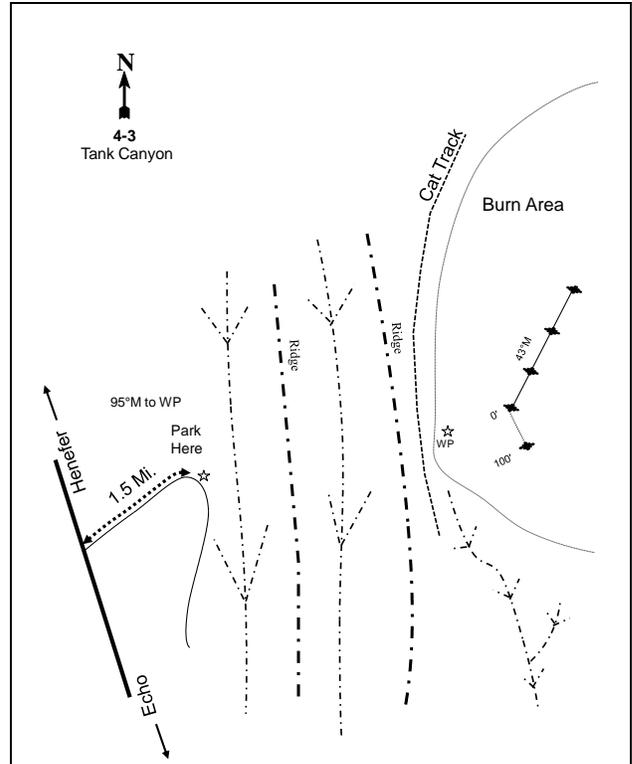
Directions:

From the East Henefer/Echo Exit, travel east parallel to the freeway. Turn left (north) up Fire Canyon to the DWR gate. Proceed 0.8 miles on the Fire Canyon access road to a point where the road switchbacks. Park at 3 full high posts before the switchback. Walk at a bearing of 11 degrees magnetic walking down and back up the ravine to the next ridge to an open area that has been burned. A witness post is in the opening. The 0-foot baseline stake is just north of the witness post. The 0-foot baseline stake is marked with browse tag #7944. Line 1 runs at a bearing of 146 degrees magnetic. The rest of the baseline runs off the 0-foot baseline in a direction of 43 degrees magnetic.

Map Name: Henefer



Diagrammatic Sketch:



Township: 3N Range: 4E Section: 11

GPS: NAD 83, UTM 12S 461262 E 4540256 N

TANK CANYON - TREND STUDY NO. 4-3

Site Information

Site Description: This study samples crucial deer winter range on the Division of Wildlife Resources (DWR) Henefer-Echo Wildlife Management Area (WMA) between Tank Canyon and Bald Rock Canyon. The area was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) prior to a 1982 fire, and appears to have been seeded following the fire. Another small fire burned 40 acres of the area, including the study, between 1984 and 1990. In 1990, the frequency data was collected where it had burned and density data was collected mainly in an unburned area, which caused an incongruity between the two. During the 1996 reading, the sampling area was enlarged and the entire study was moved completely into the burned area. Therefore, all data and trends from 1984 and 1990 can be found in previous reports, but only data collected since 1996 will be included in this report. Cattle and sheep, owned by ranchers to the north and south of the property, graze the lower elevations of the WMA. On the original studies, pellet groups were abundant and several winter-killed carcasses were seen in the immediate vicinity. Elk pellet groups have been sampled in moderate to high abundance since 2001. Deer pellet groups have been moderated in abundance since 2001. Sampled cattle sign has been high since 2006 (Table - Pellet Group Data).

Browse: Prior to the burn, the browse composition consisted primarily of mountain big sagebrush, with a lesser component comprised of stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*), mountain snowberry (*Symphoricarpos oreophilus*), and Saskatoon serviceberry (*Amelanchier alnifolia*). Since the fire, browse species have been much less common on the site. The most abundant shrub species since the fire has been stickyleaf low rabbitbrush (Table - Browse Characteristics).

Herbaceous Understory: Grasses and forbs were rare prior to the burn, but grasses have dominated the site since 1996. The grass component has been dominated by the seeded species crested wheatgrass (*Agropyron cristatum*) and the weedy species bulbous bluegrass (*Poa bulbosa*). Competition from these species appears to be preventing sagebrush seedling establishment. The seeded species smooth brome (*Bromus inermis*) increased significantly in 2011, and became prevalent on the study. Forbs are abundant, but the seeded forb species alfalfa (*Medicago sativa*) provides nearly all of the forb cover. The native species American vetch (*Vicia americana*) is also common, but provides limited cover (Table - Herbaceous Trends).

Soil: The soil is in the Horrocks-Cutoff complex, likely as part of the Horrocks component. These soils occur on mountain slopes, with parent material consisting of colluvium derived from conglomerate, sandstone, and andesite. The soils are characterized as moderately deep, well drained, and moderately permeable (Soil Survey 2011). This area is excessively drained and probably holds little available water in mid-summer. Soil texture is a clay loam with a neutral soil reaction (pH 7.0) (Table - Soil Analysis Data). Bare ground cover is low, with a very high amount of vegetation and litter cover (Table - Basic Cover). The soil erosion condition has been classified as stable since 2001.

Trend Assessments

Browse:

- **1996 to 2001 - stable (0):** Browse remains limited on the site. Stickyleaf low rabbitbrush density decreased 46% from 3,500 plants/acre to 1,900 plants/acre, and cover decreased from 3% to 1%.
- **2001 to 2006 - stable (0):** Browse remains limited on the site.
- **2006 to 2011 - stable (0):** Browse remains limited on the site.

Grass:

- **1996 to 2001 - slightly down (-1):** The sum of nested frequency of perennial grasses, excluding bulbous bluegrass, remained similar, but cover increased from 17% to 33%. Bulbous bluegrass increased significantly in nested frequency, and cover increased from 19% to 25%.

- **2001 to 2006 - stable (0):** There was little change in the sum of nested frequency of perennial grasses, excluding bulbous bluegrass, though cover decreased to 22%. Nested frequency of bulbous bluegrass remained similar, but cover increased to 29%.
- **2006 to 2011 - slightly down (-1):** The sum of nested frequency of perennial grasses, excluding bulbous bluegrass, decreased 13%, and cover decreased to 19%. There was a slight change in composition with a significant decrease in the nested frequency of crested wheatgrass, and a significant increase in the nested frequency of smooth brome. Bulbous bluegrass remained the dominant species on the site.

Forb:

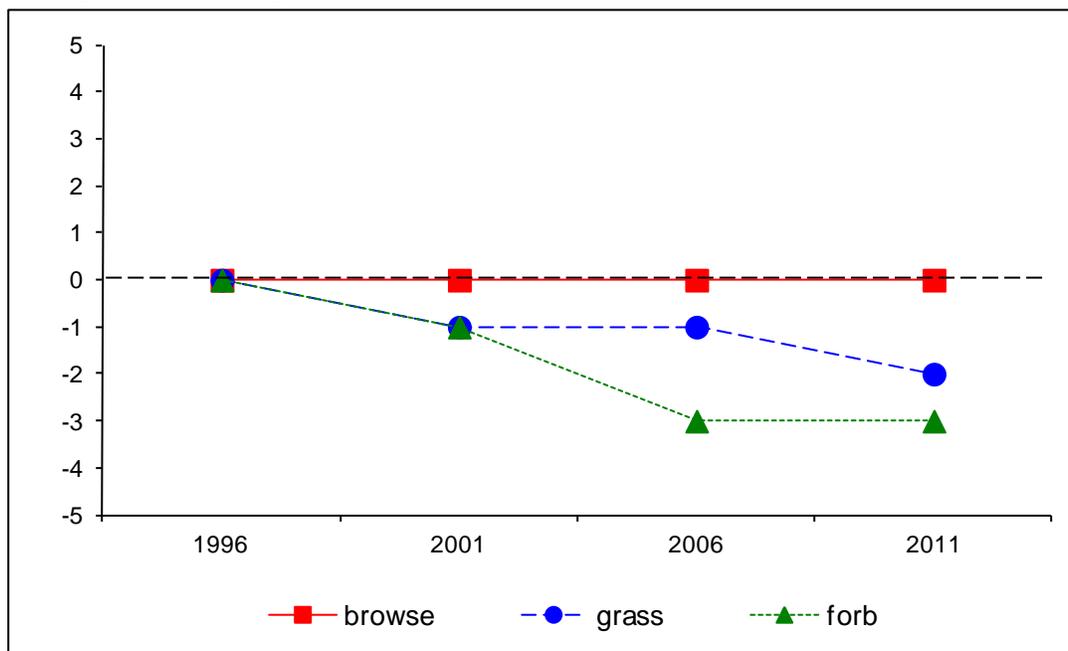
- **1996 to 2001 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 15%, though cover increased from 13% to 19%.
- **2001 to 2006 - down (-2):** The perennial forb sum of nested frequency decreased by 37%, and cover decreased to 11%. There was a significant decrease in the nested frequency of alfalfa.
- **2006 to 2011 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, but cover decreased to 6%.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 4, study no: 3

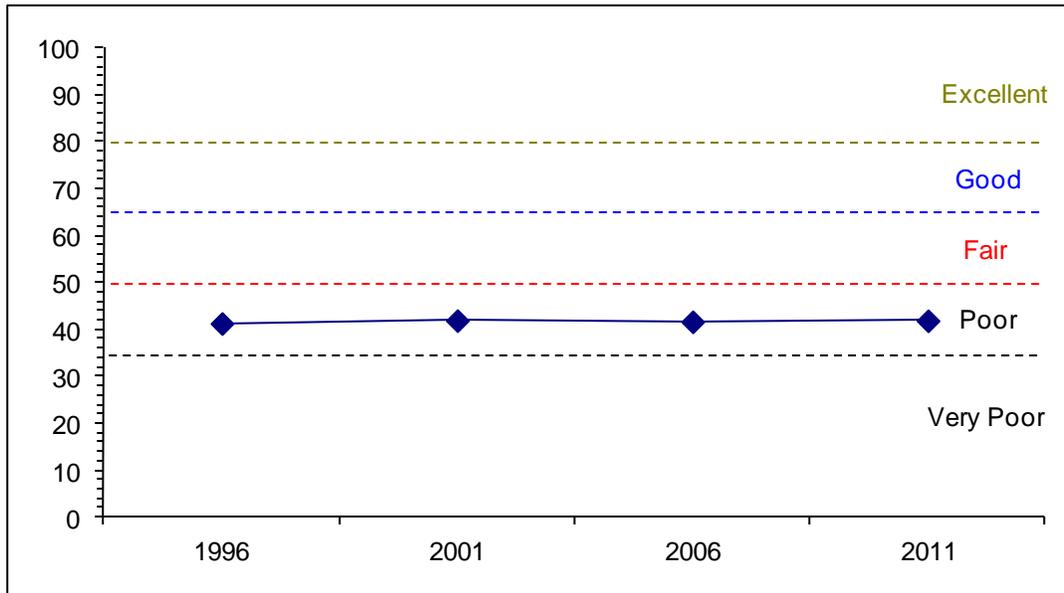
| Year | Preferred Browse Cover | Preferred Browse Decadence | Preferred Browse Young | Perennial Grass Cover (-POBU) | Annual Grass Cover | Perennial Forb Cover | Noxious Weeds | Total Score | Ranking |
|------|------------------------|----------------------------|------------------------|-------------------------------|--------------------|----------------------|---------------|-------------|---------|
| 96 | 1.5 | 0.0 | 0.0 | 30.0 | -0.2 | 10.0 | 0.0 | 41.3 | Poor |
| 01 | 1.9 | 0.0 | 0.0 | 30.0 | 0.0 | 10.0 | 0.0 | 41.9 | Poor |
| 06 | 1.7 | 0.0 | 0.0 | 30.0 | 0.0 | 10.0 | 0.0 | 41.7 | Poor |
| 11 | 1.9 | 0.0 | 0.0 | 30.0 | 0.0 | 10.0 | 0.0 | 41.9 | Poor |

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 4 Study no: 3



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL--
 Management unit 4, Study no: 3



HERBACEOUS TRENDS--
 Management unit 04, Study no: 3

| Type | Species | Nested Frequency | | | | Average Cover % | | | |
|-----------------------------|------------------------|------------------|------------------|-------------------|-------------------|-----------------|-------|-------|-------|
| | | '96 | '01 | '06 | '11 | '96 | '01 | '06 | '11 |
| G | Agropyron cristatum | b ²⁷⁵ | c ³²² | bc ³²¹ | a ¹⁶³ | 14.40 | 28.78 | 14.76 | 7.40 |
| G | Agropyron dasystachyum | b ¹² | a ⁻ | a ⁻ | a ⁻ | .10 | - | - | - |
| G | Agropyron intermedium | b ⁵⁶ | b ⁷⁰ | b ⁴⁴ | a ¹⁶ | .77 | 2.92 | 1.03 | .37 |
| G | Agropyron spicatum | b ¹⁵ | ab ⁴ | a ⁻ | b ¹⁷ | 1.08 | .18 | - | 1.11 |
| G | Bromus inermis | b ⁵² | a ²⁰ | ab ³⁴ | c ¹⁶¹ | .70 | .38 | .61 | 6.88 |
| G | Bromus japonicus (a) | 3 | - | - | - | .00 | - | - | - |
| G | Bromus tectorum (a) | b ¹⁵ | a ¹ | a ⁻ | a ⁻ | .21 | .00 | - | - |
| G | Festuca ovina | 3 | 3 | - | - | .18 | .00 | - | - |
| G | Oryzopsis hymenoides | - | - | - | - | - | - | - | - |
| G | Poa bulbosa | a ²⁸⁷ | b ³⁵⁸ | ab ³²⁶ | ab ³³⁵ | 18.70 | 24.53 | 29.17 | 29.90 |
| G | Poa fendleriana | - | - | - | - | - | - | - | - |
| G | Poa pratensis | - | - | - | 13 | - | - | - | 1.39 |
| G | Poa secunda | a ⁻ | b ¹⁸ | c ⁵² | b ²⁵ | - | .81 | 5.03 | 2.30 |
| G | Sitanion hystrix | 1 | 1 | - | - | .00 | .00 | - | - |
| Total for Annual Grasses | | 18 | 1 | 0 | 0 | 0.21 | 0.00 | 0 | 0 |
| Total for Perennial Grasses | | 701 | 796 | 777 | 730 | 35.96 | 57.62 | 50.63 | 49.37 |
| Total for Grasses | | 719 | 797 | 777 | 730 | 36.18 | 57.62 | 50.63 | 49.37 |
| F | Achillea millefolium | - | - | - | - | - | - | - | .00 |
| F | Agoseris glauca | - | - | - | 3 | - | - | - | .03 |
| F | Allium sp. | - | - | - | 1 | - | - | - | .00 |
| F | Alyssum alyssoides (a) | b ⁶⁹ | b ⁵² | a ²⁴ | b ⁶¹ | .26 | .18 | .05 | .30 |
| F | Astragalus cibarius | - | - | - | - | - | - | .00 | - |
| F | Astragalus sp. | - | - | 2 | 4 | - | - | .00 | .16 |

| Type | Species | Nested Frequency | | | | Average Cover % | | | |
|---------------------------|------------------------------------|------------------|------------------|------------------|------------------|-----------------|-------|-------|------|
| | | '96 | '01 | '06 | '11 | '96 | '01 | '06 | '11 |
| F | <i>Calochortus nuttallii</i> | - | 3 | - | - | - | .01 | - | - |
| F | <i>Cirsium undulatum</i> | 2 | 4 | 4 | - | .00 | .30 | .01 | - |
| F | <i>Collinsia parviflora</i> (a) | - | 2 | 11 | 3 | - | .00 | .03 | .01 |
| F | <i>Collomia linearis</i> (a) | - | 2 | - | 1 | - | .00 | - | .00 |
| F | <i>Comandra pallida</i> | 1 | - | - | - | .00 | - | - | - |
| F | <i>Cymopterus</i> sp. | - | 5 | 3 | 5 | - | .04 | .01 | .07 |
| F | <i>Descurainia pinnata</i> (a) | a- | a ¹ | a- | b ¹⁴ | - | .00 | - | .04 |
| F | <i>Epilobium brachycarpum</i> (a) | - | - | 8 | 4 | - | - | .01 | .01 |
| F | <i>Eriogonum ovalifolium</i> | 3 | - | - | - | .00 | - | - | - |
| F | <i>Erodium cicutarium</i> (a) | - | 7 | 1 | 2 | - | .04 | .00 | .00 |
| F | <i>Lactuca serriola</i> (a) | a- | a- | a- | b ¹⁴ | - | - | - | .05 |
| F | <i>Lesquerella</i> sp. | - | 3 | - | - | - | .00 | - | - |
| F | <i>Medicago sativa</i> | b ¹⁶⁹ | b ¹⁸³ | a ¹²⁹ | a ¹²⁰ | 11.81 | 16.42 | 10.31 | 5.29 |
| F | <i>Microsteris gracilis</i> (a) | - | - | 3 | - | - | - | .00 | - |
| F | <i>Pedicularis centranthera</i> | - | - | 1 | - | - | - | .15 | - |
| F | <i>Polygonum douglasii</i> (a) | 5 | - | 3 | - | .01 | - | .01 | - |
| F | <i>Ranunculus testiculatus</i> (a) | - | - | - | 3 | - | - | - | .00 |
| F | <i>Sanguisorba minor</i> | 9 | 5 | - | 6 | .06 | .18 | - | .06 |
| F | <i>Sisymbrium altissimum</i> (a) | - | 1 | - | - | - | .00 | - | - |
| F | <i>Sphaeralcea coccinea</i> | 2 | - | - | - | .03 | - | - | - |
| F | <i>Tragopogon dubius</i> (a) | b ²³ | a ⁷ | a ¹ | a- | .11 | .09 | .00 | - |
| F | <i>Vicia americana</i> | c ¹⁷³ | b ¹⁰² | a ⁵³ | a ⁵⁰ | 1.22 | 1.50 | .42 | .71 |
| Total for Annual Forbs | | 97 | 72 | 51 | 102 | 0.38 | 0.33 | 0.12 | 0.43 |
| Total for Perennial Forbs | | 359 | 305 | 192 | 189 | 13.14 | 18.46 | 10.92 | 6.33 |
| Total for Forbs | | 456 | 377 | 243 | 291 | 13.53 | 18.80 | 11.04 | 6.77 |

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

BROWSE TRENDS--

Management unit 04, Study no: 3

| Type | Species | Strip Frequency | | | | Average Cover % | | | |
|------------------|--|-----------------|-----|-----|-----|-----------------|------|------|------|
| | | '96 | '01 | '06 | '11 | '96 | '01 | '06 | '11 |
| B | <i>Amelanchier alnifolia</i> | 3 | 1 | 1 | 1 | - | - | - | - |
| B | <i>Artemisia tridentata vaseyana</i> | 10 | 3 | 3 | 5 | .68 | 1.13 | .38 | .91 |
| B | <i>Chrysothamnus nauseosus albicaulis</i> | 6 | 6 | 5 | 7 | .48 | .39 | .94 | .59 |
| B | <i>Chrysothamnus viscidiflorus viscidiflorus</i> | 66 | 38 | 51 | 47 | 3.00 | 1.44 | 2.59 | 1.75 |
| B | <i>Gutierrezia sarothrae</i> | 6 | 6 | 4 | 1 | .01 | - | - | .00 |
| B | <i>Tetradymia canescens</i> | - | - | - | - | - | - | - | .01 |
| Total for Browse | | 91 | 54 | 64 | 61 | 4.18 | 2.97 | 3.92 | 3.28 |

CANOPY COVER, LINE INTERCEPT--

Management unit 04, Study no: 3

| Species | Percent Cover | |
|---|---------------|------|
| | '06 | '11 |
| Artemisia tridentata vaseyana | .18 | .11 |
| Chrysothamnus nauseosus albicaulis | .88 | .16 |
| Chrysothamnus viscidiflorus viscidiflorus | 1.26 | 1.48 |
| Gutierrezia sarothrae | .11 | - |

BASIC COVER--

Management unit 04, Study no: 3

| Cover Type | Average Cover % | | | |
|-------------|-----------------|-------|-------|-------|
| | '96 | '01 | '06 | '11 |
| Vegetation | 53.31 | 68.63 | 66.61 | 64.87 |
| Rock | 3.11 | 2.72 | 3.68 | 2.06 |
| Pavement | 1.29 | 3.76 | 4.38 | 4.01 |
| Litter | 63.50 | 34.77 | 29.13 | 36.70 |
| Cryptogams | .40 | .58 | .30 | .33 |
| Bare Ground | 1.60 | 3.50 | 4.73 | 8.16 |

SOIL ANALYSIS DATA --

Management unit 04, Study no: 3, Study Name: Tank Canyon

| Effective rooting depth (in) | pH | Clay-Loam | | | %OM | PPM P | PPM K | ds/m |
|------------------------------|-----|-----------|--------|--------|-----|-------|-------|------|
| | | % sand | % silt | % clay | | | | |
| 16.3 | 7.0 | 41.9 | 29.7 | 28.4 | 3.8 | 9.8 | 108.8 | 0.6 |

PELLET GROUP DATA--

Management unit 04, Study no: 3

| Type | Quadrat Frequency | | | | Days use per acre (ha) | | |
|--------|-------------------|-----|-----|-----|------------------------|----------|----------|
| | '96 | '01 | '06 | '11 | '01 | '06 | '11 |
| Sheep | 26 | - | - | 1 | - | - | - |
| Rabbit | - | 6 | 26 | 8 | - | - | - |
| Elk | 9 | 15 | 63 | 15 | 46 (112) | 56 (137) | 37 (91) |
| Deer | 11 | 12 | 12 | 12 | 21 (51) | 15 (38) | 11 (26) |
| Cattle | - | 4 | 24 | 7 | - | 35 (86) | 51 (125) |

BROWSE CHARACTERISTICS--

Management unit 04, Study no: 3

| Year | Plants per Acre (excluding seedlings) | Age class distribution | | | Seedling (plants/acre) | Utilization | | | Average Height Crown (in) |
|-----------------------|---------------------------------------|------------------------|----------|------------|------------------------|-------------|---------|--------------|---------------------------|
| | | % Young | % Mature | % Decadent | | % moderate | % heavy | % poor vigor | |
| Amelanchier alnifolia | | | | | | | | | |
| 96 | 60 | 0 | 100 | 0 | - | 67 | 33 | 0 | 22/26 |
| 01 | 220 | 100 | 0 | 0 | - | 0 | 0 | 0 | 14/20 |
| 06 | 20 | 0 | 100 | 0 | - | 0 | 0 | 0 | 13/24 |
| 11 | 20 | 100 | 0 | 0 | - | 0 | 0 | 0 | 19/28 |

| 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 tridentata vaseyana</i> | | | | | | | | | |
| 96 | 200 | 40 | 60 | 0 | - | 10 | 0 | 0 | 21/27 |
| 01 | 60 | 0 | 100 | 0 | - | 0 | 33 | 0 | 22/22 |
| 06 | 60 | 33 | 33 | 33 | 160 | 0 | 0 | 33 | 26/39 |
| 11 | 140 | 57 | 29 | 14 | - | 14 | 43 | 14 | 14/27 |
| <i>Chrysothamnus nauseosus albicaulis</i> | | | | | | | | | |
| 96 | 140 | 14 | 71 | 14 | - | 0 | 0 | 0 | 24/36 |
| 01 | 140 | 14 | 43 | 43 | - | 0 | 0 | 0 | 24/27 |
| 06 | 140 | 29 | 57 | 14 | - | 57 | 0 | 0 | 25/39 |
| 11 | 180 | 44 | 33 | 22 | 40 | 33 | 11 | 22 | 21/27 |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | | |
| 96 | 3500 | 16 | 82 | 2 | 140 | 26 | 0 | 2 | 13/19 |
| 01 | 1900 | 6 | 88 | 5 | - | 0 | 0 | 1 | 8/11 |
| 06 | 2060 | 11 | 86 | 3 | 20 | 10 | 0 | .97 | 8/12 |
| 11 | 1440 | 42 | 58 | 0 | - | 15 | 6 | 0 | 10/15 |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | |
| 96 | 220 | 64 | 36 | 0 | 40 | 0 | 0 | 0 | 7/10 |
| 01 | 280 | 7 | 93 | 0 | - | 0 | 0 | 0 | 9/9 |
| 06 | 120 | 0 | 83 | 17 | - | 0 | 0 | 17 | 10/11 |
| 11 | 20 | 100 | 0 | 0 | - | 0 | 0 | 0 | 5/4 |
| <i>Opuntia sp.</i> | | | | | | | | | |
| 96 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 6/21 |
| 01 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 06 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 3/7 |
| 11 | 0 | 0 | 0 | - | 20 | 0 | 0 | 0 | 4/7 |
| <i>Symphoricarpos oreophilus</i> | | | | | | | | | |
| 96 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 18/45 |
| 01 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 06 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 15/26 |
| 11 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 26/36 |
| <i>Tetradymia canescens</i> | | | | | | | | | |
| 96 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 01 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | -/- |
| 06 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 13/20 |
| 11 | 0 | 0 | 0 | - | 40 | 0 | 0 | 0 | 6/11 |