

Trend Study 16B-8-07

Study site name: Starvation Mahogany .

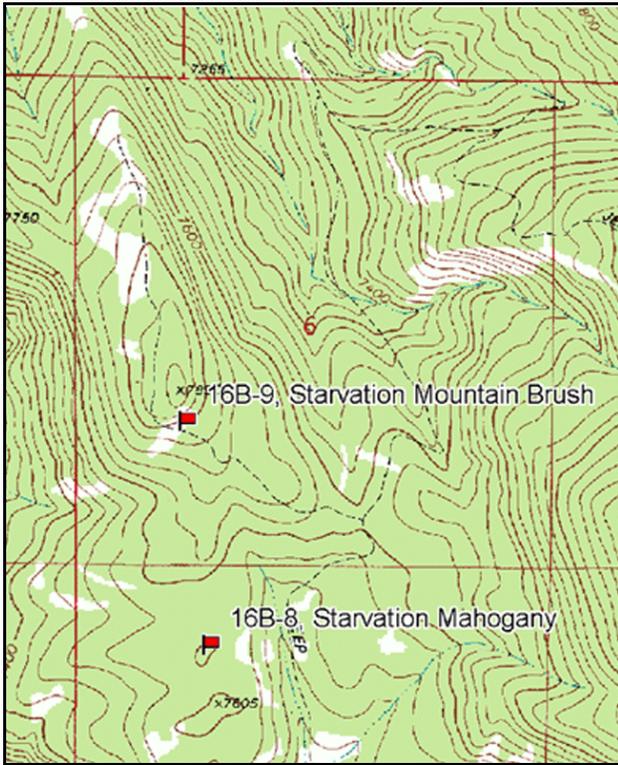
Vegetation type: Curlleaf Mountain Mahogany .

Compass bearing: frequency baseline 160 degrees magnetic (line 2-4 @ 151°M).

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

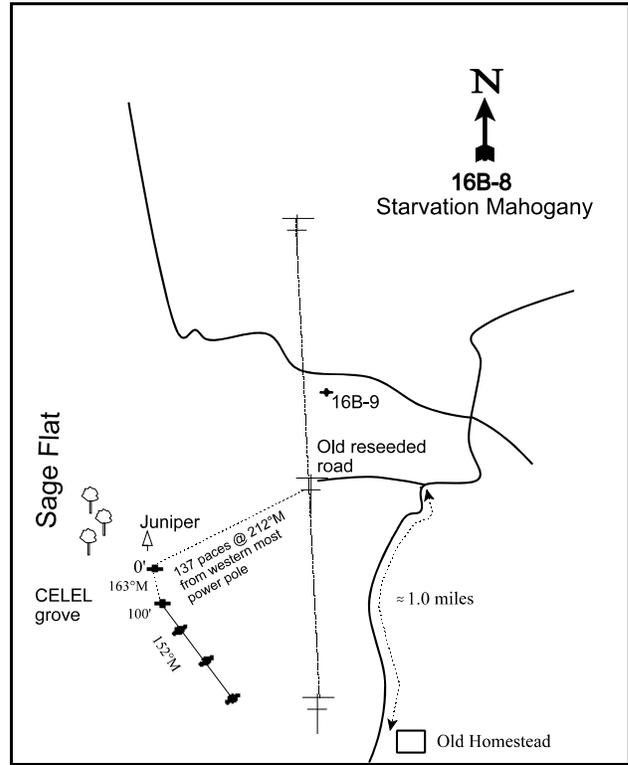
LOCATION DESCRIPTION

From Tucker rest area on Highway 6 in Spanish Fork Canyon, take the Starvation Canyon road 4.6 miles. Turn left and go 0.5 miles to another fork. Turn left and go up a small canyon on a rough road for 1.15 miles to a fork. Turn left, cross the creek, and go 0.3 miles to an old homestead site. Continue up the road about 1.0 miles to an old road on the left that has been seeded over. From here, walk east to the double powerlines on the hill. From the westernmost pole, walk 137 paces at 212 degrees magnetic to the 0-foot stake of the baseline. It is marked by browse tag #9047.



Map Name: Tucker

Township 11S, Range 7E, Section 7



Diagrammatic Sketch

GPS: NAD 83, UTM 12S 484111 E 4414856 N

DISCUSSION

Starvation Mahogany - Trend Study No. 16B-8

Study Information

This study is located in the Starvation Creek drainage on Division of Wildlife Resources property and was established in 1989 [elevation: 7,600 feet (2,316 m), slope: 5%, aspect: southwest]. It is considered important winter range for both mule deer and elk. Starvation Creek is located 0.75 miles (1.2 km) to the west. From the pellet group transect data, deer use was estimated at 34 days use/acre (84 ddu/ha) in 1999, 58 days use/acre (144 ddu/ha) in 2002, and 56 days use/acre (139 ddu/ha) in 2007. Elk use was estimated at 34 days use/acre (84 edu/ha) in 1999, 18 days use/acre (45 edu/ha) in 2002 and 60 days use/acre (147 edu/ha) in 2007. Livestock use was very light with an estimated 4 cow days use/acre (9 cdu/ha) in 1999, 7 cow days use/acre (16 cdu/ha) in 2002 and 3 cow days use/acre (7 cdu/ha) in 2007. A large 4-point buck antler shed was found while hiking to the study in 1999, and deer were seen near the study in 2007.

Soil

The soil is a dark brown clay loam with a slightly alkaline pH (7.4). There is very little rock or pavement on the surface. There is a clay layer 12 inches (30.5 cm) below the surface that is about 6 inches (15.2 cm) thick. Erosion is minimal because of the high vegetation and litter cover. Organic matter is moderately high at 3.2%, while phosphorus levels are quite low (2.7 ppm). Phosphorus levels less than 6 ppm can be limiting to normal plant growth and development (Tiedemann and Lopez 2004). The composition of ground cover has steadily shown an increase in vegetation and bare soil, and a decrease in litter. The erosion condition was classified as slight in 2002 and improved to stable in 2007.

Browse

The browse community is diverse, with 14 species sampled. The key species include Utah serviceberry (*Amelanchier utahensis*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), true mountain mahogany (*Cercocarpus montanus*), curl-leaf mahogany (*Cercocarpus ledifolius*), and antelope bitterbrush (*Purshia tridentata*). These key species have accounted for about one-third of the total browse cover since 1999. Less preferred species such as mountain snowberry (*Symphoricarpos oreophilus*), Gambel oak (*Quercus gambelii*), and stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) provide the majority of the browse cover. The baseline was extended in 1999 to better sample browse populations that have clumped and/or discontinuous distributions. The extension of the baseline and discontinuation of the relatively small density plots accounts for some of the changes in population densities after 1989 for many of the shrub species.

Utah serviceberry canopy cover has been 1% since 2002. The population density has fluctuated between 480 and 580 plants/acre (1,190 and 1,535 plants/ha) since 1999. Recruitment was high in 1999; 52% of the plants were classified as young, which resulted in a slight increase in density in 2002. Recruitment remained good at 17% in 2002 and 25% in 2007. Decadence has been moderately low in all sample years, ranging from 7% to 14% of the population. The proportion of plants exhibiting poor vigor has ranged from 5% to 12%. The number of plants with heavy browse use was highest in 2002 (55%) and declined in 2007 to 21%.

Mountain big sagebrush canopy cover has been consistent at 2% since 2002. The density was approximately 900 plants/acre (2,230 plants/ha) in 1999 and 2002 and declined to 760 plants/acre (1,880 plants/ha) in 2007. Most plants occur in open areas. Sagebrush decadency has been high in all sample years, ranging from 43% in 1999 to 32% in 2007. The number of dead plants sampled has also steadily decreased since 1999. Reproduction and recruitment have been low in all years, except in 1989 when half of the population was categorized as young. Plants exhibiting poor vigor accounted for a small proportion of the population through 2002 (11% or less), and increased to 21% in 2007. In 2007 there were also galls and bugs on individual plants. Annual growth was minimal on sagebrush in 2002, averaging less than 2 inches (5.1 cm). Sagebrush

use has also been variable, though plants with heavy use increased from 7% in 2002 to 34% in 2007.

True mountain mahogany canopy cover decreased from 7% in 2002 to 5% in 2007. The density was estimated at 740 plants/acre (1,832 plants/ha) in 1999 and 2002, and decreased to 640 plants/acre (1,584 plants/ha) in 2007. Young plants decreased from 76% of the population in 1989 to 16% in 2002, and increased to 25% in 2007. The percent decadency has been low in all sample years, 5% or less. The percentage of plants with poor vigor has been low in all sample years. True mountain mahogany plants with heavy use increased from 2% in 1989 to 66% in 2007. Curl-leaf mahogany canopy cover decreased from 5% in 2002 to 4% in 2007. The population density was estimated at 180 plants/acre (445 plants/ha) in 1999, 300 plants/acre (743 plants/ha) in 2002, and 220 plants/acre (545 plants/ha) in 2007. Decadent curl-leaf plants have accounted for about 10% of the population since 1999. The plants exhibiting poor vigor have remained a relatively small portion of the population. Heavy browsing use increased from 0% in 1989 to 80% in 2002, and declined to 64% in 2007. Height and crown measurements have decreased each sample year. In 2007, the plants averaged 19 inches (48 cm) tall with a crown width of 16 inches (41 cm). However, there are taller, highlined curl-leaf plants present.

The antelope bitterbrush population is composed of mature, heavily utilized individuals. Canopy cover was 1% in 2002 and 2% in 2007. The estimated density has remained stable at approximately 130 plants/acre (320 plants/ha) since 1999. Decadence has been low and vigor has been normal. The moderate to heavy use on bitterbrush is expected because of the relatively low densities of this preferred species.

Herbaceous Understory

The herbaceous understory is diverse in both grasses and forbs. Fifteen species of grasses (14 perennial species) have been sampled since 1989. The most abundant species include bluebunch wheatgrass (*Agropyron spicatum*), western wheatgrass (*Agropyron smithii*), and three bluegrass species (*Poa* sp.). These species comprised 6% of the total ground cover in 1999, 8% in 2002, and 11% in 2007. The grasses have had good stature even in drought conditions. Cheatgrass is present, but was sampled for the first time in 2007 and was only in three quadrats.

Perennial forb cover has been stable at approximately 8% since 1999. Forb species richness is high; 46 species (38 perennial species) have been sampled since 1989. Hood's phlox (*Phlox hoodii*) is the most abundant forb and has consistently occurred in about half of the sampling quadrats. The remaining species occur at low frequencies. Annual forbs have accounted for 1% or less of the total ground cover since 1999. Bur buttercup (*Ranunculus testiculatus*), an allelopathic annual (Buchanan et al. 1978) was first sampled in 2007 in two quadrats.

1999 TREND ASSESSMENT

The browse trend is stable. There were large decreases in the estimated density for Utah serviceberry, curl-leaf mahogany, true mountain mahogany, and bitterbrush. However, the decrease was attributed to the change in the sample area measured in 1999. In this instance, trend was determined from other parameters. Seedling and young recruitment was high for serviceberry, true mountain mahogany, and curl-leaf mahogany. Percent decadence was also relatively low. These species all display evidence of moderate-heavy use. However, there was a decrease in young recruitment of sagebrush, and decadency remained high (43%). The grass trend is up. The sum of nested frequency of perennial grasses increased 54%. There were significant increases in the nested frequencies of western wheatgrass and Kentucky bluegrass (*Poa pratensis*). The forb trend is slightly down. The sum of nested frequency of perennial forbs decreased 25%, including significant decreases of the nested frequencies of five species. Trend was only rated as slightly down because the decrease in forbs was likely also a product of the change in sample area. The Desirable Components Index (DCI) score is fair-good due to the high percentage of preferred browse plants that were young, moderate levels of browse cover and decadence, and high perennial forb cover.

winter range condition (DCI) - fair-good (70) High potential scale
browse - stable (0) grass - up (+2) forb - slightly down (-1)

2002 TREND ASSESSMENT

The browse trend is stable. Even with drought in 2002 (Utah Climate Summaries 2007), the key species showed improvements in important parameters. Density increased or remained stable for most of the key species. Reproduction declined for serviceberry, true mountain mahogany, and curl-leaf mahogany. Mountain big sagebrush and bitterbrush already had very low reproduction prior to 2002. All of the key species had stable or decreasing decadency and poor vigor rates, which is a positive sign during periods of drought. Browse use appears to have increased on most of the key browse species. There are two possible explanations for the increase. First, browse use can be overestimated during years of minimal annual growth like 2002. Low annual growth results in plants having a heavily hedged appearance making ocular browse use estimates difficult to determine. Second, use may have increased because the key species occur in relatively low densities, and animals may have concentrated use on key areas due to drought conditions. The grass trend is stable. The sum of nested frequency of perennial grasses increased by 2%, and there were no annual grasses present. The forb trend is also stable. The sum of nested frequency of perennial forbs decreased 9%. There was an increase in annual forb nested frequency, but most of the increase was from species that are not regarded as weedy. The DCI score remained fair-good. The increase in preferred browse cover and perennial grass cover was countered by a decrease in young browse plants.

winter range condition (DCI) - fair-good (71) High potential scale
browse - stable (0) grass - stable (0) forb - stable (0)

2007 TREND ASSESSMENT

The browse trend is slightly down. Density declined for all the preferred browse species except bitterbrush. However, bitterbrush had a low enough density that it did not impact trend. The decadent and young components of the populations remained stable for the preferred species. Plants exhibiting poor vigor increased from 11% to 21% of the mountain big sagebrush population. Gambel oak density decreased by about 25%, and poor vigor increased from 17% to 47%. These changes in the oak population appeared to be the result of frost damage. The trend for grass is stable. The sum of nested frequency for perennial grasses increased 13%. Bluebunch wheatgrass and Kentucky bluegrass (*Poa pratensis*) increased significantly in nested frequency, while mutton bluegrass (*Poa fendleriana*) decreased significantly. However, cheatgrass (*Bromus tectorum*) was also observed for the first time and was found in three quadrats, which negatively impacts trend. The forb trend is slightly up. The sum of nested frequency for all forbs increased by 54%, but the nested frequency of perennial forbs only increased by 15%. The remainder of the increase was attributed to annual forbs, mostly blue-eyed Mary (*Collinsia parviflora*) and little polecat (*Microsteris gracilis*). The DCI score remained fair-good because the decrease in browse cover was countered by an increase in perennial grass cover.

winter range condition (DCI) - fair-good (71) High potential scale
browse - slightly down (-1) grass - stable (0) forb - slightly up (+1)

HERBACEOUS TRENDS --
Management unit 16B, Study no: 8

| Type | Species | Nested Frequency | | | | Average Cover % | | |
|-----------------------------|---------------------------------|------------------|------------------|------------------|------------------|-----------------|-------|-------|
| | | '89 | '99 | '02 | '07 | '99 | '02 | '07 |
| G | <i>Agropyron cristatum</i> | b ₂₅ | a ₉ | ab ₁₃ | a ₅ | .18 | .39 | .18 |
| G | <i>Agropyron smithii</i> | a ₅₉ | b ₁₂₅ | b ₁₃₇ | b ₁₅₆ | 1.98 | 2.26 | 2.38 |
| G | <i>Agropyron spicatum</i> | a ₈₀ | a ₉₂ | a ₈₆ | b ₁₂₇ | 2.56 | 3.23 | 5.12 |
| G | <i>Agropyron trachycaulum</i> | 16 | - | - | - | - | - | - |
| G | <i>Bromus inermis</i> | - | a ₂ | a ₄ | a ₆ | .03 | .15 | .53 |
| G | <i>Bromus tectorum</i> (a) | - | - | - | 6 | - | - | .01 |
| G | <i>Carex</i> sp. | a ₉ | a ₆ | a ₁₇ | a ₅ | .44 | 1.00 | .16 |
| G | <i>Koeleria cristata</i> | a ₄ | a ₁₂ | a ₋ | a ₁₂ | .05 | - | .25 |
| G | <i>Oryzopsis hymenoides</i> | a ₁₁ | a ₂ | a ₁₃ | a ₁₀ | .06 | .30 | .39 |
| G | <i>Poa fendleriana</i> | a ₂₂ | a ₅₂ | b ₈₃ | a ₂₉ | .69 | 2.42 | 1.13 |
| G | <i>Poa pratensis</i> | a ₄ | b ₄₉ | a ₁₆ | b ₃₇ | .88 | .42 | 2.00 |
| G | <i>Poa secunda</i> | - | a ₁₁ | ab ₂₅ | b ₄₃ | .05 | .16 | .59 |
| G | <i>Sitanion hystrix</i> | a ₄ | a ₁₁ | - | a ₃ | .10 | - | .15 |
| G | <i>Stipa comata</i> | - | a ₂ | a ₈ | a ₁₂ | .00 | .33 | .22 |
| G | <i>Stipa lettermani</i> | a ₃₇ | a ₄₃ | a ₂₁ | a ₃₃ | .79 | .51 | .78 |
| Total for Annual Grasses | | 0 | 0 | 0 | 6 | 0 | 0 | 0.01 |
| Total for Perennial Grasses | | 271 | 416 | 423 | 478 | 7.87 | 11.19 | 13.92 |
| Total for Grasses | | 271 | 416 | 423 | 484 | 7.87 | 11.19 | 13.94 |
| F | <i>Achillea millefolium</i> | a ₆ | a ₃ | - | - | .15 | - | - |
| F | <i>Agoseris glauca</i> | - | - | a ₆ | b ₃₆ | - | .04 | .13 |
| F | <i>Alyssum alyssoides</i> (a) | - | - | - | 1 | - | - | .00 |
| F | <i>Antennaria rosea</i> | - | a ₄ | a ₁₄ | a ₁₂ | .15 | .39 | .17 |
| F | <i>Arabis</i> sp. | a ₁ | a ₃ | a ₂ | - | .00 | .01 | - |
| F | <i>Aster chilensis</i> | b ₅₇ | a ₁₆ | a ₂₅ | a ₁₆ | .12 | .13 | .22 |
| F | <i>Astragalus convallarius</i> | a ₂₆ | a ₂₃ | a ₂₁ | a ₃₂ | .19 | .16 | .25 |
| F | <i>Astragalus eurekensis</i> | - | - | - | 8 | - | - | .09 |
| F | <i>Astragalus miser</i> | - | a ₁ | a ₂ | a ₂ | .03 | .15 | .03 |
| F | <i>Astragalus</i> sp. | a ₉ | a ₉ | a ₁₀ | - | .01 | .07 | - |
| F | <i>Castilleja linariaefolia</i> | - | - | - | 1 | - | - | .15 |
| F | <i>Calochortus nuttallii</i> | - | a ₁ | a ₃ | b ₁₁ | .00 | .00 | .03 |
| F | <i>Chaenactis douglasii</i> | a ₉ | a ₂ | a ₁ | a ₃ | .01 | .00 | .00 |
| F | <i>Cirsium</i> sp. | b ₃₀ | a ₁₃ | a ₁₂ | a ₉ | .05 | .07 | .37 |
| F | <i>Comandra pallida</i> | a ₂₀ | a ₁₅ | - | a ₂₁ | .10 | - | .18 |
| F | <i>Collinsia parviflora</i> (a) | - | - | a ₄₁ | b ₁₀₁ | - | .10 | .71 |
| F | <i>Crepis acuminata</i> | - | - | - | 3 | - | - | .04 |

| Type | Species | Nested Frequency | | | | Average Cover % | | |
|---------------------------|------------------------------------|------------------|-------------------|------------------|------------------|-----------------|------|------|
| | | '89 | '99 | '02 | '07 | '99 | '02 | '07 |
| F | <i>Draba</i> sp. (a) | - | 3 | - | - | .01 | - | - |
| F | <i>Erigeron</i> sp. | - | - | 3 | - | - | .00 | - |
| F | <i>Eriogonum racemosum</i> | - | - | _a - | _a - | - | .01 | .00 |
| F | <i>Eriogonum umbellatum</i> | _a 20 | _a 12 | _a 15 | _a 16 | .08 | .11 | .18 |
| F | <i>Ipomopsis aggregata</i> | 3 | - | - | - | - | - | - |
| F | <i>Lappula occidentalis</i> (a) | - | - | - | 4 | - | - | .01 |
| F | <i>Lactuca serriola</i> | - | - | - | 1 | - | - | .00 |
| F | <i>Lithospermum ruderales</i> | - | - | - | - | - | - | .00 |
| F | <i>Lomatium</i> sp. | _a 3 | _a 5 | _a 4 | _a 4 | .33 | .21 | .45 |
| F | <i>Machaeranthera canescens</i> | _b 95 | _a 42 | _a 27 | _a 22 | .16 | .19 | .26 |
| F | <i>Microsteris gracilis</i> (a) | - | - | _a 7 | _b 80 | - | .01 | .40 |
| F | <i>Orthocarpus</i> sp. (a) | - | _a 6 | _a 2 | _b 18 | .04 | .01 | .11 |
| F | <i>Penstemon caespitosus</i> | - | _a 31 | _a 21 | _a 26 | .46 | .41 | .18 |
| F | <i>Penstemon cyananthus</i> | _b 69 | _a 7 | _b 51 | _b 50 | .04 | 1.15 | .93 |
| F | <i>Penstemon humilis</i> | _b 31 | _a 3 | - | - | .00 | - | - |
| F | <i>Penstemon</i> sp. | - | 58 | - | - | 1.00 | - | - |
| F | <i>Phlox hoodii</i> | _b 154 | _{ab} 129 | _a 125 | _a 106 | 4.45 | 5.38 | 3.60 |
| F | <i>Phlox longifolia</i> | _a 4 | _a 6 | _a 9 | _a 11 | .01 | .05 | .05 |
| F | <i>Polygonum douglasii</i> (a) | - | _{ab} 4 | _a 1 | _b 15 | .01 | .00 | .03 |
| F | <i>Ranunculus testiculatus</i> (a) | - | - | - | 5 | - | - | .01 |
| F | <i>Schoenocrambe linifolia</i> | - | - | - | 1 | - | - | .00 |
| F | <i>Senecio integerrimus</i> | - | - | - | 6 | - | - | .06 |
| F | <i>Senecio multilobatus</i> | _a 8 | - | _a 10 | _a 1 | - | .05 | .00 |
| F | <i>Solidago</i> sp. | - | 2 | - | - | .03 | - | - |
| F | <i>Taraxacum officinale</i> | - | _a 17 | _a 4 | _a 15 | .03 | .01 | .05 |
| F | <i>Tragopogon dubius</i> | - | - | _a 2 | _a 5 | - | .00 | .01 |
| F | <i>Viguiera multiflora</i> | _a 1 | _a 3 | _a 3 | - | .00 | .03 | - |
| F | <i>Viola</i> sp. | - | - | - | 4 | - | - | .01 |
| F | <i>Zigadenus paniculatus</i> | - | - | _a - | _a 2 | - | .00 | .00 |
| Total for Annual Forbs | | 0 | 13 | 51 | 224 | 0.06 | 0.12 | 1.28 |
| Total for Perennial Forbs | | 546 | 405 | 370 | 424 | 7.47 | 8.67 | 7.52 |
| Total for Forbs | | 546 | 418 | 421 | 648 | 7.54 | 8.80 | 8.81 |

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

BROWSE TRENDS --

Management unit 16B, Study no: 8

| T y p e | Species | Strip Frequency | | | Average Cover % | | |
|------------------|--|-----------------|-----|-----|-----------------|-------|-------|
| | | '99 | '02 | '07 | '99 | '02 | '07 |
| B | Amelanchier utahensis | 21 | 25 | 19 | .77 | 1.20 | 1.80 |
| B | Artemisia tridentata vaseyana | 34 | 34 | 30 | .98 | 2.24 | 2.01 |
| B | Cercocarpus ledifolius | 8 | 14 | 9 | .79 | 1.70 | .36 |
| B | Cercocarpus montanus | 24 | 28 | 24 | 3.63 | 3.87 | 2.34 |
| B | Chrysothamnus depressus | 2 | 4 | 2 | .53 | .33 | .06 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 62 | 74 | 70 | 3.77 | 5.45 | 5.34 |
| B | Gutierrezia sarothrae | 14 | 16 | 16 | .45 | 1.14 | 1.24 |
| B | Juniperus scopulorum | 0 | 0 | 0 | - | .00 | .00 |
| B | Mahonia repens | 33 | 31 | 31 | 2.75 | 2.49 | 1.05 |
| B | Opuntia fragilis | 4 | 3 | 1 | - | .00 | - |
| B | Pachistima myrsinites | 0 | 0 | 1 | - | - | - |
| B | Purshia tridentata | 6 | 6 | 6 | 1.23 | 1.61 | 1.48 |
| B | Quercus gambelii | 14 | 17 | 15 | 4.83 | 2.41 | 2.04 |
| B | Symphoricarpos oreophilus | 57 | 54 | 58 | 6.97 | 6.71 | 7.53 |
| B | Tetradymia canescens | 13 | 16 | 15 | .33 | .33 | .36 |
| Total for Browse | | 292 | 322 | 297 | 27.06 | 29.51 | 25.67 |

CANOPY COVER, LINE INTERCEPT --

Management unit 16B, Study no: 8

| Species | Percent Cover | |
|--|---------------|-------|
| | '02 | '07 |
| Amelanchier utahensis | 1.00 | 1.25 |
| Artemisia tridentata vaseyana | 1.64 | 1.61 |
| Cercocarpus ledifolius | 4.81 | 4.44 |
| Cercocarpus montanus | 6.73 | 4.63 |
| Chrysothamnus depressus | .15 | .13 |
| Chrysothamnus viscidiflorus viscidiflorus | 8.01 | 6.38 |
| Gutierrezia sarothrae | 1.36 | .90 |
| Mahonia repens | 2.01 | .28 |
| Purshia tridentata | 1.31 | 1.51 |
| Quercus gambelii | 5.61 | 2.48 |
| Symphoricarpos oreophilus | 14.11 | 10.11 |
| Tetradymia canescens | .53 | .46 |

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 16B, Study no: 8

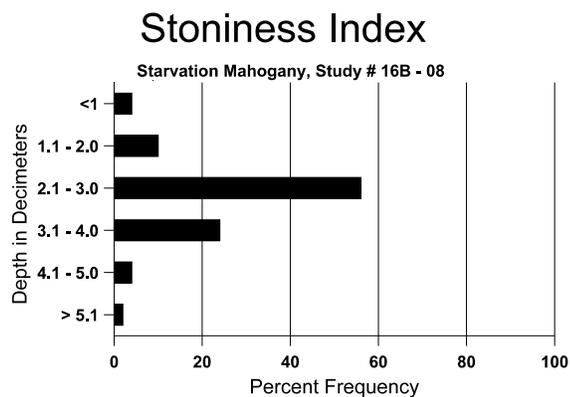
| Species | Average leader growth (in) | |
|-------------------------------|----------------------------|-----|
| | '02 | '07 |
| Amelanchier utahensis | - | 2.0 |
| Artemisia tridentata vaseyana | 1.9 | - |
| Cercocarpus montanus | 1.3 | 1.5 |
| Purshia tridentata | 1.1 | - |

BASIC COVER --
Management unit 16B, Study no: 8

| Cover Type | Average Cover % | | | |
|-------------|-----------------|-------|-------|-------|
| | '89 | '99 | '02 | '07 |
| Vegetation | 16.00 | 39.83 | 46.26 | 48.65 |
| Rock | 1.00 | 5.50 | 3.86 | 5.59 |
| Pavement | .50 | .72 | 1.46 | .72 |
| Litter | 64.75 | 50.79 | 46.75 | 34.37 |
| Cryptogams | .75 | 3.12 | 1.64 | .32 |
| Bare Ground | 17.00 | 17.17 | 18.37 | 27.59 |

SOIL ANALYSIS DATA --
Herd Unit 16B, Study # 08, Starvation Mahogany

| Effective rooting depth (in) | Temp °F (depth) | pH | Clay loam | | | %OM | ppm P | ppm K | dS/m |
|------------------------------|-----------------|-----|-----------|-------|-------|-----|-------|-------|------|
| | | | %sand | %silt | %clay | | | | |
| 13.9 | 46.2 (15.1) | 7.4 | 36.7 | 28.7 | 34.6 | 3.2 | 2.7 | 156.8 | 0.7 |



PELLET GROUP DATA --
 Management unit 16B, Study no: 8

| Type | Quadrat Frequency | | |
|--------|-------------------|-----|-----|
| | '99 | '02 | '07 |
| Rabbit | - | 6 | 4 |
| Elk | 24 | 12 | 33 |
| Deer | 20 | 24 | 16 |
| Cattle | 2 | 2 | - |

| Days use per acre (ha) | | |
|------------------------|----------|----------|
| '99 | '02 | '07 |
| - | - | - |
| 34 (84) | 18 (45) | 60 (147) |
| 34 (84) | 58 (144) | 56 (139) |
| 4 (10) | 7 (16) | 3 (7) |

BROWSE CHARACTERISTICS --
 Management unit 16B, 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>Amelanchier utahensis</i> | | | | | | | | | | | | |
| 89 | 2733 | 200 | 2400 | 133 | 200 | - | 12 | 0 | 7 | - | 5 | 31/18 |
| 99 | 500 | 60 | 260 | 180 | 60 | 20 | 28 | 16 | 12 | 8 | 12 | 42/59 |
| 02 | 580 | - | 100 | 400 | 80 | - | 14 | 55 | 14 | 3 | 7 | 25/29 |
| 07 | 480 | - | 120 | 320 | 40 | - | 17 | 21 | 8 | 8 | 8 | 30/23 |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | |
| 89 | 799 | - | 400 | 66 | 333 | - | 58 | 0 | 42 | - | 0 | 18/22 |
| 99 | 940 | - | 20 | 520 | 400 | 800 | 21 | 6 | 43 | 11 | 11 | 18/24 |
| 02 | 900 | - | 20 | 580 | 300 | 360 | 18 | 7 | 33 | 11 | 11 | 17/24 |
| 07 | 760 | 40 | 40 | 480 | 240 | 160 | 39 | 34 | 32 | 21 | 21 | 20/29 |
| <i>Cercocarpus ledifolius</i> | | | | | | | | | | | | |
| 89 | 1066 | 1200 | 666 | 400 | - | - | 0 | 0 | 0 | - | 0 | 235/146 |
| 99 | 180 | 60 | 120 | 40 | 20 | 20 | 11 | 33 | 11 | 11 | 11 | 140/152 |
| 02 | 300 | - | 180 | 100 | 20 | - | 7 | 80 | 7 | - | 7 | 27/27 |
| 07 | 220 | - | 100 | 100 | 20 | - | 18 | 64 | 9 | - | 0 | 23/18 |
| <i>Ceanothus martinii</i> | | | | | | | | | | | | |
| 89 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 99 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 02 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | 9/26 |
| 07 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | 10/30 |
| <i>Cercocarpus montanus</i> | | | | | | | | | | | | |
| 89 | 2799 | 133 | 2133 | 600 | 66 | - | 36 | 2 | 2 | - | 0 | 30/20 |
| 99 | 740 | 100 | 420 | 320 | - | - | 30 | 19 | 0 | - | 0 | 38/40 |
| 02 | 740 | - | 120 | 580 | 40 | - | 11 | 59 | 5 | 3 | 5 | 24/27 |
| 07 | 640 | 20 | 160 | 460 | 20 | - | 6 | 66 | 3 | 3 | 3 | 27/30 |

| | | 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 depressus | | | | | | | | | | | | |
| 89 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 99 | 220 | - | - | 220 | - | - | 0 | 0 | - | - | 0 | -/- |
| 02 | 280 | - | - | 280 | - | - | 0 | 0 | - | - | 0 | 3/11 |
| 07 | 60 | - | - | 60 | - | - | 0 | 0 | - | - | 0 | 3/8 |
| Chrysothamnus viscidiflorus viscidiflorus | | | | | | | | | | | | |
| 89 | 5600 | - | 4000 | 1200 | 400 | - | 0 | 0 | 7 | .35 | 1 | 11/12 |
| 99 | 4780 | - | 220 | 4440 | 120 | - | 0 | 0 | 3 | .83 | .83 | 12/15 |
| 02 | 6300 | - | 220 | 5880 | 200 | 40 | .31 | 0 | 3 | - | 0 | 10/15 |
| 07 | 5080 | 60 | 120 | 4920 | 40 | - | 0 | 0 | 1 | .78 | .78 | 10/16 |
| Gutierrezia sarothrae | | | | | | | | | | | | |
| 89 | 399 | - | 133 | 266 | - | - | 0 | 0 | - | - | 0 | 8/7 |
| 99 | 1020 | 40 | 240 | 780 | - | - | 4 | 0 | - | - | 0 | 6/12 |
| 02 | 1440 | - | 20 | 1420 | - | - | 0 | 0 | - | - | 0 | 3/8 |
| 07 | 1800 | - | 20 | 1780 | - | - | 0 | 0 | - | - | 0 | 8/9 |
| Juniperus scopulorum | | | | | | | | | | | | |
| 89 | 0 | 66 | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 99 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 02 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 07 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| Mahonia repens | | | | | | | | | | | | |
| 89 | 14000 | 666 | 12200 | 1800 | - | - | 0 | 0 | 0 | - | 0 | 4/4 |
| 99 | 9900 | 160 | 4280 | 5620 | - | - | 0 | 0 | 0 | - | 0 | 4/4 |
| 02 | 8100 | - | 560 | 7440 | 100 | - | 0 | 0 | 1 | - | 0 | 3/4 |
| 07 | 6300 | - | 20 | 6280 | - | - | 0 | 0 | 0 | - | 0 | 2/3 |
| Opuntia fragilis | | | | | | | | | | | | |
| 89 | 0 | - | - | - | - | - | 0 | 0 | 0 | - | 0 | -/- |
| 99 | 140 | 20 | 60 | 60 | 20 | - | 0 | 0 | 14 | 14 | 14 | 4/9 |
| 02 | 80 | - | 60 | 20 | - | - | 0 | 0 | 0 | - | 0 | -/- |
| 07 | 60 | - | - | 60 | - | - | 0 | 0 | 0 | - | 0 | 3/11 |
| Pachistima myrsinites | | | | | | | | | | | | |
| 89 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 99 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 02 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 07 | 20 | - | - | 20 | - | - | 0 | 0 | - | - | 0 | 6/8 |

| | | 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) |
| Pinus edulis | | | | | | | | | | | | |
| 89 | 66 | - | 66 | - | - | - | 0 | 0 | - | - | 100 | -/- |
| 99 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 02 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 07 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| Purshia tridentata | | | | | | | | | | | | |
| 89 | 200 | - | - | 200 | - | - | 0 | 67 | 0 | - | 33 | 14/23 |
| 99 | 120 | - | 20 | 80 | 20 | - | 33 | 50 | 17 | - | 0 | 17/44 |
| 02 | 120 | - | - | 120 | - | - | 17 | 83 | 0 | - | 0 | 13/31 |
| 07 | 140 | - | - | 140 | - | - | 14 | 86 | 0 | - | 0 | 11/27 |
| Quercus gambelii | | | | | | | | | | | | |
| 89 | 1132 | 133 | 666 | 66 | 400 | - | 0 | 0 | 35 | - | 0 | 177/39 |
| 99 | 1980 | 500 | 1060 | 880 | 40 | 220 | 1 | 0 | 2 | - | 0 | 86/38 |
| 02 | 2420 | 40 | 540 | 1280 | 600 | 240 | .82 | .82 | 25 | 17 | 17 | 46/20 |
| 07 | 1840 | 60 | 580 | 580 | 680 | 20 | 7 | 29 | 37 | 4 | 47 | 40/18 |
| Symphoricarpos oreophilus | | | | | | | | | | | | |
| 89 | 10599 | - | 5933 | 3066 | 1600 | - | 10 | 0 | 15 | .18 | .62 | 17/20 |
| 99 | 3120 | 140 | 800 | 2180 | 140 | - | 0 | 0 | 4 | 1 | 1 | 17/38 |
| 02 | 2420 | - | 100 | 2140 | 180 | - | 0 | 13 | 7 | 2 | 3 | 13/32 |
| 07 | 4380 | - | 620 | 3740 | 20 | - | .91 | 0 | 0 | - | 0 | 15/23 |
| Tetradymia canescens | | | | | | | | | | | | |
| 89 | 399 | - | 133 | 133 | 133 | - | 0 | 0 | 33 | - | 0 | 16/12 |
| 99 | 320 | - | 60 | 200 | 60 | - | 0 | 0 | 19 | - | 0 | 12/15 |
| 02 | 380 | - | 20 | 320 | 40 | - | 5 | 0 | 11 | 5 | 5 | 10/14 |
| 07 | 380 | - | 20 | 340 | 20 | - | 21 | 42 | 5 | 5 | 5 | 10/16 |