

Trend Study 5-9-06

Study site name: Davis Co. Rifle Range .

Vegetation type: Bitterbrush .

Compass bearing: frequency baseline 165 degrees magnetic.

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

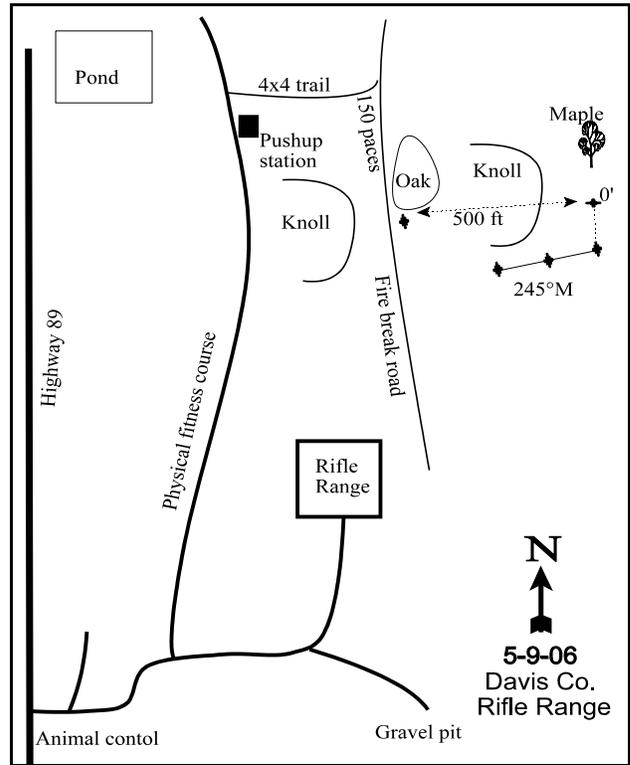
LOCATION DESCRIPTION

Take Highway 89 into Davis County. Turn east up the road toward the Animal Control and the Davis County Rifle Range. Go east past the Animal Control Center to a dirt road marked "Par Course". Follow this road 0.45 miles north to a well-developed trail going east. Walk up the trail to a fire break road, then follow the fire break road south 150 paces to a rebar witness post 10 feet south of an oak clone. From the witness post, head due east 500 feet up a bare ridge, then across to a lone maple. A rebar tagged #7081 marks the 0-foot baseline. The baseline doglegs west (245 degrees magnetic) after 100 feet.



Map Name: Kaysville

Township 4N , Range 1W , Section 25



Diagrammatic Sketch

UTM NAD 27, UTM 12T 4544690 N 424627 E

DISCUSSION

Davis County Rifle Range - Trend Study No. 5-9

Study Information

This trend study is located on a slope above gravel pits and the Davis County Rifle range east of Kaysville (elevation: 5,400 feet, slope: 40%, aspect: west). Like other Forest Service land along the Wasatch Front, livestock grazing has been discontinued in order to protect the watershed. Although there are many roads, the distance to housing developments is greater here than other studies along the Wasatch Front. Therefore, human pressure is relatively low. Deer pellet groups were very abundant in 1985 and 1990. A pellet group transect read on the site estimated 67 deer use days/acre (165 ddu/ha) in 2001 and 34 deer days use/acre (84 ddu/ha) in 2006. Most of the deer pellet groups appear to be from late winter use with some from early spring. Some coyote scat was identified on site but not encountered within the pellet group transect.

Soil

The soil is in the highly erosion-susceptible Ridd series (USDA 1968). It is underlain by bedrock at a depth of 25 to 40 inches. The effective rooting depth was estimated at 37 inches in 2001. The soil is a rocky sandy loam with a majority of the surface protected by vegetation, litter, and a buildup of organic matter. Some erosion has been apparent in the form of pedestalling around shrubs, flow patterns, rills, and some localized soil movement. The erosion condition class was determined as slight in 2001 and stable in 2006.

Browse

Antelope bitterbrush and mountain big sagebrush are the key browse species at this study. Antelope bitterbrush provides the majority of browse cover. Bitterbrush density was 760 plants/acre in 2001 and 1,140 plants/acre in 2006. Decadent individuals made up only 8% of the population in 2001 and 14% in 2006. It is highly preferred and displayed heavy hedging in 1985, but use has been moderate to light since. The plants are large and vigorous and there was adequate recruitment in 1985 and 1990, but few seedlings and young were encountered in 2001 or 2006. This is not as critical for the persistence of bitterbrush because, unlike sagebrush, it is a fairly long-lived shrub.

Mountain big sagebrush has provided only a small part of the overall browse component. Sagebrush density was 1,060 plants/acre in 2001 and 980 plants/acre in 2006. The population was moderate to heavily browsed in 1985, but has been lightly browsed since. Decadent individuals made up 6% of the overall population in 2001 and 10% in 2006. The individuals classified as dying made up 2% of the population in 2001 and 4% in 2006. The average annual leader growth of sagebrush was 2.3 inches in 2001 and 2.5 inches in 2006. The only other browse species sampled include small numbers of Wyeth eriogonum, broom snakeweed, and prickly pear cactus.

Herbaceous Understory

The herbaceous understory is dominated by cheatgrass, which provided 15% cover in 2001 and 2006. In 2006, Japanese brome was first sampled with 2% cover. The low value perennial, bulbous bluegrass is also abundant. It produced 14% cover in 2001 and 15% in 2006. Preferred perennial grasses occur in low numbers; mutton bluegrass and bluebunch wheatgrass are the most common.

Forbs are diverse and moderately abundant, although the composition is poor with many annual species. The most abundant annual is storksbill. The only common perennial is yellow salsify. Utilization of all herbaceous species is generally light. Dalmation toadflax, a noxious weed in Wasatch County, was sampled in 2001 and 2006. Dyer's woad was identified in 2006, although not sampled in quadrats.

1990 TREND ASSESSMENT

The data show a large decline in browse density. Mountain big sagebrush has decreased in density by 30%. However, vigor is fair and use has been lighter on the mature plants. Young plants of sagebrush and bitterbrush were sampled. Bitterbrush is more heavily hedged and it has decreased in density by 44%. There

is competition in the understory from the abundant cheatgrass and small bluegrasses. Perennial grasses, excluding bulbous bluegrass, decreased in nested frequency by 32%. As in 1985, yellow salsify is the dominant perennial forb, although it decreased significantly in nested frequency. The sum of the nested frequency of perennial forbs decreased 72%.

browse - down (-2)

grass - down (-2)

forb - down (-2)

2001 TREND ASSESSMENT

The trend for browse is stable. Sagebrush has increased slightly in density and displays a decline in percent decadence. Reproduction is poor but young plants currently account for 8% of the population. Bitterbrush remains at a similar density. Utilization remains moderate to heavy but vigor is good and decadence has declined to only 8%. Recruitment is poor with no young plants sampled. Dry conditions combined with competition from the weedy understory are likely having a negative effect of seedling establishment. These changes in density for this shrub are likely due to the much larger sample size used beginning in 1992, which better estimates shrub populations with clumped and/or discontinuous distributions. The grass trend is down. The existing perennial grasses decreased in nested frequency by 26%, mainly because Sandberg bluegrass decreased significantly in nested frequency. Bulbous bluegrass nested frequency increased significantly. Cheatgrass nested frequency and cover are both high. The forb trend is slightly up with a slight increase in the nested frequency and quadrat frequency of perennial forbs. The lack of annual forb data in 1990 makes determining annual forb changes impossible. The Desirable Components Index score was poor due to high annual grass cover.

winter range condition (DC Index) - poor (43) Mid-level potential scale

browse - stable (0)

grass - down (-2)

forb - slightly up (+1)

2006 TREND ASSESSMENT

The browse trend is up. The density of bitterbrush increased 33% and the density of sagebrush decreased 8%. The loss of sagebrush individuals is much less than the gain of bitterbrush. In the case of both sagebrush and bitterbrush, the percentage of decadent individuals increased, but so did the percentage of young individuals. The grass trend is stable. Cheatgrass nested frequency increased significantly, but nested frequency of perennial grasses increased 14%. The forb trend is up. The nested frequency and cover of perennial forbs increased two-fold. Annual forb nested frequency also increased nearly 2-fold, but most of which were small annuals which compete little with perennial species. The Desirable Components Index score improved to fair because of a very large increase in perennial forbs.

winter range condition (DC Index) - fair (57) Mid-level potential scale

browse - up (+2)

grass - stable (0)

forb - up (+2)

HERBACEOUS TRENDS --
Management unit 05 , Study no: 9

| Type | Species | Nested Frequency | | | | Average Cover % | |
|-----------------------------|-----------------------------------|------------------|------------------|------------------|-------------------|-----------------|-------|
| | | '85 | '90 | '01 | '06 | '01 | '06 |
| G | <i>Agropyron spicatum</i> | 28 | 38 | 27 | 18 | 1.51 | 1.82 |
| G | <i>Bromus brizaeformis</i> (a) | - | - | _b 25 | _a - | .12 | - |
| G | <i>Bromus japonicus</i> (a) | - | - | _a - | _b 90 | - | 2.08 |
| G | <i>Bromus tectorum</i> (a) | - | - | _a 293 | _b 333 | 15.16 | 15.33 |
| G | <i>Carex</i> sp. | - | - | 3 | - | .03 | - |
| G | <i>Festuca myuros</i> (a) | - | - | 6 | - | .03 | - |
| G | <i>Poa bulbosa</i> | _a 58 | _b 136 | _c 222 | _c 217 | 13.56 | 14.86 |
| G | <i>Poa secunda</i> | _c 202 | _b 118 | _a 84 | _{ab} 112 | 2.18 | 7.88 |
| Total for Annual Grasses | | 0 | 0 | 324 | 423 | 15.32 | 17.41 |
| Total for Perennial Grasses | | 288 | 292 | 336 | 347 | 17.30 | 24.57 |
| Total for Grasses | | 288 | 292 | 660 | 770 | 32.62 | 41.99 |
| F | <i>Agoseris glauca</i> | _b 25 | _a - | _a 3 | _a 3 | .00 | .03 |
| F | <i>Alyssum alyssoides</i> (a) | - | - | _a 47 | _b 120 | .11 | .66 |
| F | <i>Allium</i> sp. | _c 35 | _a - | _{ab} 11 | _b 17 | .05 | .04 |
| F | <i>Arenaria</i> sp. | - | - | - | 1 | - | .03 |
| F | <i>Artemisia ludoviciana</i> | - | - | - | - | - | .03 |
| F | <i>Astragalus</i> sp. | 5 | - | - | 2 | - | .15 |
| F | <i>Calochortus nuttallii</i> | - | - | - | 2 | - | .00 |
| F | <i>Cirsium</i> sp. | - | - | - | 6 | - | .03 |
| F | <i>Cirsium undulatum</i> | 3 | 5 | 10 | 14 | .36 | .78 |
| F | <i>Collomia linearis</i> (a) | - | - | 1 | 5 | .00 | .02 |
| F | <i>Crepis acuminata</i> | _{ab} 10 | _a 2 | _{ab} 8 | _b 24 | .15 | .58 |
| F | <i>Cymopterus longipes</i> | 33 | 16 | 16 | 38 | .15 | 1.04 |
| F | <i>Draba</i> sp. (a) | - | - | _a - | _b 130 | - | 1.83 |
| F | <i>Epilobium brachycarpum</i> (a) | _c 112 | _a - | _b 12 | _b 14 | .02 | .19 |
| F | <i>Erodium cicutarium</i> (a) | _b 10 | _a - | _c 194 | _c 184 | 7.44 | 1.31 |
| F | <i>Erigeron</i> sp. | 3 | - | - | - | - | - |
| F | <i>Galium</i> sp. | _a - | _a - | _a - | _b 22 | - | .34 |
| F | <i>Hackelia patens</i> | - | - | 3 | 3 | .03 | .00 |
| F | <i>Holosteum umbellatum</i> (a) | - | - | _a 60 | _b 142 | .17 | .89 |
| F | <i>Lactuca serriola</i> | - | - | - | 2 | - | .03 |
| F | <i>Linaria dalmatica</i> | - | - | 3 | 3 | .03 | .00 |
| F | <i>Lithospermum ruderales</i> | - | - | - | 3 | - | .15 |
| F | <i>Microsteris gracilis</i> (a) | - | - | _a - | _b 14 | - | .03 |
| F | <i>Montia perfoliata</i> (a) | - | - | _a - | _b 20 | - | .90 |

| Type | Species | Nested Frequency | | | | Average Cover % | |
|---------------------------|--------------------------|------------------|-----------------|-----------------|-----------------|-----------------|-------|
| | | '85 | '90 | '01 | '06 | '01 | '06 |
| F | Penstemon comarrhenus | - | - | - | 1 | - | .00 |
| F | Plectritis macrocera (a) | - | - | _a - | _b 21 | - | .35 |
| F | Polygonum douglasii (a) | - | - | 7 | - | .01 | - |
| F | Tragopogon dubius | _b 146 | _a 51 | _a 44 | _a 36 | .75 | .60 |
| F | Unknown forb-perennial | 3 | - | - | - | - | - |
| Total for Annual Forbs | | 122 | 0 | 321 | 650 | 7.76 | 6.20 |
| Total for Perennial Forbs | | 263 | 74 | 98 | 177 | 1.55 | 3.87 |
| Total for Forbs | | 385 | 74 | 419 | 827 | 9.31 | 10.07 |

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

BROWSE TRENDS --

Management unit 05 , Study no: 9

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|-------------------------------|-----------------|-----|-----------------|-------|
| | | '01 | '06 | '01 | '06 |
| B | Artemisia tridentata vaseyana | 33 | 30 | 6.01 | 9.42 |
| B | Eriogonum heracleoides | 7 | 5 | .79 | .76 |
| B | Gutierrezia sarothrae | 14 | 2 | 1.24 | .30 |
| B | Opuntia polyacantha | 2 | 1 | .00 | - |
| B | Purshia tridentata | 26 | 35 | 16.82 | 18.39 |
| B | Quercus gambelii | 0 | 1 | .03 | - |
| Total for Browse | | 82 | 74 | 24.90 | 28.88 |

CANOPY COVER, LINE INTERCEPT --

Management unit 05 , Study no: 9

| Species | Percent Cover |
|-------------------------------|---------------|
| | '06 |
| Artemisia tridentata vaseyana | 10.41 |
| Eriogonum heracleoides | .53 |
| Purshia tridentata | 25.23 |

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 05 , Study no: 9

| Species | Average leader growth (in) | |
|-------------------------------|----------------------------|-----|
| | '01 | '06 |
| Artemisia tridentata vaseyana | 2.3 | 2.5 |
| Purshia tridentata | 2.1 | 1.2 |

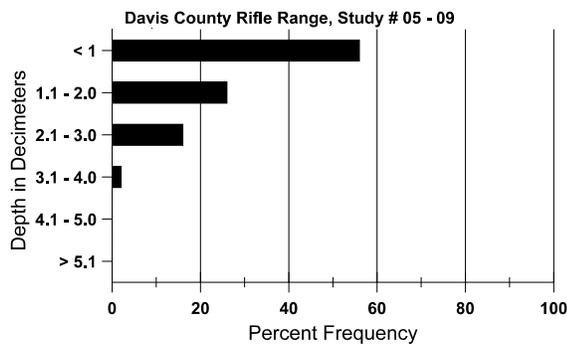
BASIC COVER --
Management unit 05 , Study no: 9

| Cover Type | Average Cover % | | | |
|-------------|-----------------|-------|-------|-------|
| | '85 | '90 | '01 | '06 |
| Vegetation | 9.50 | 4.75 | 63.66 | 70.40 |
| Rock | 3.25 | 1.75 | 2.98 | 4.31 |
| Pavement | 11.75 | 12.00 | 8.18 | 10.81 |
| Litter | 53.50 | 73.25 | 53.75 | 26.29 |
| Cryptogams | 0 | .50 | .00 | .41 |
| Bare Ground | 22.00 | 7.75 | 4.78 | 3.13 |

SOIL ANALYSIS DATA --
Herd Unit 05, Study no: 09, Davis County Rifle Range

| Effective rooting depth (in) | Temp °F (depth) | PH | | | | %0M | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| | | | %sand | %silt | %clay | | | | |
| 37.2 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Stoniness Index



PELLET GROUP DATA --
Management unit 05 , Study no: 9

| Type | Quadrat Frequency | | Days use per acre (ha) | |
|--------|-------------------|-----|------------------------|---------|
| | '01 | '06 | '01 | '06 |
| Rabbit | 4 | 2 | - | - |
| Deer | 13 | 13 | 67 (165) | 34 (84) |

BROWSE CHARACTERISTICS --
Management unit 05 , Study no: 9

| | | 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>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | |
| 85 | 1132 | - | 200 | 466 | 466 | - | 41 | 24 | 41 | - | 18 | 24/26 |
| 90 | 798 | 66 | 266 | 266 | 266 | - | 0 | 0 | 33 | - | 0 | 16/26 |
| 01 | 1060 | - | 80 | 920 | 60 | 380 | 8 | 0 | 6 | 2 | 2 | 21/33 |
| 06 | 980 | 100 | 100 | 780 | 100 | 160 | 10 | 0 | 10 | 4 | 4 | 25/40 |
| <i>Eriogonum heracleoides</i> | | | | | | | | | | | | |
| 85 | 266 | - | 133 | 133 | - | - | 0 | 0 | - | - | 0 | 10/13 |
| 90 | 266 | - | 66 | 200 | - | - | 0 | 0 | - | - | 0 | 7/17 |
| 01 | 180 | - | - | 180 | - | - | 0 | 0 | - | - | 0 | 8/16 |
| 06 | 120 | - | 20 | 100 | - | - | 67 | 0 | - | - | 0 | 12/30 |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | |
| 85 | 2132 | 66 | 733 | 1333 | 66 | - | 0 | 0 | 3 | - | 3 | 11/13 |
| 90 | 1466 | 666 | 733 | 733 | - | - | 0 | 0 | 0 | - | 0 | 12/20 |
| 01 | 440 | - | - | 380 | 60 | 580 | 5 | 0 | 14 | 5 | 5 | 13/19 |
| 06 | 80 | - | - | 80 | - | 20 | 0 | 0 | 0 | - | 0 | 9/13 |
| <i>Leptodactylon pungens</i> | | | | | | | | | | | | |
| 85 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 90 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 01 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | 11/23 |
| 06 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| <i>Opuntia polyacantha</i> | | | | | | | | | | | | |
| 85 | 200 | - | - | 200 | - | - | 0 | 0 | - | - | 0 | 8/10 |
| 90 | 133 | - | - | 133 | - | - | 0 | 0 | - | - | 0 | 7/10 |
| 01 | 60 | - | - | 60 | - | - | 0 | 0 | - | - | 0 | 9/19 |
| 06 | 20 | - | - | 20 | - | - | 0 | 0 | - | - | 0 | 7/23 |
| <i>Purshia tridentata</i> | | | | | | | | | | | | |
| 85 | 1533 | - | 333 | 1000 | 200 | - | 13 | 83 | 13 | - | 13 | 43/24 |
| 90 | 866 | - | 333 | 400 | 133 | - | 38 | 15 | 15 | - | 0 | 45/43 |
| 01 | 760 | - | - | 700 | 60 | 20 | 47 | 13 | 8 | - | 0 | 41/84 |
| 06 | 1140 | - | 40 | 940 | 160 | - | 49 | 16 | 14 | 4 | 4 | 30/63 |
| <i>Quercus gambelii</i> | | | | | | | | | | | | |
| 85 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 90 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | -/- |
| 01 | 0 | - | - | - | - | - | 0 | 0 | - | - | 0 | 36/37 |
| 06 | 80 | - | - | 80 | - | 20 | 0 | 0 | - | - | 0 | 22/25 |