

UTAH BIG GAME RANGE TREND STUDIES 2002 Volume 2 Central Region



Photo courtesy of Dan Summers

**PUBLICATION NUMBER 03-15
REPORT FOR FEDERAL AID PROJECT W-82-R-47**

**STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE RESOURCES**

**UTAH BIG GAME
RANGE TREND STUDIES
2002 Volume 2**

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Performance Report for Federal Aid Project W-82-R-47

Publication No. 03-15

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PROGRAM NARRATIVE

State: UTAH

Project Number: W-82-R

Grant Title: Wildlife Habitat Research and Monitoring

Project Title: Wildlife Habitat Monitoring/Range Trend Studies

Need:

The ability to detect changes in vegetation composition (range trend) on big game winter ranges is an important part of the Division's big game management program. The health and vigor of big game populations are closely correlated to the quality and quantity of forage in key areas. The majority of the permanent range trend studies will be located on deer and elk winter ranges, however on certain management units, studies will be located on spring and/or summer ranges, if vegetation composition on these ranges is the limiting factor for big game populations. Range trend data are used by wildlife biologists for habitat improvement planning purposes, reviewing BLM and USFS allotment management plans, and as one of several sources of information for revising deer and elk herd unit management plans.

Objective:

Monitor, evaluate, and report range trend at designated key areas throughout the state, and inform Division biologists, public land managers and private landowners of significant changes in plant community composition in these areas.

Expected Results or Benefits:

Range trend studies in each region will be reread every five years, and vegetation condition and trend assessments will be made for key areas. DWR biologists, land management personnel from the USFS and BLM, and private landowners will use the range trend database to evaluate the impact of land management programs on big game habitat. Annual reports will be readily available on the Division's website, on CDs, and in hard copies located in DWR regional offices, BLM and USFS offices, and public libraries. Special studies (habitat project monitoring and big game/livestock forage utilization studies) will give DWR biologists and public land managers additional information to address local resource management problems.

REMARKS

The work completed during the 2002 field season and reported in this publication involves the reading of interagency range trend studies in the DWR Central Region. Trend studies surveyed in these management units were established in 1983, 1989, 1990, 1997, 1998, and 2002, with rereads in 1989, 1990, 1997, 1998, 1999, and 2002.

The following Bureau of Land Management and U.S. Forest Service offices provided information and/or assistance in completion of the trend studies which add to the value of this interagency report:

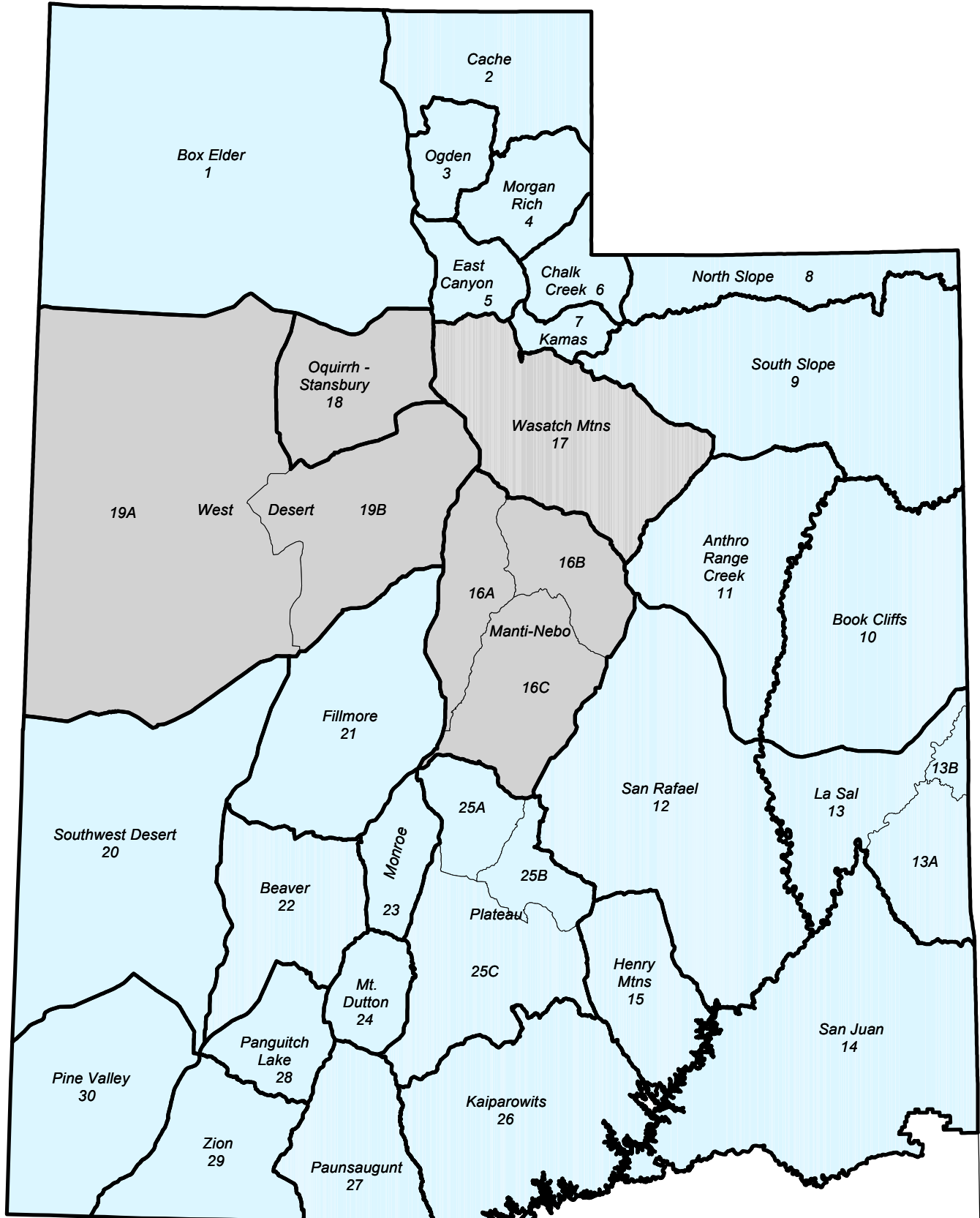
Bureau of Land Management Salt Lake Field Office

Bureau of Land Management Fillmore Field Office

Uinta National Forest
Spanish Fork Ranger District

Private landowners were cooperative in allowing access to study sites located on their land.

Utah Management Units Surveyed in 2002



RANGE TREND STUDY METHODS

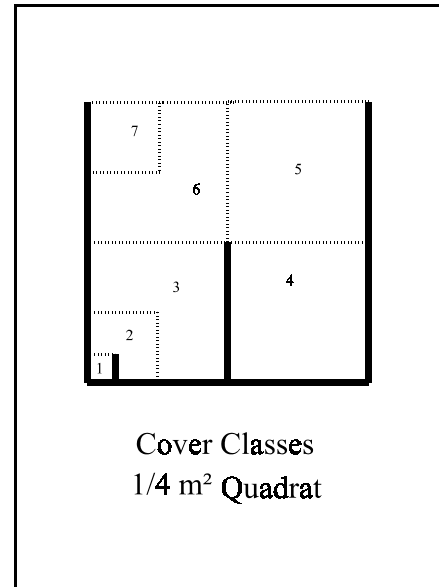
Studies monitoring range trend depend greatly on site selection, especially when dealing with large geographic areas such as wildlife management units. Since it is impossible to intensively monitor all vegetative or habitat types within a unit, it is necessary to concentrate on specific sites and/or “key” areas within distinct plant communities on big game ranges. These “key” areas should be where big game have demonstrated a definite pattern of use during normal climatic conditions over a long period of time. Trend studies are located within these areas of high use and/or critical habitat as agreed upon by DWR, BLM, and USFS personnel. Often, range trend studies are established in conjunction with permanently marked pellet group transects. Once a “key” area has been selected, specific placement for sampling is determined. The sampling grid is carefully placed in order to adequately represent the surrounding area. All sampling baselines are permanently marked by half-high steel fence posts. The first, or beginning baseline stake, is marked with a metal tag for proper identification of the transect. The beginning of each belt is marked by rebar to ensure a more precise alignment of the originally sampled belt.

Vegetative composition

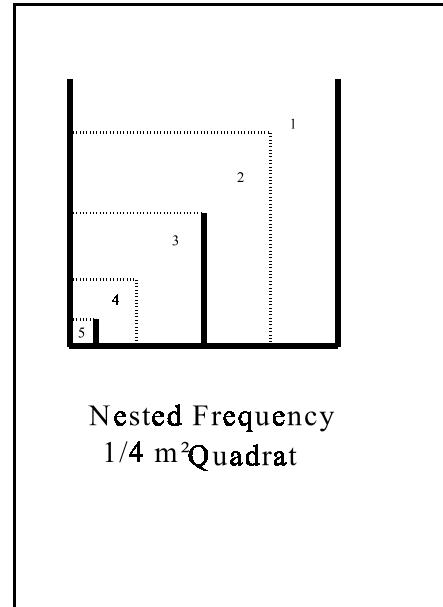
Determining vegetational characteristics for each “key” area is determined by setting up 5 consecutive 100 ft baseline transects in the area of interest. This 500 ft line is the baseline and one, 100 ft belt is placed perpendicular to each 100 ft section of the baseline at random foot marks and centered on the 50 ft mark. A 1/4 m² quadrat is centered every 5 feet along the same side of the belt, starting at the 5 foot mark. Cover and nested frequency values are determined for vegetation, litter, rock, pavement, cryptogams, and bare ground. Cover and nested frequency values are also estimated for all species occurring within a quadrat, including annual species.

Cover is determined using a slightly modified Daubenmire (1959) cover class method (Bailey and Poulton, 1968). The seven cover class are: 1) .01-1%, 2) 1.1-5%, 3) 5.1-25%, 4) 25.1-50%, 5) 50.1-75%, 6) 75.1-95%, 7) 95.1-100%. For example, to estimate vegetative cover with this method, an observer would visualize which cover class all the vegetation would fit into if the plants were moved together until they were touching. To quantify percent cover for bare ground, litter, rock, pavement, and cryptogams, the observer would visually estimate which cover class could accommodate all of the specified cover type within the quadrat. These numbers are then recorded. To determine percent cover for each belt, the midpoint for each cover class value observed is summed and divided by the number of sampling quadrats (20). The mean for the five belts is the average for a given site.

Total canopy cover of shrubs or trees is estimated using the line intercept method. The distance along each belt covered by a particular species of tree or shrub is divided by the total length of the line to give percent canopy cover. Prior to 2002, only canopy cover above eye level was estimated.



Nested frequency values for the quadrat range from 1-5 according to which area or which sub-quadrat the plant species is rooted in. The notation for each sub-quadrat is as follows: 5 = 1% of the area, 4 = 5% of the area, 3 = 25% of the area, 2 = 50% of the area, and 1 = the remainder of the quadrat. Each time a particular plant species or cover type occurs within the quadrat, it is scored relative to which of the smallest nested quadrats it is rooted in (in the case of vegetation) or where it first occurs (for all other cover types). The highest possible score is 5 for each quadrat occurrence and 100 per belt, for a possible score of 500 for each species or cover type at a given site.



Higher nested frequency scores represent a higher abundance for that plant species. These summed values are used to help determine changes in trend and composition through time. Nested frequency has been found to be a more sensitive measurement for changes taking place within plant communities than quadrat frequency (Smith et al. 1987, Smith et al. 1986, Mosley et al. 1986). Plant cover and density values are not reliable indicators of trend for herbaceous species and can fluctuate greatly with precipitation and time of season sampled.

Therefore, plant cover and density values can be misleading if used by themselves and do not necessarily indicate changes in composition and/or distribution of key plant species. Quadrat frequency is used as another quantitative, but less sensitive measure to help corroborate the trends being illustrated by the sum of nested frequency values.

Nested frequency, quadrat frequency, and average percent cover data for individual grass and forb species are summarized in the “Herbaceous Trends” table. Nested frequency and average cover of vegetation, rock, pavement, litter, cryptogams, and bare ground are summarized in the “Basic Cover” table.

Shrub densities are estimated using five, 1/100th acre strips centered over the length of each 100 foot belt. All shrubs rooted within each strip are counted and placed in the following five classes. (U.S. Department of Interior Bureau of Land Management 1996).

Seedling: Plants up to three years old which have become firmly established, usually less than 1/8-inch diameter.

Young: Larger with more complex branching. Does not show signs of maturity. Usually between 1/8 and 1/5-inch diameter.

Mature: Complex branching, rounded growth form, larger size, seed is produced on healthy plants. Generally larger than 1/4-inch diameter.

Decadent: Plant, regardless of age, that is in a state of decline, usually evidenced by 25% or more dead branches.

Dead: A plant which is no longer living.

Shrubs are also rated according to the amount of use by placing shrubs in form classes 1 through 9.

1. All available, lightly hedged.
2. All available, moderately hedged.
3. All available, heavily hedged.
4. Largely available, lightly hedged.
5. Largely available, moderately hedged.
6. Largely available, heavily hedged.
7. Mostly unavailable.
8. Unavailable due to height.
9. Unavailable due to hedging.

Lightly hedged: 0 to 40 percent of twigs browsed.

Moderately hedged: 41 to 60 percent of twigs browsed.

Heavily hedged: Over 60 percent of twigs browsed. Degree of hedging is based on leader use over the past three years: current annual growth is not included.

Largely available: One-third to two-thirds of plant available to animal.

Mostly unavailable: Less than one-third of plant available to animal.

In classifying browse to a form class, unavailability may be the result of height, location, or density.

Shrubs are also rated on their health by vigor classes 1-4.

1. Normal and vigorous.
2. Insect infested or diseased.
3. Poor vigor - chlorotic or discolored leaves, smaller than normal stems or leaves, flowering restricted, partially trampled, pulled up, or otherwise damaged. Stunted growth, partial crown death.
4. Dying - substantial portion of crown dead (more than 50%), more extreme than 3 above. Probably an irreversible condition.

In addition, each mature shrub species closest to every 10 foot mark along a sampling belt is measured to determine average height and crown. This allows a possible sample of 50 plants per species depending on their respective densities. Annual leader growth is estimated for key browse species on each trend study site. This is done by measuring five leaders on the closest mature shrub in each quarter (similar to point-center quarter method) from 3 stakes along the study site baseline (0', 200' and 400' stakes). These numbers are then averaged. Tree density is determined by the point-center quarter method centered on two-hundred foot intervals. Three hundred feet are added to the end of the transect so that five, 200 foot point-quarter centers can be read. This allows sampling trees on a much larger scale. The strip method, used to estimate shrub density, can in most cases effectively inventory seedling and young tree densities.

A more accurate method of determining shrub frequency is being used in this and all subsequent reports. It was found that nested and quadrat frequency of shrubs in previous reports did not usually reflect accurate trends in shrub populations which had particularly low or high densities. Therefore, each 1/100 acre shrub strip is divided into 20, five foot segments. Presence or absence is now determined in these strip segments to give a more accurate measure of shrub frequency. This larger sample will better reflect changing trends in the shrub populations. This data along with shrub cover is recorded in the browse trends table. For example, if a species was rooted in 25 of the shrub 100 strips, strip frequency for this species would be 25%.

TREND DETERMINATION

The methods described above rely on relative and absolute measurements of plant composition as determined from the frequency, cover, and density data. In addition, estimates of plant vigor, height, crown diameter, form class, and age class are utilized to characterize shrub populations. Particular attention is paid to woody plants and their important role as trend indicators on critical winter ranges. A variety of parameters are used to help determine trend on key browse species through time. These include:

- 1) changes in density or number of plants/acre
- 2) proportion of decadent plants and percentage of decadent plants that are classified as dying
- 3) biotic potential or proportion of seedlings to the population
- 4) proportion of young plants in population
- 5) proportion of individuals moderately or heavily browsed
- 6) proportion of plants in poor vigor
- 7) changes in height and crown diameter measurements for mature age class
- 8) changes in browse species composition
- 9) strip frequency values
- 10) proportion of cover contributed by key species

Trends in herbaceous plants as a group or as a single "key" species can be determined by comparing the sum of nested and quadrat frequency values between readings. Attention is also given to changes in species composition of grasses and forbs through time. A non-parametric statistical test (Friedman test which is analogous to analysis of variance) (Conover 1980) is conducted on nested frequencies of each species to determine significant changes at $\alpha = .10$. Ground cover parameters are analyzed and compared in the discussions of the reread studies. Trends for soil are determined by comparing basic ground cover measurements and cover composition (herbs vs shrubs) between years as well as comparing photos and observer observations between readings. The ratio of bare soil nested frequency values to protective cover nested frequency values can also be used to help determine changes in soil trend. On newly established studies, a more subjective or apparent assessment is made from qualitative comparisons.

The following tables and partial tables are taken from study number 23-1 to help illustrate some basic comparisons that can be made with the data. The "herbaceous trends" table summarizes average cover, quadrat frequency, and nested frequency data for individual grass and forb species. The table contains all the

grass and forb species found on site 23-1. Readings prior to mid-1992 include only nested and quadrat frequency data for *perennial* species. Beginning in mid-1992, all trend studies have data for perennial and annual species as well as cover estimates for individual species.

In the following example, grasses have a combined total cover of 11.39%. In 1985, *Agropyron spicatum* had a sum of nested frequency value of 227. In 1991, the sum of nested frequency value slightly decreased to 220. By 1998, sum of nested frequency declined to 183. The subscript letters indicate that the sum of nested frequency value between 1985 and 1991 were not statistically different. However, the 1998 sum of nested frequency for *A. spicatum* shows a significant decrease compared to 1985 and 1991. Quadrat frequency showed a slight increase from 1985 to 1991 and then a marked decrease in 1998. Cover was estimated at 7.78% for *A. spicatum* in 1998. Trend for this grass is down due to a significant decline in sum of nested frequency.

HERBACEOUS TRENDS --

Herd unit 23 , Study no: 1

| T y p e | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % 98 |
|-------------------------|---------------------------------|------------------|------------------|------------------|-------------------|-----|-----|--------------------------|
| | | '85 | '91 | '98 | '85 | '91 | '98 | |
| G | <i>Agropyron spicatum</i> | _b 227 | _b 220 | _a 183 | 79 | 84 | 68 | 7.78 |
| G | <i>Bromus tectorum</i> (a) | - | - | 42 | - | - | 14 | .43 |
| G | <i>Oryzopsis hymenoides</i> | 4 | 12 | 12 | 2 | 4 | 4 | .17 |
| G | <i>Poa fendleriana</i> | _a 6 | _b 36 | _b 49 | 3 | 16 | 21 | .98 |
| G | <i>Poa secunda</i> | _a 3 | _b 18 | _c 94 | 1 | 10 | 40 | 2.00 |
| G | <i>Sitanion hystrix</i> | _b 25 | _{ab} 20 | _a 6 | 13 | 9 | 3 | .01 |
| Total Annual Grasses | | 0 | 0 | 42 | 0 | 0 | 14 | .43 |
| Total Perennial Grasses | | 265 | 313 | 344 | 98 | 123 | 136 | 10.96 |
| Total for Grasses | | 265 | 313 | 386 | 98 | 123 | 150 | 11.39 |
| F | <i>Agoseris glauca</i> | - | 10 | 1 | - | 5 | 1 | .00 |
| F | <i>Arabis</i> spp. | _a - | _b 18 | _a 1 | - | 9 | 1 | .00 |
| F | <i>Astragalus convallarius</i> | _a 2 | _a 4 | _b 6 | 1 | 1 | 6 | .15 |
| F | <i>Calochortus nuttallii</i> | _{ab} 4 | _b 8 | _a - | 2 | 4 | - | - |
| F | <i>Collinsia parviflora</i> (a) | - | - | 3 | - | - | 1 | .00 |
| F | <i>Crepis acuminata</i> | - | 6 | 7 | - | 2 | 2 | .06 |
| F | <i>Eriogonum racemosum</i> | - | - | 4 | - | - | 1 | .03 |
| F | <i>Eriogonum umbellatum</i> | - | 1 | 9 | - | 1 | 5 | .16 |
| F | <i>Phlox austromontana</i> | - | 6 | 4 | - | 3 | 2 | .16 |
| F | <i>Phlox longifolia</i> | _a 8 | _b 27 | _a 16 | 4 | 14 | 6 | .20 |
| Total Annual Forbs | | 0 | 0 | 3 | 0 | 0 | 1 | .00 |
| Total Perennial Forbs | | 14 | 80 | 48 | 0 | 0 | 24 | .78 |
| Total for Forbs | | 14 | 80 | 51 | 7 | 39 | 25 | .78 |

Values with different subscript letters are significantly different at alpha = .10 (annuals excluded)

In 1985, perennial grasses had a sum of nested frequency value of 265. This value has steadily increased to 313 in 1991 and 344 in 1998. The summed value of 344 for 1998 was derived by subtracting the annual grass value (*Bromus tectorum*) from the total value of 386. These changes would indicate a slightly upward overall trend for perennial grasses on this site. The forb trend can be determined in a similar manner. The herbaceous understory trend is determined using both (combined value for nested frequency) the grass and forb nested frequency value. For example, total herbaceous cover is 12.23% (total grass cover + total forb cover) with grass providing the bulk of the cover. Therefore, when determining herbaceous trend, the grass proportion should be weighted more heavily than the forb proportion in this example.

The following browse trends table summarizes strip frequency and cover for all shrub species occurring on this site. All of the shrubs encountered at study number 23-1 are listed. For example, mountain big sagebrush had a strip frequency of 40 out of a possible 100. Cover is determined using the 1/4m² quadrat and estimating the percent of the quadrat covered below eye level (~4 feet). In this case, mountain big sagebrush cover is estimated to be 2.54%.

BROWSE TRENDS --
Herd unit 23 , Study no: 1

| Type | Species | Strip Frequency '98 | Average Cover % '98 |
|------------------|-------------------------------------------|---------------------|---------------------|
| B | Artemisia nova | 35 | 2.24 |
| B | Artemisia tridentata vaseyana | 40 | 2.54 |
| B | Chrysothamnus depressus | 1 | - |
| B | Chrysothamnus viscidiflorus viscidiflorus | 1 | .15 |
| B | Gutierrezia sarothrae | 2 | - |
| B | Juniperus osteosperma | 4 | 5.51 |
| B | Opuntia spp. | 1 | .15 |
| B | Pinus edulis | 4 | 5.99 |
| B | Purshia tridentata | 18 | 3.20 |
| Total for Browse | | 106 | 19.79 |

To more accurately estimate canopy cover for trees and shrubs, the line intercept method is used along each 100 ft belt. This data is reported in the canopy cover table which follows. For example, *Juniperus osteosperma* has an estimated average cover of 7%.

CANOPY COVER --
Herd unit 23 , Study no: 1

| Species | Percent Cover '98 |
|-----------------------|-------------------|
| Juniperus osteosperma | 7 |
| Pinus edulis | 3 |

The basic cover table summarizes nested frequency and average cover of vegetation, rock, pavement, litter, cryptogams, and bare ground. Average cover prior to mid-1992 adds up to only 100%, while cover with the current method (post mid-1992) estimates several layers of plant and ground cover and will usually exceed 100%. For vegetation cover, the previous method only determined basal vegetative cover (2.0 and 5.75), while the new method estimates projected vegetational cover (30.04). Therefore, comparisons can be made for all cover measurements except for general vegetation cover which now examines projected foliar cover rather than just basal cover.

BASIC COVER --
Herd unit 23 , Study no: 1

| Cover Type | Nested Frequency 08 | Average Cover % | | |
|-------------|------------------------|-----------------|-------|-------|
| | | '85 | '91 | '98 |
| Vegetation | 274 | 2.00 | 5.75 | 30.04 |
| Rock | 216 | 6.00 | 5.25 | 11.18 |
| Pavement | 279 | 30.50 | 24.25 | 26.32 |
| Litter | 381 | 46.50 | 46.50 | 42.49 |
| Cryptogams | 46 | 5.00 | 3.00 | .93 |
| Bare Ground | 254 | 10.00 | 15.25 | 21.42 |

A summary of the soil data is found in the soil analysis data table. Effective rooting depth is an average of 25 soil penetrometer readings, 5 of the deepest probes possible near each of the 5 baseline starting stakes. The effective rooting depth is a relative index that can be used for site comparisons with regard to individual species differences, site preferences, and abundance. Average soil temperature is taken from the deepest probe, one at each of the 5 baseline starting stakes. The temperature is listed in the table as the top measurement (e.g., 64.4°F), with the average depth (in inches) as the lower measurement (12.7). Chemical and textural characteristics are also listed and were determined by laboratory analysis of a composite sample taken near each of the 5 baseline starting stakes.

SOIL ANALYSIS DATA --
Herd Unit 23, Study # 01, Study Name: Bear Ridge

| Effective rooting depth (inches) | Temp °F (depth) | pH | %sand | %silt | %clay | %0M | PPM P | PPM K | dS/m |
|----------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 11.2 | 64.4 (12.7) | 7.3 | 40.0 | 33.4 | 26.6 | 3.4 | 9.0 | 57.6 | .5 |

The descriptive terms used for ranges in pH are as follows:

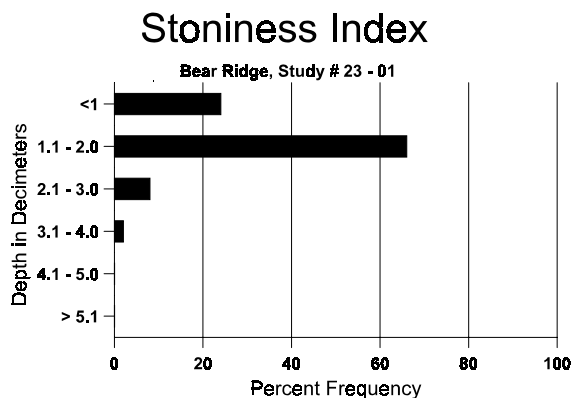
| | |
|------------------------|---------|
| Ultra acid | <3.5 |
| Extremely acid | 3.5-4.4 |
| Very strongly acid | 4.5-5.0 |
| Strongly acid | 5.1-5.5 |
| Moderately acid | 5.6-6.0 |
| Slightly acid | 6.1-6.5 |
| Neutral | 6.6-7.3 |
| Slightly alkaline | 7.4-7.8 |
| Moderately alkaline | 7.9-8.4 |
| Strongly alkaline | 8.5-9.0 |
| Very strongly alkaline | >9.1 |

Percent organic matter (% OM) refers to the amount of organic matter in the top 12 inches of soil. Parts per million of phosphorus and potassium are also included. Values for phosphorus and potassium less than 10 ppm and 70 ppm respectively have been shown to be limiting to plant growth and development.

The electrical conductivity of the soil is reported in decisiemens per meter (dS/m). Electrical conductivity is related to the amount of salts more soluble than gypsum in the soil. The following classes can be used as a reference.

| | |
|----------------------|------|
| Non saline | 0-2 |
| Very slightly saline | 2-4 |
| Slightly saline | 4-8 |
| Moderately saline | 8-16 |
| Strongly saline | >16 |

To help become more aware of how rock is distributed throughout the upper soil profile, a stoniness index is determined for each of the sites. Depth to the nearest rock is estimated at the first 10 feet (at one-foot intervals) of each of the 5 baselines, which allows 50 measurements. These data are then analyzed for each of the 5 incremental decimeter measurements, making it possible to visually determine the proportion (relative percent of rock at each depth) of rock from <1 decimeter to >5 decimeters.



The pellet group frequency table summarizes the quadrat frequency of wildlife and livestock droppings found on the site. This data was not included in reports done prior to mid-1992. For example in 1998, rabbit pellet groups were found in 25% of the quadrats placed on study 23-1, indicating the relative amount of rabbit use. With future readings, this data can help characterize changes in wildlife use patterns on the site.

PELLET GROUP FREQUENCY --
Herd unit 23 , Study no: 1

| Type | Quadrat Frequency | | Pellet Transect | |
|--------|-------------------|-----|------------------------|------------------------|
| | '93 | '98 | Pellet Groups per Acre | Days Use per Acre (ha) |
| Rabbit | 6 | 25 | 08 | 08 |
| Elk | 2 | 4 | - | - |
| Deer | 9 | 36 | 35 | 3 (5) |
| | | | 357 | 25 (62) |

It was determined additional information on pellet groups was necessary. Therefore, a larger sample distributed over a larger area is now read in conjunction with the vegetative transects. The pellet group transect utilizes 50, 100ft² circular plots which are placed through the area. These are usually two parallel transects of 25 plots on each side of the vegetative transect which runs 500 feet in length. The number of recent pellet groups for wildlife (usually deer and elk) and pats for cattle are recorded. That number is then converted to days use per acre. If more precision is required, the transect is marked permanently (rebar) and the pellet groups within the circular plots are removed or marked.

On the following page is a section of a browse table which summarizes characteristics of shrubs on study 23-1. Total plants/acre for Mountain big sagebrush, excluding seedlings (S) and dead (X) was 1,400 in 1985, 1,065 in 1991, and 1,100 in 1998. Seedlings are excluded from the population estimate because with summer drought, they will most likely all die by late fall causing great fluctuations in population estimates between sampling dates. Since mid-1992, a larger shrub sample (more than three times larger) is used to better characterize the shrub populations. Therefore, changes in density (before and after 1992) may not necessarily indicate changes in trend, especially species populations that characteristically are clumped and/or have discontinuous distributions. The earlier smaller sample could easily either overestimate or underestimate shrub populations. Other characteristics like percent decadency, vigor, percent heavy hedging, biotic potential, etc. should be given more weight in determining shrub trend when comparing sampled years where sample sizes are different.

The following data on mountain big sagebrush shows the proportion of decadent shrubs (abbreviated as Dec: in the table) in the population has steadily increased from 57% in 1985, to 63% in 1991, and to 67% by 1998. More seedlings were encountered in 1985 and 1991, with slight fluctuations in the numbers of young plants. The percentage of plants displaying poor vigor has increased from 14% in 1985 to 38% in 1991, and is estimated at 40% in 1998. This percentage is determined by dividing the number of shrubs in vigor classes 3 and 4 by the total number of shrubs sampled (yearly totals for each grouping; Y, M, and D). The proportion of shrubs displaying heavy hedging declined from 24% in 1985, to 6% in 1991, and only 2% by 1998. This is determined by dividing the number of shrubs in form classes 3, 6 and 9 by the total number of shrubs sampled (total column). The proportion of shrubs displaying moderate use has fluctuated from 67% in 1985, down to 19% in 1991, and up to 56% in 1998. This is determined by dividing the number of shrubs in form classes 2 and 5 by the total number of shrubs sampled. The dead to live ratio is 2:1. This ratio is determined by dividing the number of dead plants by the number of live plants. The average height of sagebrush (mature plants) and crown diameter has fluctuated from 13" x 15" to 12" x 13", and finally 15" x 23". Considering all these factors, trend for sagebrush in 1998 is slightly downward due to increased poor vigor and increased percent decadency. Also the number of dead plants encountered is more than double the number of live plants inventoried. An additional statistic to look at is the proportion of plants classified as dying in the decadent age class. For example, 60% of the decadent plants were reported as dying in 1991 and 41% of the decadent plants were reported as dying in 1998. This number is determined by dividing the number of plants in vigor class 4 by the total number of plants in the decadent age class. Both the dead to live ratio and the percentage of dying plants in the decadent age class indicate there has been a large shrub die-off in the past and this might continue into the future.

BROWSE CHARACTERISTICS --

Herd unit 23, Study no: 1

| AGE | YR | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) | | Total |
|------------------------------------------------|----|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|-----------------|------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | Ht. | Cr. | |
| Artemisia tridentata vaseyana | | | | | | | | | | | | | | | | | | |
| S | 85 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 266 | | 4 | |
| | 91 | - | - | - | 1 | - | - | 4 | - | - | 5 | - | - | - | 333 | | 5 | |
| | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 85 | - | 2 | 1 | - | - | - | - | - | - | 3 | - | - | - | 200 | | 3 | |
| | 91 | 4 | - | - | 1 | - | - | - | - | - | 5 | - | - | - | 333 | | 5 | |
| | 98 | 2 | - | - | 3 | - | - | - | - | - | 5 | - | - | - | 100 | | 5 | |
| M | 85 | 1 | 4 | 1 | - | - | - | - | - | - | 4 | - | 2 | - | 400 | 13 | 15 | 6 |
| | 91 | - | - | 1 | - | - | - | - | - | - | 1 | - | - | - | 66 | 12 | 13 | 1 |
| | 98 | 2 | 9 | 1 | 1 | - | - | - | - | - | 12 | - | 1 | - | 260 | 15 | 23 | 13 |
| D | 85 | 1 | 8 | 3 | - | - | - | - | - | - | 11 | - | 1 | - | 800 | | 12 | |
| | 91 | 5 | 3 | - | 2 | - | - | - | - | - | 4 | - | - | 6 | 666 | | 10 | |
| | 98 | 14 | 22 | - | 1 | - | - | - | - | - | 16 | - | 6 | 15 | 740 | | 37 | |
| X | 85 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 91 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 2300 | | 115 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '85 | | 67% | | | 24% | | | 14% | | | -24% | | | | | | | |
| '91 | | 19% | | | 06% | | | 38% | | | + 3% | | | | | | | |
| '98 | | 56% | | | 02% | | | 40% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '85 | 1400 | Dec: | 57% | | | |
| | | | | | | | | | | | | '91 | 1065 | | 63% | | | |
| | | | | | | | | | | | | '98 | 1100 | | 67% | | | |

Management background information, photographs, and knowledgeable plant identification add to the data base for each site. Management and background information for each site is obtained from the administering agency. Permanently located photographs are taken; a general view down and back up the line, then a close-up of each half-high baseline post to further characterize individual sites. Correct plant identification is critical for a complete and accurate site analysis. Species identification mostly follows "A Utah Flora" (Welsh et al. 1987). In some cases, most notably *Agropyron* and *Purshia*, the species names used by the Range Trend Study Plant Species List (Giunta 1983) and the Intermountain Flora (Cronquist et al. 1977) are retained to maintain continuity and alleviate confusion with earlier published reports.

Sometimes information is requested for the production of shrubs and/or herbaceous species. These methods are described in a Interagency Technical Reference on Sampling Vegetation Attributes (²U.S. Department of Interior Bureau of Land Management 1996). The standard double weight sampling method is used for determining shrub production. This requires the establishment of a weight reference unit for each shrub species occurring in the area being sampled. Weights for 10 mature shrubs are determined for each species. Then this average weight is used with the population estimates to help estimate production by species on a per acre basis. When estimates for herbaceous species are needed, the same method is utilized except that three clipped quadrats are correlated to the herbaceous plant cover values.

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- ²U.S. Department of Interior Bureau of Land Management. 1996. Sampling vegetation attributes, Interagency Technical Reference, BLM/RS/ST-96/002+1730.
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REPORT FORMAT

An introductory segment at the beginning of each herd unit categorizes the trend studies and provide references to further information on winter range limits, land ownership patterns, livestock management practices, and management unit objectives.

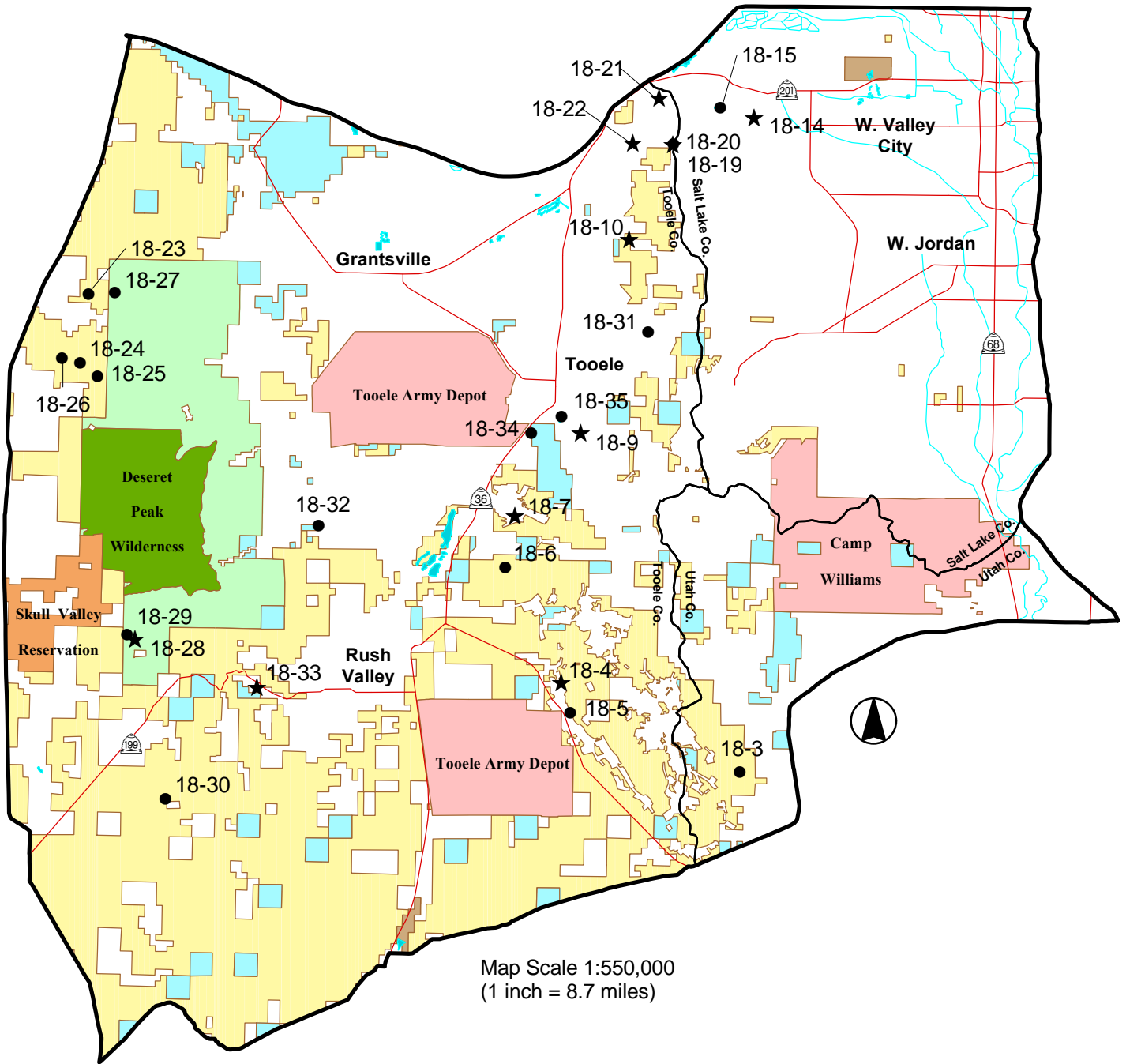
The name of the site and directions for locating the site are given on the location page. Also included on this page are the vegetation type, arrangement and diagrammatic sketch of the baseline, and the location on a topographical map. The 7.5 minute topographical map name and public land survey description are located below the map. In addition, UTM coordinates follow the public land survey location. Compass bearings are in degrees relative to magnetic north, unless specified as true north (T).

A discussion of the study site includes descriptions of the site's physical characteristics (elevation, slope, aspect), soil, ground cover, vegetative community, and species composition. The trend assessment is based upon the comparison of the recent year and the previous years data. Additional assessment is made by comparing photographs from year to year.

Tables with the compiled data follow the study discussions. A computer-generated data summary presents the pooled data for nested frequency, quadrat frequency, basic ground cover, soil characterization, shrub density, and shrub characterization. A nonparametric statistical analysis, Friedman test, is performed on the nested frequency values between years. This analysis indicates significance levels, between species over time, at $\alpha = 0.10$. Significant change is indicated in the herbaceous trends table.

Summaries and evaluations at the end of each management unit address range trends in these key areas. This report will serve to identify and verify changes that are occurring on key areas for big game.

Management Unit 18



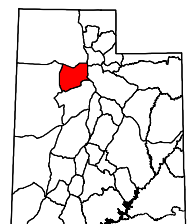
Map Scale 1:550,000
(1 inch = 8.7 miles)

- Forest Service
- BLM
- State of Utah
- Tribal Land
- Private Land
- Military

- State Wildlife Reserve
- USFS & BLM Wilderness
- Water Body
- County Boundary
- Road
- Water Course

- Transect Location
- Suspended Site

Unit Location



MANAGEMENT UNIT 18 - OQUIRRH-STANSBURY

Boundary Description

Salt Lake, Utah, and Tooele counties - Boundary begins at the junction of I-15 and I-80 in Salt Lake City; south on I-15 to SR-73; west on SR-73 to SR-36; south on SR-36 to the Pony Express road located just south of Faust; west on this road to the Skull Valley-Dugway-Timpie road; north on this road to I-80 at Rowley Junction; east on I-80 to I-15 and beginning point.

Unit Description

This management unit encompasses the Stansbury, Oquirrh and Onaqui Mountains. Big game activity of the unit centers around the Oquirrh Mountains and the Stansbury Mountains with their southern extension. These two mountain ranges are both fairly isolated from surrounding areas and are the only lands suitable as big game habitat.

The summer range for the Oquirrh Mountains is limited to land above the 7,000 to 7,500 foot contour and makes up about 48% of the area classified as suitable habitat for big game. The remainder of the habitat is classified as winter range (48%). During severe winters, the amount of available winter habitat is reduced to almost half this area. This is considered the major management problem for the Oquirrh Mountains. Another major concern is that 63% and 45% of the summer and winter range respectively are under private ownership. This problem is further worsened by the patterns of uses and abuses these lands have been subjected to. This area has a history of heavy grazing (almost year round) by cattle, sheep, wild horses, and occasionally even goats. Although current use is perhaps less intense than in the past, range condition is still on the decline, especially on the winter range.

A concurrent problem, especially on the north end of the Oquirrh Mountains, has been air pollution from the smelter. Pollution has eliminated almost all vegetation within localized drainages. Accumulations of mine tailings in Bingham and Mercur Canyons have covered significant acreages on both summer and winter ranges. Another notable problem in the area is that public access on the private land is greatly restricted, posing further management difficulties. Kennecott Copper Corporation, the largest single land owner, allows very limited hunting access for elk and no access to deer hunting.

In contrast, the Stansbury Mountains summer range is limited to about the 6,800 to 7,000 foot contour where it makes up 45% of the range that has been classified as suitable for big game. The remainder of the habitat is classified as suitable winter range (55%). The proportion of private lands on this big game habitat are respectively 6% and 14% of the summer and winter range. Although the overall winter range condition is generally more satisfactory than that of the Oquirrh Mountains, there is still the ongoing state-wide problem of invasive weeds restricting the reproduction and establishment of browse species.

Study sites were originally established on the unit in 1983. Rereads occurred on some of the sites in 1989, 1990, 1997 and 2002. Several sites were discontinued but text and tables have been retained.

Trend Study 18-3-02

Study site name: Manning Canyon .

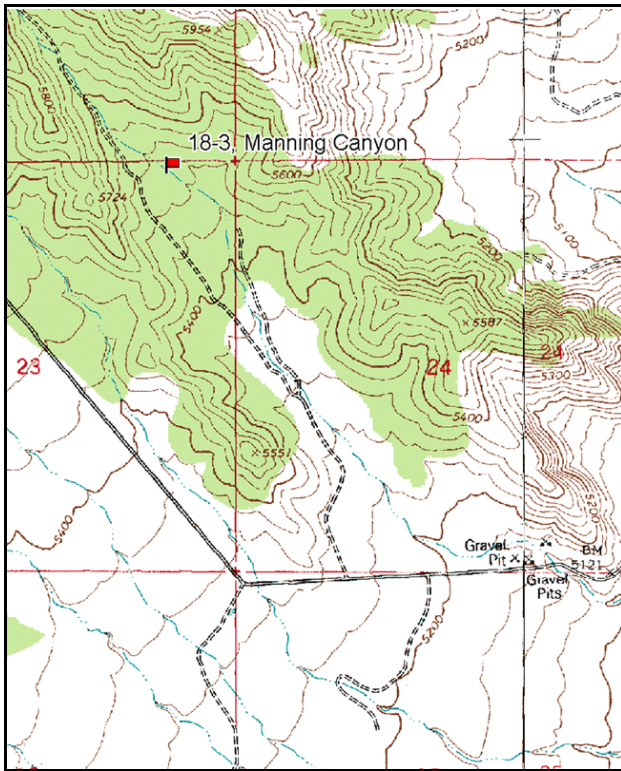
Vegetation type: Pinyon-Juniper .

Compass bearing: frequency baseline 187 degrees magnetic (Line 2-4 @113°M).

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

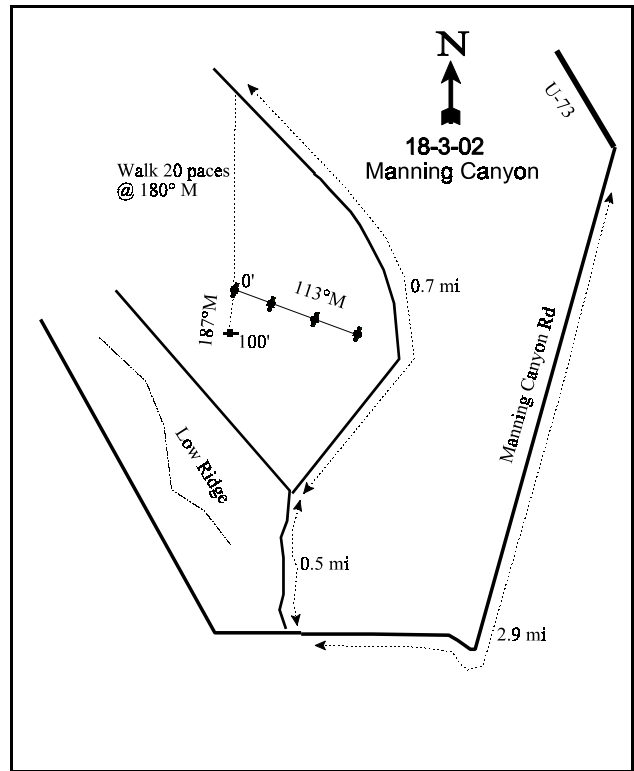
LOCATION DESCRIPTION

From the junction of Highway U-73 and the Manning Canyon road, between Cedar Fort and Fairfield, travel west on the Manning Canyon road for 2.9 miles. Turn north (right) on a dirt road and travel 0.5 mile to a fork. Take the right fork (east) and travel an additional 0.7 mile. Walk south on an azimuth of 180 degrees magnetic for 26 paces to the 0-foot mark of the frequency baseline, marked by a short fencepost with a red browse tag, number 3985.



Map Name: Mercur

Township 6S , Range 3W , Section 14



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 44604 09 N 402957 E

DISCUSSION

Manning Canyon - Trend Study No. 18-3

The Manning Canyon study is within the critical winter range at the extreme south end of the Oquirrh Mountains. It is located within a small valley surrounded with juniper covered hills. This area is managed by the BLM. The site is nearly level with an elevation of 5,500 feet. The range type is essentially a pinyon/juniper/big sagebrush/grass ecotone. Deer use of the area appears to have been heavy in the past but current use is more moderate. A pellet group transect read on site in 2002 estimated 31 deer days use/acre (78 ddu/ha). Only one elk pellet group was encountered. Rabbit pellets were extremely abundant and had a high quadrat frequency value of 45% in 2002. During past readings, there has been domestic sheep and cattle use noted. Juniper trees on and around the site provide excellent thermal cover for wintering big game. Pinyon-juniper density is low on the site itself with point-quarter data estimating about 35 juniper and 8 pinyon trees/acre in 1997 and 2002. Juniper trees are large mature individuals averaging 10 inches in diameter in 2002.

The study is on an alluvial flood plain with soils that are gravelly to cobbly. There appears to be no strong development of distinct horizons. Soil at the site has a clay loam texture with a moderately alkaline reaction (pH of 7.9). Effective rooting depth is estimated at over 14 inches with a soil temperature of nearly 50° F at 17 inches in depth. Phosphorus is moderately low at 7.7 ppm. Values below 10 ppm can be a limiting factor to plant growth and development. Ground cover is fair and erosion is minimal due to the gentle terrain. The soil erosion condition classification was determined as stable in 2002. Some sedimentation is apparent and a number of small drainage channels traverse the area. The area is subject to flood damage from high intensity storms and runoff from higher up the slope.

The principal preferred browse is Wyoming big sagebrush which made up about 60% of the browse cover in 1997 and 2002. There appears to be some hybridizing occurring between Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) and basin big sagebrush (*Artemisia tridentata tridentata*). Some plants have more upright growth forms characteristic of basin big sagebrush, while there is greater utilization occurring on shrubs which have more characteristics of Wyoming big sagebrush. For this report, all sagebrush are classified as Wyoming big sagebrush. In 1983, the population was comprised of a moderately dense stand of heavily hedged plants where 92% of the plants were classified as heavily utilized. Vigor was fair, but excessive decadence by 1990 was a cause of concern (88%). Density of sagebrush was estimated at about 2,100 plants/acre in 1997 and 2002. Utilization has been mostly light to moderate since 1983 with a few plants being heavily hedged. Vigor was poor on 25% of the sagebrush sampled in 2002 and the number of decadent plants increased to 46%. Dead plants first sampled in 1997 are abundant and provide evidence that a large proportion of the population has died off in the past.

Other browse species on the site include green ephedra, Stansbury cliffrose, pricklypear cactus, Utah juniper, stickyleaf low rabbitbrush, white rubber rabbitbrush, and black sagebrush. With the exception of heavy use on cliffrose, moderate use on low rabbitbrush and black sagebrush, the remainder of the browse species are only lightly utilized. Some of the sagebrush and low rabbitbrush use is from rabbits which are abundant on the site. There are also an occasional fourwing saltbush and grey horsebrush.

Grasses, especially annuals, are one of the principal understory components. Cheatgrass brome, in places, is capable of carrying a fire. Perennial grasses are all bunchgrasses, and show evidence of considerable past grazing use. Principal species include bluebunch wheatgrass, Indian ricegrass, and needle-and-thread. These grasses tend to be large, slightly pedestalled, and unevenly distributed. Fairly good quantities of bare ground and pavement separates the grasses and shrubs.

Forbs, especially succulent species, are lacking. Several increasers such as rock goldenrod, are indicative of past heavy grazing use. Annual forbs are common but only pale alyssum is abundant.

1983 APPARENT TREND ASSESSMENT

Soil condition is fair. The area is potentially highly erodible. Only the gentle slope prevents serious soil movement. There is a moderate to high fire hazard related primarily to growth and abundance of cheatgrass and pale alyssum. The key browse species, Wyoming big sagebrush, appears to be declining. Increaser shrubs and forbs appear to be expanding. A slowly thickening juniper stand may cause downward trends for browse and herbaceous plants in the future.

1990 TREND ASSESSMENT

The Wyoming big sagebrush component continues to show signs of serious decline as evidenced by the sharp increase in percent decadence from 25% to 88%. Density has changed little. Sagebrush canopy cover is highly variable, but averages about 4%. The sagebrush are generally moderately hedged, 56% were classified as such. All age classes of juniper are present on the site and appear to be increasing. Point-center quarter data provides estimates of 65 juniper and 10 pinyon/acre. Bluebunch wheatgrass is common on the better soils at the site. Large bare interspaces remain and these are becoming increasingly covered by erosion pavement. However, percent bare soil has decreased from 26% to 16% and vegetative basal cover has increased.

TREND ASSESSMENT

soil - up slightly (4)

browse - slightly down for the key species, Wyoming big sagebrush (2)

herbaceous understory - stable (3)

1997 TREND ASSESSMENT

The trend for soil is still slightly improving with further decreases in percent bare soil. In addition, herbaceous plants provide 68% of the total vegetation cover. Herbaceous cover is more protective of the soils than aerial cover from shrubs and trees. Trend for browse is starting to show signs of improving, but 42% of the plants are classified as dead. Percent decadence has decreased from the high of 88% in 1990 to only 31% currently and vigor has improved. Percent decadence is still relatively high, even for a dry Wyoming big sagebrush community. At this time, 61% of the browse cover is contributed by Wyoming big sagebrush. The herbaceous understory shows a slight improvement, mostly by bluebunch wheatgrass. Annuals still contribute much to the composition with two annuals, cheatgrass and pale alyssum, contributing almost 40% of the herbaceous understory cover. Fire is a real threat to this community with the high amount of fine fuels provided by the annuals.

TREND ASSESSMENT

soil - slightly improved (4)

browse - slightly improving for Wyoming big sagebrush (4)

herbaceous understory - slightly improved, but poor composition (4)

2002 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1997. There are some signs of past erosion but the soil erosion condition class was determined to be stable in 2002. Trend for browse is down slightly for the key species, Wyoming big sagebrush. Utilization continues to be mostly light to moderate. Density has remained similar to 1997 estimates but recruitment remains poor and the number of decadent plants has increased to nearly half of the population (46%). In addition, 51% of the decadent sagebrush sampled were classified as dying (480 plants/acre) and young recruitment is not currently adequate to maintain the stand. A return to normal precipitation will most likely reverse this trend but a continuation of drought conditions will cause further population declines. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses increased slightly while frequency of forbs declined slightly. Bluebunch wheatgrass remains the most abundant species. Cheatgrass declined slightly in frequency and cover. The forb composition remains poor with only rock goldenrod and the annual, pale alyssum, being common.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 3

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|--------------------------|------------------|-------------------|------------------|-------------------|-------------------|-----|-----|-----|-----------------|-------|
| | | '83 | '90 | '97 | '02 | '83 | '90 | '97 | '02 | '97 | '02 |
| G | Agropyron smithii | - | - | - | 6 | - | - | - | 2 | - | .03 |
| G | Agropyron spicatum | _a 110 | _{ab} 133 | _b 162 | _{ab} 151 | 40 | 54 | 52 | 56 | 9.96 | 6.05 |
| G | Bromus japonicus (a) | - | - | - | 2 | - | - | - | 1 | - | .00 |
| G | Bromus tectorum (a) | - | - | 282 | 251 | - | - | 84 | 78 | 6.69 | 4.89 |
| G | Oryzopsis hymenoides | _b 77 | _{ab} 64 | _a 41 | _a 45 | 38 | 29 | 20 | 17 | 1.82 | 1.13 |
| G | Poa bulbosa | - | - | - | 2 | - | - | - | 1 | - | .03 |
| G | Poa secunda | _a 1 | _{ab} 15 | _b 39 | _c 75 | 1 | 7 | 15 | 29 | .28 | .80 |
| G | Sitanion hystrix | _c 89 | _b 55 | _b 33 | _a 3 | 47 | 25 | 17 | 1 | .53 | .15 |
| G | Stipa comata | _a 11 | _c 29 | _{bc} 54 | _c 64 | 5 | 13 | 21 | 25 | 2.65 | 3.56 |
| Total for Annual Grasses | | 0 | 0 | 282 | 253 | 0 | 0 | 84 | 79 | 6.69 | 4.89 |
| Total for Perennial Grasses | | 288 | 296 | 329 | 346 | 131 | 128 | 125 | 131 | 15.26 | 11.77 |
| Total for Grasses | | 288 | 296 | 611 | 599 | 131 | 128 | 209 | 210 | 21.96 | 16.67 |
| F | Agoseris glauca | - | - | - | 4 | - | - | - | 2 | - | .01 |
| F | Alyssum alyssoides (a) | - | - | _b 315 | _a 244 | - | - | 95 | 80 | 3.25 | 1.31 |
| F | Astragalus spp. | 6 | - | 1 | - | 2 | - | 1 | - | .03 | - |
| F | Castilleja linariaefolia | - | - | 7 | 2 | - | - | 3 | 1 | .06 | .03 |
| F | Calochortus nuttallii | _b 17 | _a | _b 15 | _b 10 | 11 | - | 8 | 6 | .04 | .03 |
| F | Castilleja spp. | - | - | 4 | - | - | - | 2 | - | .01 | - |
| F | Cirsium spp. | - | - | 1 | - | - | - | 1 | - | .00 | - |
| F | Descurainia pinnata (a) | - | - | 3 | - | - | - | 1 | - | .03 | - |
| F | Erodium cicutarium (a) | - | - | 3 | 9 | - | - | 1 | 3 | .00 | .01 |
| F | Eriogonum umbellatum | - | - | 4 | 10 | - | - | 2 | 3 | .01 | .01 |

| T y p e | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|---------------------------|------------------------------------|------------------|-----|----------------|-----------------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '90 | '97 | '02 | '83 | '90 | '97 | '02 | '97 | '02 |
| F | <i>Gilia</i> spp. (a) | - | - | 3 | 4 | - | - | 1 | 2 | .00 | .01 |
| F | <i>Lathyrus brachycalyx</i> | 3 | - | 4 | 7 | 1 | - | 2 | 3 | .06 | .31 |
| F | <i>Lactuca serriola</i> | - | - | - | - | - | - | - | - | .00 | - |
| F | <i>Petradoria pumila</i> | 23 | 37 | 22 | 25 | 10 | 16 | 7 | 10 | .94 | .54 |
| F | <i>Phlox hoodii</i> | - | - | 4 | - | - | - | 1 | - | .00 | - |
| F | <i>Phlox longifolia</i> | 2 | - | - | 3 | 1 | - | - | 1 | - | .00 |
| F | <i>Ranunculus testiculatus</i> (a) | - | - | _a 3 | _b 26 | - | - | 1 | 11 | .00 | .08 |
| F | <i>Sphaeralcea coccinea</i> | 20 | 21 | 24 | 9 | 9 | 8 | 12 | 6 | .28 | .06 |
| F | <i>Streptanthus cordatus</i> | 9 | - | 6 | 4 | 4 | - | 3 | 2 | .16 | .03 |
| F | <i>Vicia americana</i> | - | 2 | 3 | - | - | 1 | 1 | - | .15 | - |
| Total for Annual Forbs | | 0 | 0 | 327 | 283 | 0 | 0 | 99 | 96 | 3.31 | 1.42 |
| Total for Perennial Forbs | | 80 | 60 | 95 | 74 | 38 | 25 | 43 | 34 | 1.76 | 1.03 |
| Total for Forbs | | 80 | 60 | 422 | 357 | 38 | 25 | 142 | 130 | 5.07 | 2.46 |

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

BROWSE TRENDS --

Herd unit 18 , Study no: 3

| T y p e | Species | Strip Frequency | | Average Cover % | |
|------------------|--------------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | <i>Artemisia tridentata wyomingensis</i> | 61 | 62 | 7.70 | 7.89 |
| B | <i>Chrysothamnus viscidiflorus viscidiflorus</i> | 11 | 13 | .48 | .09 |
| B | <i>Ephedra viridis</i> | 1 | 2 | .85 | .98 |
| B | <i>Gutierrezia sarothrae</i> | 7 | 11 | .19 | .03 |
| B | <i>Juniperus osteosperma</i> | 1 | 1 | 3.34 | 3.65 |
| B | <i>Opuntia</i> spp. | 2 | 6 | - | - |
| B | <i>Pinus monophylla</i> | 0 | 0 | - | .63 |
| Total for Browse | | 83 | 95 | 12.57 | 13.28 |

CANOPY COVER --

Herd unit 18 , Study no: 3

| Species | Percent Cover | |
|------------------------------|---------------|-----|
| | '97 | '02 |
| <i>Juniperus osteosperma</i> | 3.6 | 5 |

Key Browse Annual Leader Growth
Herd unit 18 , Study no: 3

| Species | Average leader growth (in) '02 |
|-------------------------------|-----------------------------------|
| Artemisia tridentata vaseyana | 2.3 |

Point-Quarter Tree Data
Herd unit 18 , Study no: 3

| Species | Trees per Acre | | Average diameter (in) | |
|-----------------------|----------------|-----|-----------------------|------|
| | '97 | '02 | '97 | '02 |
| Juniperus osteosperma | 34 | 37 | 8.0 | 10.1 |
| Pinus monophylla | 7 | 13 | 3.2 | 4.3 |

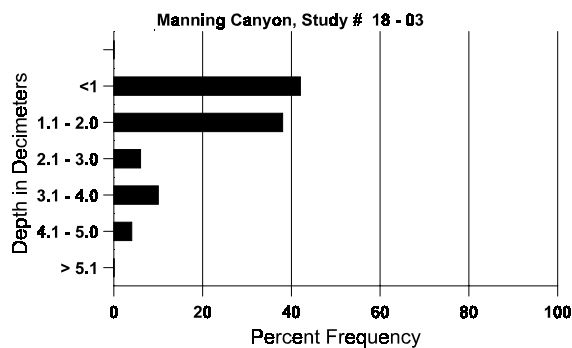
BASIC COVER --
Herd unit 18 , Study no: 3

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '90 | '97 | '02 |
| Vegetation | 376 | 358 | 1.50 | 5.25 | 38.40 | 36.87 |
| Rock | 159 | 196 | 5.25 | 7.25 | 6.62 | 9.95 |
| Pavement | 251 | 277 | 4.25 | 25.75 | 13.51 | 7.94 |
| Litter | 380 | 378 | 59.25 | 41.00 | 39.88 | 35.18 |
| Cryptogams | 170 | 293 | 4.00 | 4.75 | 4.61 | 21.70 |
| Bare Ground | 195 | 190 | 25.75 | 16.00 | 8.93 | 7.19 |

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 3, Manning Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 14.3 | 48.8 (16.8) | 7.9 | 40.3 | 33.2 | 26.6 | 2.6 | 7.7 | 124.8 | 0.5 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 18 , Study no: 3

| Type | Quadrat Frequency | | Pellet Transect | |
|--------|-------------------|-----|------------------------------|------------------------------|
| | '97 | '02 | Pellet Groups per Acre 02 | Days Use per Acre (ha) 02 |
| Rabbit | 10 | 45 | - | - |
| Elk | 2 | - | 9 | 1 (2) |
| Deer | 52 | 21 | 409 | 31 (78) |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 3

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|----|------|-----------------|-----------------------------|----|-------|---|----|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | | | | |
| Artemisia nova | | | | | | | | | | | | | | | | | | | | | |
| M | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | | | |
| | '90 | - | 1 | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 8 | 10 | 1 |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 12 | 15 | 0 | | | 0 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | | | | |
| | | '83 | | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| | | '90 | | | 100% | | | 00% | | | 00% | | | | | | | | | | |
| | | '97 | | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| | | '02 | | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | | | | |
| | | | | | | | | | | | | '90 | 33 | | - | | | | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|----|------------------|---|---|-------------------|---|---|----------------|------|------|-----|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Artemisia tridentata wyomingensis | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 90 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| Y | 83 | 3 | 1 | - | - | - | - | - | - | - | 4 | - | - | - | 133 | | 4 | |
| | 90 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| | 02 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | | 3 | |
| M | 83 | - | - | 32 | - | - | - | - | - | - | 32 | - | - | - | 1066 | 13 18 | 32 | |
| | 90 | 1 | 2 | - | - | 1 | - | - | - | - | 4 | - | - | - | 133 | 14 16 | 4 | |
| | 97 | 59 | 4 | 4 | 1 | 4 | - | - | - | - | 72 | - | - | - | 1440 | 31 43 | 72 | |
| | 02 | 32 | 18 | 2 | - | - | - | - | - | - | 50 | 1 | 1 | - | 1040 | 21 31 | 52 | |
| D | 83 | - | - | 12 | - | - | - | - | - | - | 2 | - | 10 | - | 400 | | 12 | |
| | 90 | 15 | 21 | 1 | 1 | - | - | - | - | - | 26 | - | 7 | 5 | 1266 | | 38 | |
| | 97 | 22 | 4 | - | 1 | 6 | 1 | - | - | - | 21 | - | - | 13 | 680 | | 34 | |
| | 02 | 26 | 14 | 2 | 2 | - | 2 | 1 | - | - | 23 | - | - | 24 | 940 | | 47 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 90 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1580 | | 79 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1380 | | 69 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 02% | | | 92% | | | 21% | | | -10% | | | | | | | |
| '90 | | 56% | | | 02% | | | 28% | | | +34% | | | | | | | |
| '97 | | 17% | | | 05% | | | 12% | | | - 6% | | | | | | | |
| '02 | | 31% | | | 06% | | | 25% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 1599 | Dec: | 25% | | | | |
| | | | | | | | | | | | '90 | 1432 | | 88% | | | | |
| | | | | | | | | | | | '97 | 2160 | | 31% | | | | |
| | | | | | | | | | | | '02 | 2040 | | 46% | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Chrysothamnus viscidiflorus viscidiflorus | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 90 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 166 | | 5 | |
| | 90 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 6 | - | - | - | - | - | - | - | - | 6 | - | - | - | 200 | 12 | 16 | 6 |
| | 90 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 5 | 4 | 1 |
| | 97 | 15 | - | - | - | - | - | - | - | - | 15 | - | - | - | 300 | 11 | 12 | 15 |
| | 02 | 7 | 2 | - | - | - | - | - | - | - | 9 | - | - | - | 180 | 8 | 11 | 9 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 90 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | 33 | | 1 | |
| | 97 | - | - | - | - | - | 1 | - | - | - | - | - | - | 1 | 20 | | 1 | |
| | 02 | 4 | 3 | - | - | - | - | - | - | - | 4 | - | 1 | 2 | 140 | | 7 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 90 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 60 | | 3 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | -82% | | | | | | | |
| '90 | | 50% | | | 00% | | | 50% | | | +81% | | | | | | | |
| '97 | | 00% | | | 06% | | | 06% | | | - 6% | | | | | | | |
| '02 | | 31% | | | 00% | | | 19% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 366 | Dec: | 0% | | | |
| | | | | | | | | | | | | '90 | 66 | | 50% | | | |
| | | | | | | | | | | | | '97 | 340 | | 6% | | | |
| | | | | | | | | | | | | '02 | 320 | | 44% | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | | | | | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|---|--------------------|--------------------------------|----------------|-------|-----|-----|------|-----|-----|----|----|---|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | | | | | | | |
| <i>Cowania mexicana stansburiana</i> | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 90 | - | - | - | - | - | 1 | - | - | 1 | - | - | - | 33 | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | - | 1 | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 90 | - | - | 2 | - | - | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 33 | 33 | 28 | 1 |
| | 90 | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 33 | 35 | 26 | 1 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | | | | | |
| '83 | | 50% | | 50% | | 00% | | +33% | | | | | | | | | |
| '90 | | 00% | | 100% | | 00% | | | | | | | | | | | |
| '97 | | 00% | | 00% | | 00% | | | | | | | | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 66 | Dec: | - | | | | |
| | | | | | | | | | | '90 | 99 | | - | | | | |
| | | | | | | | | | | '97 | 0 | | - | | | | |
| | | | | | | | | | | '02 | 0 | | - | | | | |
| <i>Ephedra viridis</i> | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 90 | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | - | 6 | - | - | - | - | - | - | 5 | - | - | 1 | 200 | 39 | 39 | 6 |
| | 90 | 1 | - | - | 1 | - | - | - | - | 2 | - | - | - | 66 | 40 | 39 | 2 |
| | 97 | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 41 | 53 | 1 |
| | 02 | - | - | - | 1 | - | - | - | - | 1 | - | - | - | 20 | 46 | 66 | 1 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 90 | 4 | - | - | - | - | - | - | - | 3 | - | 1 | - | 133 | | 4 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | | | | | |
| '83 | | 100% | | 00% | | 17% | | +14% | | | | | | | | | |
| '90 | | 00% | | 00% | | 14% | | -91% | | | | | | | | | |
| '97 | | 00% | | 00% | | 00% | | +50% | | | | | | | | | |
| '02 | | 00% | | 50% | | 00% | | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 200 | Dec: | 0% | | | | |
| | | | | | | | | | | '90 | 232 | | 57% | | | | |
| | | | | | | | | | | '97 | 20 | | 0% | | | | |
| | | | | | | | | | | '02 | 40 | | 50% | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|------|------|-----|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Gutierrezia sarothrae | | | | | | | | | | | | | | | | | | |
| Y | 83 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 166 | | 5 | |
| | 90 | 6 | - | - | - | - | - | - | - | - | 6 | - | - | - | 200 | | 6 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| M | 83 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 233 | 9 | 7 | 7 |
| | 90 | 21 | - | - | 1 | - | - | - | - | - | 21 | - | 1 | - | 733 | 5 | 6 | 22 |
| | 97 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 140 | 10 | 10 | 7 |
| | 02 | 10 | - | - | - | - | - | - | - | - | 10 | - | - | - | 200 | 5 | 7 | 10 |
| D | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | | 1 |
| | 90 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 100 | | | 3 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | 7 | - | - | - | - | - | - | - | - | 2 | - | - | 5 | 140 | | | 7 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 90 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +58% | | | | | | | |
| '90 | | 00% | | | 00% | | | 03% | | | -85% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +58% | | | | | | | |
| '02 | | 00% | | | 00% | | | 26% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 432 | Dec: | 8% | | | | |
| | | | | | | | | | | | '90 | 1033 | | 10% | | | | |
| | | | | | | | | | | | '97 | 160 | | 0% | | | | |
| | | | | | | | | | | | '02 | 380 | | 37% | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| Y | 83 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | | 2 |
| | 90 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | | 1 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 90 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 91 | 69 | 1 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | - | - | 1 |
| | 02 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | 20 | - | - | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '90 | | 00% | | | 00% | | | 00% | | | -70% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 66 | Dec: | - | | | | |
| | | | | | | | | | | | '90 | 66 | | - | | | | |
| | | | | | | | | | | | '97 | 20 | | - | | | | |
| | | | | | | | | | | | '02 | 20 | | - | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | | |
| S | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '90 | - | - | - | 1 | - | - | - | - | - | - | - | 1 | - | 33 | | 1 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '90 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | '83 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | 7 | 5 | 2 |
| | '90 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 133 | 6 | 7 | 4 |
| | '97 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 80 | 8 | 14 | 4 |
| | '02 | 6 | - | - | - | - | - | - | - | - | 6 | - | - | - | 120 | 5 | 13 | 6 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +60% | | | | | | | |
| '90 | | 00% | | | 00% | | | 00% | | | -52% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +33% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 66 | Dec: | - | | | |
| | | | | | | | | | | | | '90 | 166 | | - | | | |
| | | | | | | | | | | | | '97 | 80 | | - | | | |
| | | | | | | | | | | | | '02 | 120 | | - | | | |

Trend Study 18-5-02

Study site name: Big Dip Gulch .

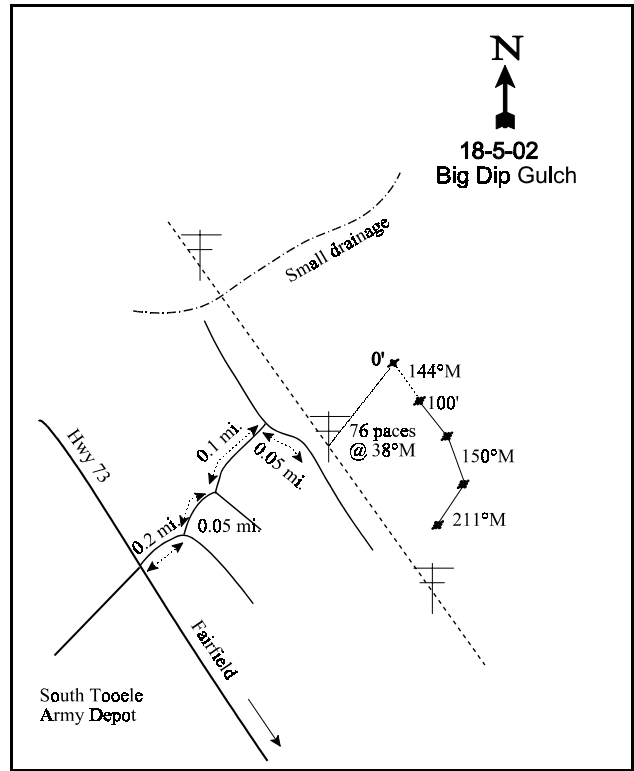
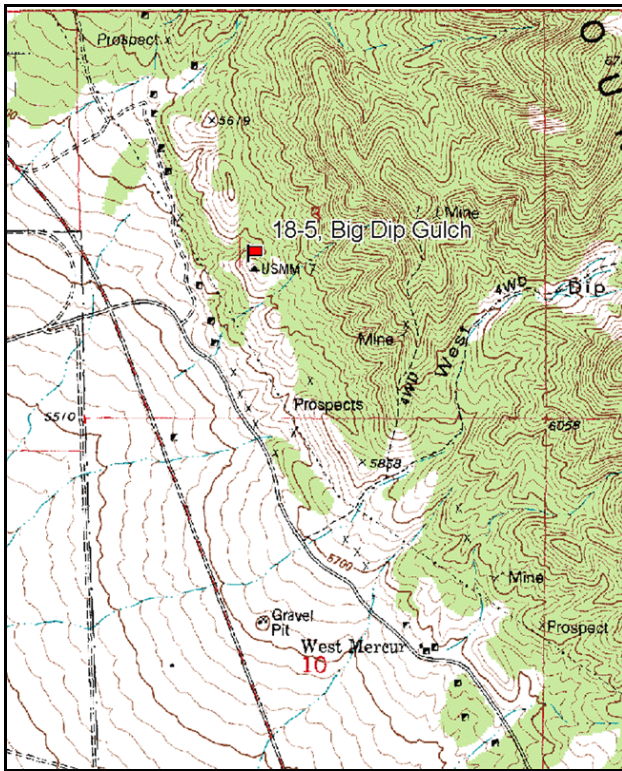
Vegetation type: Black Sagebrush .

Compass bearing: frequency baseline 150 degrees magnetic. (Line 4 @ 211°M)

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

LOCATION DESCRIPTION

From the junction of Highway U-73 and the east entrance to the South Tooele Army Depot, turn east on the dirt road directly across from the depot entrance towards West Dip Gulch and travel 0.20 miles to an intersection. Turn left and travel 0.05 miles to another intersection. Turn left again and travel 0.10 miles to another intersection. Turn right and proceed 0.05 miles along a power line until you come to two power poles. The 0-foot mark of the frequency baseline is located 76 paces from the two power poles at an azimuth of 38 degrees magnetic. It is marked by a green steel fencepost 15 inches in height with a red browse tag, number 3969.



Map Name: Ophir

Diagrammatic Sketch

Township 6S, Range 4W, Section 3

GPS: NAD 27, UTM 12S 464542 N 391145 E

DISCUSSION

Big Dip Gulch - Trend Study No. 18-5

The Big Dip Gulch study is located on a black sagebrush hillside between Silverado Canyon and West Dip Gulch. Elevation of the site is 5,700 feet with a variable slope of 12% to 25% and a west aspect. The Bureau of Land Management manages this area. The range type is black sagebrush interspersed with an occasional cluster of Wyoming big sagebrush. The Wyoming big sagebrush occurs more commonly down slope. The herbaceous understory is noticeably lacking. The site is classified as critical deer winter range. It has shown evidence of domestic sheep use in the past. Deer use was moderately heavy in 1997 with a quadrat frequency of 42% for pellet groups. Deer use was lower in 2002 with a quadrat frequency of pellet groups at 22%. A pellet group transect read along the study baseline in 2002 estimated 44 deer days use/acre (109 ddu/ha).

Textural analysis indicates a clay loam soil containing abundant shale fragments with a mildly alkaline reaction (pH 7.5). Effective rooting depth is estimated at only about 6 inches with a soil temperature of 47°F at about 8 inches. The amount of phosphorus in the soil is quite low (4.9 ppm) and could be a limiting factor to plant growth and development. Drainage is poor and potential erodibility is severe. No litter or soil organic matter have accumulated in any significant amounts. Vegetation cover is limited to shrub crowns with the shrub interspaces being occupied by either erosion pavement or bare soil. The proportion of the cover contributed by rock and pavement has consistently been high at over 70% since 1983. The soil erosion condition class was determined as stable in 2002, due in part to the armored nature of the soil surface.

The majority of the browse forage comes from black sagebrush. They comprise a relatively uniform, low growing, and evenly spaced shrub community that initially had an estimated density of 9,532 plants/acre in 1983. Utilization was classified as heavy. Density was estimated at 5,640 plants/acre in 1997, with the much larger sample. Utilization was moderate and vigor was normal on most plants. Young recruitment was good with 16% of the population consisting of young plants. Decadent plants accounted for only 7% of the population in 1997. Density was estimated at just over 7,000 plants/acre in 2002 with a cover value of 8%. Use remained light to moderate. A few plants displayed heavy browsing. Vigor remained good but the number of decadent plants increased to 22% of the population. Other browse plants are incidental in occurrence and include broom snakeweed, narrowleaf low rabbitbrush, little leaf horsebrush, and a few widely scattered Utah juniper and Stansbury cliffrose. Broom snakeweed declined dramatically in density, due to drought, from 4,300 plants/acre in 1997 down to 580 in 2002.

Grasses and forbs occur infrequently and account for minimal forage production. Species composition is typical for this type of site. The more common grasses include bluebunch wheatgrass, bottlebrush squirreltail, and Sandberg bluegrass. Forbs are mostly low growing species such as rose pussytoes, Hoods phlox, and Douglas chaenactis.

1983 APPARENT TREND ASSESSMENT

Soil condition is poor and trend appears to declining. Excessive erosion must be controlled before any soil or vegetative improvement can occur. Vegetative trend appears stable. The key browse species, black sagebrush, is stable and totally dominates the site.

1989 TREND ASSESSMENT

The soil trend appears to be stable with only about 9% bare soil. However, most of the cover is from rock and pavement which together cover 71% of the soil surface. Even with the stable soil trend, it is still in very poor condition and relatively shallow. Browse trend is stable, yet the number of decadent sagebrush is a concern. The trend for the herbaceous species is slightly up with improvements in nested frequency for bluebunch wheatgrass and Sandberg bluegrass.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly up (4)

1997 TREND ASSESSMENT

Soil trend looks to be stable but in poor condition. Percent bare soil has decreased to about 2%. Herbaceous cover is lacking, so protection from high intensity summer storms is very limited. The trend for the herbaceous understory is down with significant nested frequency losses for bluebunch wheatgrass and Sandberg bluegrass. Annuals make up only 19% of the herbaceous understory. Browse trend is stable for black sagebrush with lower rates of decadence and utilization.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - down (1)

2002 TREND ASSESSMENT

Trend for soil is down slightly due to an increase in bare ground and a corresponding decline in the ratio of protective ground cover to bare ground (from 1:4.6 to 1:2.6). The erosion condition class was determined to be stable in 2002 due to the armored nature of the soil surface. Trend for black sagebrush is considered stable. Density has increased slightly but seedling and young recruitment have declined and the number of decadent plants has increased (7% to 22%). Trend for the herbaceous understory is slightly improved but still poor. Sum of nested frequency for perennial grasses has increased slightly and nested frequency of bluebunch wheatgrass increased significantly. In addition, nested frequency of cheatgrass declined significantly. Cover of perennial grasses increased from about 4% total cover in 1997 to 7%. Forbs remain uncommon and contribute little forage to the site.

TREND ASSESSMENT

soil - down slightly (2)

browse - stable (3)

herbaceous understory - up slightly (4)

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 5

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|------------------------------------|------------------|------------------|------------------|------------------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | <i>Agropyron spicatum</i> | _a 49 | _b 119 | _a 74 | _b 100 | 25 | 51 | 32 | 41 | 2.37 | 4.19 |
| G | <i>Bromus tectorum</i> (a) | - | - | _b 192 | _a 77 | - | - | 62 | 33 | .51 | .21 |
| G | <i>Oryzopsis hymenoides</i> | _a 3 | _b 9 | _{ab} 5 | _a 3 | 1 | 7 | 2 | 1 | .04 | .03 |
| G | <i>Poa secunda</i> | _a 160 | _b 222 | _a 182 | _a 185 | 69 | 87 | 71 | 74 | 1.37 | 2.66 |
| G | <i>Sitanion hystrix</i> | _{ab} 4 | _{ab} 1 | _a - | _b 11 | 2 | 1 | - | 5 | .00 | .10 |
| Total for Annual Grasses | | 0 | 0 | 192 | 77 | 0 | 0 | 62 | 33 | 0.50 | 0.21 |
| Total for Perennial Grasses | | 216 | 351 | 261 | 299 | 97 | 146 | 105 | 121 | 3.80 | 7.00 |
| Total for Grasses | | 216 | 351 | 453 | 376 | 97 | 146 | 167 | 154 | 4.31 | 7.21 |
| F | <i>Allium</i> spp. | - | - | 2 | 9 | - | - | 1 | 6 | .00 | .05 |
| F | <i>Antennaria rosea</i> | 1 | - | - | - | 1 | - | - | - | - | - |
| F | <i>Arabis</i> spp. | - | - | 3 | 3 | - | - | 1 | 1 | .00 | .00 |
| F | <i>Astragalus</i> spp. | - | - | 3 | - | - | - | 1 | - | .00 | - |
| F | <i>Castilleja chromosa</i> | - | 2 | - | - | - | 1 | - | - | - | - |
| F | <i>Calochortus nuttallii</i> | - | - | - | 5 | - | - | - | 2 | - | .01 |
| F | <i>Chaenactis douglasii</i> | _{ab} 11 | _b 22 | _{ab} 19 | _a 2 | 5 | 10 | 8 | 1 | .04 | .00 |
| F | <i>Cryptantha</i> spp. | 2 | 3 | - | - | 1 | 1 | - | - | - | - |
| F | <i>Cymopterus</i> spp. | - | - | - | 1 | - | - | - | 1 | - | .00 |
| F | <i>Erodium cicutarium</i> (a) | - | - | 10 | 9 | - | - | 3 | 5 | .01 | .02 |
| F | <i>Eriogonum</i> spp. | - | 1 | - | - | - | 1 | - | - | - | - |
| F | <i>Lactuca serriola</i> | - | 6 | - | - | - | 2 | - | - | - | - |
| F | <i>Lygodesmia spinosa</i> | 7 | - | - | - | 2 | - | - | - | - | - |
| F | <i>Phlox hoodii</i> | - | 7 | - | - | - | 2 | - | - | - | - |
| F | <i>Ranunculus testiculatus</i> (a) | - | - | _a 134 | _b 172 | - | - | 47 | 62 | .41 | .51 |
| Total for Annual Forbs | | 0 | 0 | 144 | 181 | 0 | 0 | 50 | 67 | 0.42 | 0.53 |
| Total for Perennial Forbs | | 21 | 41 | 27 | 20 | 9 | 17 | 11 | 11 | 0.05 | 0.08 |
| Total for Forbs | | 21 | 41 | 171 | 201 | 9 | 17 | 61 | 78 | 0.47 | 0.61 |

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

BROWSE TRENDS --
Herd unit 18 , Study no: 5

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|------------------------------------------|-----------------|-----|-----------------|------|
| | | '97 | '02 | '97 | '02 |
| B | Artemisia nova | 88 | 95 | 6.40 | 8.14 |
| B | Chrysothamnus viscidiflorus stenophyllus | 2 | 1 | .01 | .03 |
| B | Cowania mexicana stansburiana | 1 | 1 | - | - |
| B | Gutierrezia sarothrae | 50 | 21 | 2.73 | .23 |
| B | Juniperus osteosperma | 1 | 1 | - | .00 |
| B | Opuntia spp. | 1 | 1 | - | - |
| B | Tetradymia glabrata | 1 | 1 | - | - |
| Total for Browse | | 144 | 121 | 9.15 | 8.40 |

Key Browse Annual Leader Growth
Herd unit 18 , Study no: 5

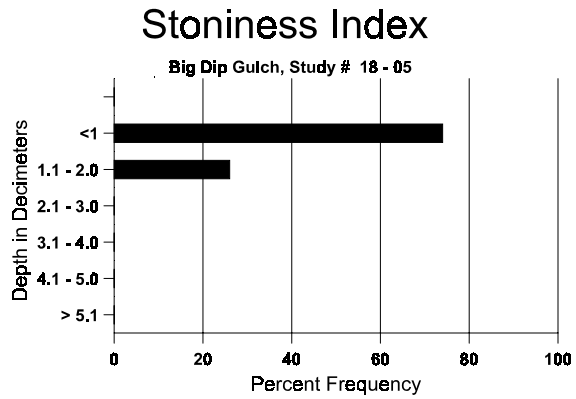
| Species | Average leader growth (in) '02 |
|----------------|-----------------------------------|
| Artemisia nova | 1.4 |

BASIC COVER --
Herd unit 18 , Study no: 5

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 324 | 296 | .75 | 10.00 | 13.81 | 15.10 |
| Rock | 331 | 342 | 16.25 | 33.00 | 25.22 | 32.12 |
| Pavement | 376 | 376 | 54.25 | 37.75 | 45.94 | 43.07 |
| Litter | 351 | 324 | 15.00 | 9.75 | 7.81 | 10.06 |
| Cryptogams | 187 | 112 | 0 | .75 | 1.14 | 1.25 |
| Bare Ground | 186 | 278 | 13.75 | 8.75 | 2.12 | 9.68 |

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 5, Big Dip Gulch

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %0M | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 5.9 | 46.8 (7.7) | 7.5 | 28.0 | 39.4 | 32.6 | 2.8 | 4.9 | 195.2 | 0.5 |



PELLET GROUP FREQUENCY --
Herd unit 18 , Study no: 5

| Type | Quadrat Frequency | |
|--------|-------------------|-----|
| | '97 | '02 |
| Rabbit | 9 | 15 |
| Horse | 1 | - |
| Deer | 42 | 22 |

| Pellet Transect | |
|------------------------|------------------------|
| Pellet Groups per Acre | Days Use per Acre (ha) |
| 02 | 02 |
| - | - |
| - | - |
| 574 | 44 (109) |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 5

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | | | | | | |
|------------------------------------------------|----------------------------|---------------------|-----|------------------|---|--------------------|--------------------------------|----------------|-----|----|----|-----|-----|---|
| | | 1 | 2 | 3 | 4 | | | | | | | | | |
| Artemisia nova | | | | | | | | | | | | | | |
| S | 83 | 1 | - | - | - | - | - | - | 1 | 1 | | | | |
| | 89 | 25 | - | - | - | - | - | - | 25 | 25 | | | | |
| | 97 | 17 | - | - | - | - | - | - | 17 | 17 | | | | |
| | 02 | 1 | - | - | - | - | - | - | 1 | 1 | | | | |
| Y | 83 | - | 18 | 34 | - | - | - | - | 51 | 1 | 52 | | | |
| | 89 | 24 | 11 | - | - | - | - | - | 35 | - | 35 | | | |
| | 97 | 36 | 8 | - | - | - | - | - | 44 | - | 44 | | | |
| | 02 | 16 | - | - | - | - | - | - | 16 | - | 16 | | | |
| M | 83 | - | 2 | 73 | - | - | - | - | 71 | - | 4 | 75 | | |
| | 89 | 4 | 20 | - | - | - | - | - | 24 | - | - | 24 | | |
| | 97 | 100 | 110 | - | 3 | 6 | - | - | 219 | - | - | 219 | | |
| | 02 | 168 | 82 | 8 | - | - | - | - | 258 | - | - | 258 | | |
| D | 83 | - | - | 16 | - | - | - | - | 10 | - | 5 | 1 | 16 | |
| | 89 | 32 | 45 | - | - | - | - | - | 77 | - | - | - | 77 | |
| | 97 | 7 | 11 | - | 1 | - | - | - | 6 | - | - | 13 | 19 | |
| | 02 | 25 | 50 | 3 | - | - | - | - | 64 | - | - | 14 | 78 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | 420 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | 520 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | | |
| '83 | | 14% | | 86% | | 08% | | - 5% | | | | | | |
| '89 | | 56% | | 00% | | 00% | | -38% | | | | | | |
| '97 | | 48% | | 00% | | 05% | | +20% | | | | | | |
| '02 | | 38% | | 03% | | 04% | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| Chrysothamnus viscidiflorus stenophyllus | | | | | | | | | | | | | | |
| Y | 83 | 1 | - | - | - | - | - | - | 1 | - | - | - | 66 | 1 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | 0 | 0 |
| | 97 | 2 | - | - | - | - | - | - | 2 | - | - | - | 40 | 2 |
| | 02 | 1 | - | - | - | - | - | - | 1 | - | - | - | 20 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | 00% | | 00% | | | | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | | | | |
| '97 | | 00% | | 00% | | 00% | | -50% | | | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|---|--------------------|--------------------------------|----------------|-------|------|--------|------|-----|
| | | 1 | 2 | 3 | 4 | | 5 | 6 | | 7 | 8 | 9 | |
| <i>Cowania mexicana stansburiana</i> | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | 1 | - | - | - | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 89 | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 97 | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 02 | 1 | - | - | - | - | - | - | - | 20 | 56 128 | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | |
| '83 | | 00% | | 00% | | 00% | | | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | | | |
| '97 | | 100% | | 00% | | 00% | | + 0% | | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 0 | Dec: | - |
| | | | | | | | | | | '89 | 0 | | - |
| | | | | | | | | | | '97 | 20 | | - |
| | | | | | | | | | | '02 | 20 | | - |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 2 | - | - | - | - | - | - | - | 133 | | 2 | |
| | 97 | 9 | - | - | - | - | - | - | - | 180 | | 9 | |
| | 02 | 5 | - | - | - | - | - | - | - | 100 | | 5 | |
| M | 83 | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 89 | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 97 | 186 | - | - | - | - | - | - | - | 3720 | 7 9 | 186 | |
| | 02 | 9 | - | - | - | - | - | - | - | 180 | 5 8 | 9 | |
| D | 83 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 20 | - | - | - | - | - | - | - | 400 | | 20 | |
| | 02 | 11 | - | - | - | - | 4 | - | - | 300 | | 15 | |
| X | 83 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | 200 | | 10 | |
| | 02 | - | - | - | - | - | - | - | - | 3560 | | 178 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | |
| '83 | | 00% | | 00% | | 00% | | | | | | | |
| '89 | | 00% | | 00% | | 00% | | +97% | | | | | |
| '97 | | 00% | | 00% | | .93% | | -87% | | | | | |
| '02 | | 00% | | 00% | | 38% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 0 | Dec: | 0% |
| | | | | | | | | | | '89 | 133 | | 0% |
| | | | | | | | | | | '97 | 4300 | | 9% |
| | | | | | | | | | | '02 | 580 | | 52% |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| Y | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | - | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |
| | | | | | | | | | | | | '02 | 20 | | - | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | | |
| Y | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | '83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | 6 | 6 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | '97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 8 | 14 | |
| | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | - | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -70% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 66 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 66 | | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |
| | | | | | | | | | | | | '02 | 20 | | - | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Tetradymia glabrata | | | | | | | | | | | | | | | | | | |
| M | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 4 | 5 | 1 |
| | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 10 | 11 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |
| | | | | | | | | | | | | '02 | 20 | | - | | | |

Trend Study 18-6-02

Study site name: South of Soldier Creek .

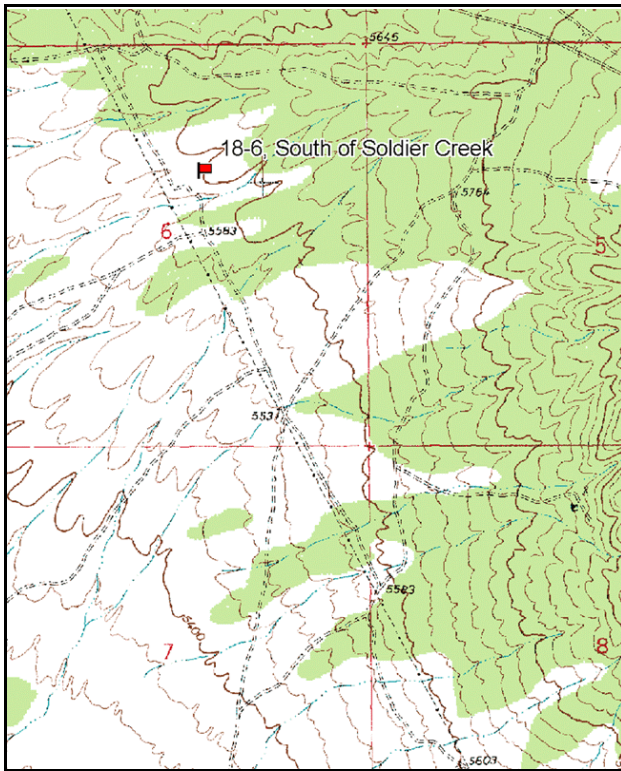
Vegetation type: Chained, Seeded P-J .

Compass bearing: frequency baseline 338 degrees magnetic.

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

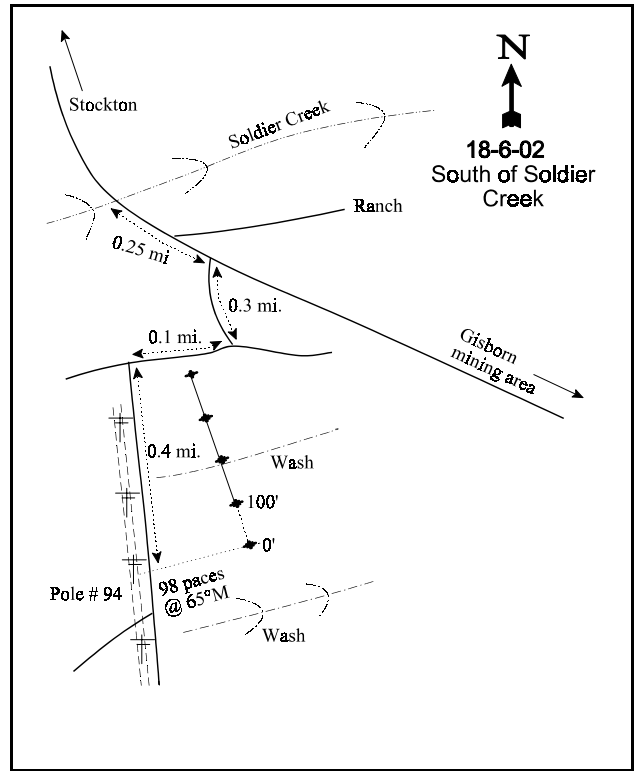
LOCATION DESCRIPTION

From the town of Stockton, proceed south on the Soldier Creek road until the road crosses over the creek. Go 0.25 miles from the creek and turn right (south) on a road that goes up on the bench to the south. Travel on this road for 0.30 miles to an intersection at the top of the hill. Turn right (west) and travel 0.10 miles to another intersection. Turn left (south) and travel 0.40 miles to where there is a double power pole on the west side of the road. From power pole #94, walk 98 paces at an azimuth of 65 degrees magnetic to the 0-foot mark of the frequency baseline, marked by a steel fencepost 15 inches in height.



Map Name: Stockton

Township 5S, Range 4W, Section 6



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4474662 N, 386629 E

DISCUSSION

South of Soldier Canyon - Trend Study No. 18-6

This study is located on an old BLM chained and seeded area immediately south of Soldier Creek. The site has a gentle 5% slope on a west facing bench formerly occupied by a dense stand of juniper and pinyon trees. Elevation is about 5,580 feet. The seeded area is within the limits of severe winter range for deer. However, judging from observations of the number of pellet groups and the level of forage utilization, relatively few deer occupy the area in the winter. Quadrat frequency of deer pellet groups was moderately low in 1997 at 19%. The key browse also showed only light to moderate use. There were scattered signs of use by elk and cattle, with most being associated with the washes running through the bench. Pellet group transect data from 2002 estimated only 4 deer and 5 elk days use/acre (10 ddu/ha and 12 edu/ha). Rabbit sign was fairly abundant in 2002.

Soil is moderately shallow and fairly rocky on the surface, but otherwise rather fine textured. Soil textural analysis indicates a clay loam soil with a soil reaction that is slightly alkaline (pH 7.5). Effective rooting depth was estimated at 11 inches with an average soil temperature of 59°F at 12 inches. Phosphorus is low at only 5.6 ppm. Values less than 10 ppm may limit normal plant growth and development. Parent material appears to be sedimentary limestone or shale. Erosion is not a significant factor on the site, with the erosion condition class determined as stable in 2002.

Browse composition and density are well below average for comparable seeded areas, especially for those on which improved big game habitat was one of the principal objectives. The presence of direct-seeded or transplanted shrubs cannot be documented. The key preferred shrub for the site is a low elevation form of mountain big sagebrush. This area occurs at the ecotone of Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) and mountain big sagebrush (*Artemisia tridentata vaseyana*) and there appears to be some hybridizing occurring between the two subspecies. Density was estimated at about 1,300 plants/acre in 1983 and 1989, but the much larger sample used in 1997 and 2002 estimate a much lower population of 680 plants/acre in 1997 and 880 plants/acre in 2002. Utilization has been mostly light over all readings with some moderate to heavy use occurring in 1997 and 2002. It appears that some sagebrush plants are more preferred as there is differential use occurring. Some plants are not utilized while others are heavily browsed. The plants with more mountain big sagebrush characteristics display heavier use.

Narrowleaf low rabbitbrush is the next most productive browse species which made up 28% of the browse cover in 1997 and 20% in 2002. This species is low in palatability and is mostly unutilized. Some of the use on this shrub appears to be from the numerous rabbits on the site. Less abundant shrubs include broom snakeweed and pricklypear cactus. A few Utah juniper and single-leaf pinyon pine occur on the site as well. Point-quarter measurements from 2002 estimate a density of 84 juniper trees/acre with an average diameter of nearly 5 inches. Trees are mostly mature in the 10 to 12 foot tall range. Young trees are uncommon and the stand does not appear to be increasing.

The herbaceous understory is dominated by crested wheatgrass with lesser amounts of bluebunch wheatgrass and Sandberg bluegrass. Indian ricegrass also occurs in small numbers. Annual cheatgrass is found on the site but it is not abundant. The forb composition is diverse but consists of species possessing relatively poor forage value. Abundance and productivity are significantly less than for grasses as forbs produce only about 27% of the herbaceous cover. No evidence of commonly seeded forbs, such as alfalfa, small burnet, or yellow sweetclover were observed anywhere on the chained and seeded site.

1983 APPARENT TREND ASSESSMENT

This seeded area has apparently matured to the point where a relatively stable condition exists. As big game winter range, the area has only fair value because of a shortage of desirable browse. As livestock range, it would be preferable to untreated juniper-pinyon, but still is not considered an important grazing area. Soil trend appears stable because of the nearly level terrain. Vegetative condition may be very slowly changing. Both narrowleaf low rabbitbrush and mountain big sagebrush appear to be slowly increasing. Grasses and forbs seem relatively static. A significant return of juniper or pinyon trees is at least 15 to 20 years in the future.

1989 TREND ASSESSMENT

With the increase in vegetative basal cover and a decrease in percent bare soil, trend for soil is considered improved. There was a significant increase in bluebunch wheatgrass and Sandberg bluegrass, while crested wheatgrass was stable. The forbs are still poorly represented on this site, but the herbaceous understory trend would be up at this time. For the browse, specifically mountain big sagebrush, trend is stable. However, there are some indications that drought conditions have caused some problems with a substantial increase in percent decadence. Use is also heavier than in 1983.

TREND ASSESSMENT

soil - up slightly (4)

browse - stable (3)

herbaceous understory - up (5)

1997 TREND ASSESSMENT

The trend for soil continues to be stable, but it is still in poor condition. Two things help protect what soil there is left on the site; the lack of any significant slope and almost 70% of the vegetation cover is contributed by herbaceous species. Compared to woody species, herbaceous vegetation better protects the soil from destructive high intensity summer storms. The key browse species for the site is a low elevation form of mountain big sagebrush that shows normal vigor, good numbers of young plants but no seedlings. Percent decadence has declined substantially from 25% to 9%. The major problem is that the population is low for this kind of site at only 680 plants/acre. This could be reflective of poor site potential. Trend for the key browse is stable even with the lower density, which is mostly reflective of the larger sample size used in 1997. The herbaceous understory's trend is slightly down due to a decline in the sum of nested frequency of perennial grasses, especially bluebunch wheatgrass. Frequency of forbs increased slightly.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - down slightly (2)

2002 TREND ASSESSMENT

Trend for soil is stable. Cover of bare ground has increased slightly but litter and vegetation cover have remained similar and the soil erosion condition class was determined as stable in 2002. Trend for the key browse, mountain big sagebrush, is stable. Density has increased slightly but it is still relatively low at only 880 plants/acre. Utilization was heavier in 2002 compared to previous readings, with 30% of the shrubs sampled displaying moderate use and 27% showing heavy use. The number of decadent plants also increased to 34% of the population. These trends are driven by drought and the sagebrush should improve with a return to normal precipitation patterns. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses and forbs remained similar to 1997 estimates. The herbaceous understory is still dominated by crested wheatgrass, bluebunch wheatgrass, and Sandberg bluegrass. Cheatgrass is present in low numbers.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 6

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|-------------------------|------------------|------------------|------------------|-------------------|-------------------|-----|-----|-----|-----------------|-------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | Agropyron cristatum | _a 106 | _a 101 | _b 159 | _{ab} 141 | 46 | 43 | 61 | 54 | 6.64 | 7.07 |
| G | Agropyron spicatum | _b 146 | _c 210 | _a 74 | _a 60 | 53 | 72 | 30 | 27 | 3.30 | 4.47 |
| G | Bromus tectorum (a) | - | - | 82 | 63 | - | - | 28 | 24 | 3.16 | 1.77 |
| G | Oryzopsis hymenoides | 22 | 14 | 8 | 13 | 9 | 8 | 4 | 6 | .22 | .33 |
| G | Poa secunda | _a 60 | _c 177 | _b 128 | _{bc} 143 | 24 | 70 | 48 | 55 | 2.21 | 2.82 |
| G | Sitanion hystrix | 7 | 4 | - | - | 3 | 2 | - | - | - | - |
| Total for Annual Grasses | | 0 | 0 | 82 | 63 | 0 | 0 | 28 | 24 | 3.16 | 1.77 |
| Total for Perennial Grasses | | 341 | 506 | 369 | 357 | 135 | 195 | 143 | 142 | 12.38 | 14.71 |
| Total for Grasses | | 341 | 506 | 451 | 420 | 135 | 195 | 171 | 166 | 15.55 | 16.49 |
| F | Alyssum alyssoides (a) | - | - | _a - | _b 21 | - | - | - | 7 | - | .20 |
| F | Allium spp. | - | - | - | 1 | - | - | - | 1 | - | .00 |
| F | Antennaria rosea | - | 1 | 1 | - | - | 1 | 1 | - | .00 | - |
| F | Arabis spp. | - | - | 4 | - | - | - | 2 | - | .01 | - |
| F | Astragalus beckwithii | _a - | _a - | _b 13 | _a - | - | - | 6 | - | .27 | - |
| F | Astragalus tenellus | _a - | _a - | _b 13 | _a - | - | - | 5 | - | .36 | - |
| F | Astragalus spp. | 1 | 4 | 6 | 3 | 1 | 2 | 4 | 2 | .03 | .04 |
| F | Astragalus utahensis | - | - | - | 3 | - | - | - | 1 | - | .00 |
| F | Camelina microcarpa (a) | - | - | 3 | - | - | - | 1 | - | .00 | - |
| F | Calochortus nuttallii | - | 2 | 6 | 3 | - | 1 | 4 | 1 | .02 | .00 |
| F | Cirsium spp. | - | - | - | 1 | - | - | - | 1 | - | .00 |
| F | Cryptantha spp. | - | 2 | - | - | - | 1 | - | - | - | - |
| F | Erodium cicutarium (a) | - | - | 6 | - | - | - | 3 | - | .01 | - |
| F | Erigeron pumilus | 1 | 3 | 1 | - | 1 | 1 | 1 | - | .03 | - |
| F | Gilia spp. (a) | - | - | - | 1 | - | - | - | 1 | - | .00 |

| T y p e | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|---------------------------|-----------------------------|------------------|------|------|-----|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| F | Lathyrus brachycalyx | a- | a- | b19 | c53 | - | - | 7 | 21 | 1.04 | 2.10 |
| F | Petradoria pumila | a19 | ab26 | bc51 | c51 | 9 | 12 | 20 | 19 | 2.09 | 1.72 |
| F | Phlox hoodii | ab69 | b93 | ab66 | a62 | 33 | 48 | 30 | 23 | .98 | .93 |
| F | Phlox longifolia | - | - | 13 | 9 | - | - | 4 | 5 | .02 | .05 |
| F | Ranunculus testiculatus (a) | - | - | 175 | 157 | - | - | 59 | 49 | 1.40 | .59 |
| F | Sisymbrium altissimum (a) | - | - | 3 | - | - | - | 1 | - | .03 | - |
| Total for Annual Forbs | | 0 | 0 | 187 | 179 | 0 | 0 | 64 | 57 | 1.45 | 0.80 |
| Total for Perennial Forbs | | 90 | 131 | 193 | 186 | 44 | 66 | 84 | 74 | 4.88 | 4.86 |
| Total for Forbs | | 90 | 131 | 380 | 365 | 44 | 66 | 148 | 131 | 6.34 | 5.66 |

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

BROWSE TRENDS --

Herd unit 18 , Study no: 6

| T y p e | Species | Strip Frequency | | Average Cover % | |
|------------------|------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | Artemisia tridentata vaseyana | 24 | 31 | 2.31 | 1.92 |
| B | Chrysothamnus viscidiflorus stenophyllus | 61 | 48 | 2.71 | 2.30 |
| B | Gutierrezia sarothrae | 14 | 16 | .36 | .40 |
| B | Juniperus osteosperma | 5 | 7 | 3.76 | 6.07 |
| B | Opuntia spp. | 3 | 4 | .15 | .15 |
| B | Pinus monophylla | 1 | 1 | .38 | .53 |
| Total for Browse | | 108 | 107 | 9.69 | 11.39 |

CANOPY COVER --

Herd unit 18 , Study no: 6

| Species | Percent Cover | |
|-----------------------|---------------|-----|
| | '97 | '02 |
| Juniperus osteosperma | 3.8 | 6 |

Key Browse Annual Leader Growth

Herd unit 18 , Study no: 6

| Species | Average leader growth (in) |
|-------------------------------|----------------------------|
| | '02 |
| Artemisia tridentata vaseyana | 1.8 |

Point-Quarter Tree Data
Herd unit 18 , Study no: 6

| Species | Trees per Acre | | Average diameter (in) | |
|-----------------------|----------------|-----|-----------------------|-----|
| | '97 | '02 | '97 | '02 |
| Juniperus osteosperma | 33 | 84 | 4.6 | 4.7 |

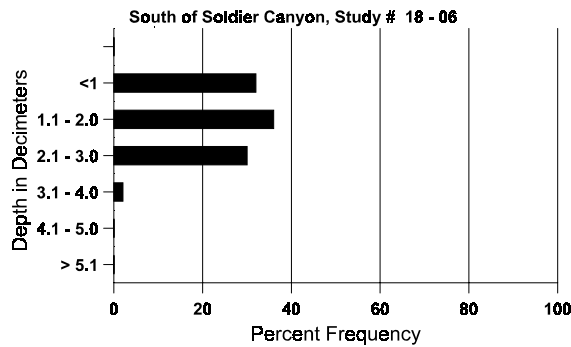
BASIC COVER --
Herd unit 18 , Study no: 6

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 333 | 333 | 5.50 | 10.00 | 29.22 | 34.22 |
| Rock | 115 | 166 | 1.25 | 2.25 | 1.96 | 2.78 |
| Pavement | 295 | 322 | 25.75 | 30.25 | 17.02 | 20.81 |
| Litter | 377 | 364 | 38.00 | 34.75 | 31.13 | 30.62 |
| Cryptogams | 221 | 229 | 3.00 | 8.50 | 7.60 | 13.11 |
| Bare Ground | 265 | 288 | 26.50 | 14.25 | 13.67 | 19.31 |

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 6, South of Soldier Creek

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 11.0 | 59.0 (12.0) | 7.5 | 36.0 | 34.4 | 29.6 | 3.2 | 5.6 | 284.8 | 0.6 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 18 , Study no: 6

| Type | Quadrat Frequency | | Pellet Transect | |
|--------|-------------------|-----|------------------------|------------------------|
| | '97 | '02 | Pellet Groups per Acre | Days Use per Acre (ha) |
| Rabbit | 29 | 29 | 0 | - |
| Elk | 1 | 4 | 61 | 5 (12) |
| Deer | 19 | 8 | 52 | 4 (10) |

BROWSE CHARACTERISTICS --
Herd unit 18 , Study no: 6

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Artemisia tridentata vaseyana | | | | | | | | | | | | | | | | | | |
| Y | '83 | 9 | - | - | - | - | - | - | - | - | 5 | 4 | - | - | 300 | | 9 | |
| | '89 | 13 | 1 | - | - | - | - | - | - | - | 14 | - | - | - | 466 | | 14 | |
| | '97 | 8 | - | - | - | - | - | - | - | - | 8 | - | - | - | 160 | | 8 | |
| | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | '83 | 28 | 3 | - | - | - | - | - | - | - | - | 31 | - | - | 1033 | 24 30 | 31 | |
| | '89 | 8 | 8 | - | - | - | - | - | - | - | 14 | 1 | 1 | - | 533 | 30 31 | 16 | |
| | '97 | 18 | 2 | 1 | 1 | 1 | - | - | - | - | 23 | - | - | - | 460 | 21 30 | 23 | |
| | '02 | 16 | 6 | 5 | - | 1 | - | - | - | - | 27 | 1 | - | - | 560 | 19 30 | 28 | |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | 4 | 6 | - | - | - | - | - | - | - | 8 | - | 1 | 1 | 333 | | 10 | |
| | '97 | - | 2 | - | - | 1 | - | - | - | - | 2 | - | - | 1 | 60 | | 3 | |
| | '02 | 1 | 6 | 5 | 1 | - | 2 | - | - | - | 7 | - | - | 8 | 300 | | 15 | |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 160 | | 8 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 140 | | 7 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 08% | | | 00% | | | 00% | | | - 0% | | | | | | | |
| '89 | | 38% | | | 00% | | | 08% | | | -49% | | | | | | | |
| '97 | | 18% | | | 03% | | | 03% | | | +23% | | | | | | | |
| '02 | | 30% | | | 27% | | | 18% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 1333 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 1332 | | 25% | | | |
| | | | | | | | | | | | | '97 | 680 | | 9% | | | |
| | | | | | | | | | | | | '02 | 880 | | 34% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|------|------|-----|--------------------|--------------------------------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | |
| Chrysothamnus viscidiflorus stenophyllus | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 100 | | 3 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| Y | 83 | 18 | - | - | - | - | - | - | - | - | 18 | - | - | - | 600 | | 18 |
| | 89 | 31 | - | - | - | - | - | - | - | - | 31 | - | - | - | 1033 | | 31 |
| | 97 | 10 | - | - | - | - | - | - | - | - | 10 | - | - | - | 200 | | 10 |
| | 02 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 80 | | 4 |
| M | 83 | 64 | - | - | - | - | - | - | - | - | 64 | - | - | - | 2133 | 11 18 | 64 |
| | 89 | 14 | 1 | - | - | - | - | - | - | - | 15 | - | - | - | 500 | 9 10 | 15 |
| | 97 | 108 | - | - | 10 | - | - | - | - | - | 115 | - | - | 3 | 2360 | 9 15 | 118 |
| | 02 | 87 | - | - | 4 | - | - | 2 | - | - | 93 | - | - | - | 1860 | 7 12 | 93 |
| D | 83 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | 33 | | 1 |
| | 89 | 12 | - | - | - | - | - | - | - | - | 12 | - | - | - | 400 | | 12 |
| | 97 | 30 | - | - | 3 | - | - | - | - | - | 10 | - | - | 23 | 660 | | 33 |
| | 02 | 28 | 6 | - | - | - | 1 | 1 | - | - | 23 | - | - | 13 | 720 | | 36 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 220 | | 11 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 220 | | 11 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | | 00% | | | 01% | | | -30% | | | | | | |
| '89 | | 02% | | | 00% | | | 00% | | | +40% | | | | | | |
| '97 | | 00% | | | 00% | | | 16% | | | -17% | | | | | | |
| '02 | | 05% | | | .75% | | | 10% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 2766 | Dec: | 1% | | | |
| | | | | | | | | | | | '89 | 1933 | | 21% | | | |
| | | | | | | | | | | | '97 | 3220 | | 20% | | | |
| | | | | | | | | | | | '02 | 2660 | | 27% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|-----|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 10 | - | - | - | - | - | - | - | - | 10 | - | - | - | 200 | | 10 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 89 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 233 | | 7 | |
| | 97 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 140 | | 7 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 13 | - | - | - | - | - | - | - | - | 13 | - | - | - | 433 | 8 12 | 13 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 8 13 | 1 | |
| | 97 | 32 | - | - | - | - | - | - | - | - | 32 | - | - | - | 640 | 6 8 | 32 | |
| | 02 | 31 | - | - | - | - | - | - | - | - | 31 | - | - | - | 620 | 4 7 | 31 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | 8 | - | - | - | - | - | - | - | - | 8 | - | - | - | 160 | | 8 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | 2 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 240 | | 12 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | -36% | | | | | | | |
| '89 | | 11% | | | 00% | | | 00% | | | +62% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 466 | Dec: | 0% | | | | |
| | | | | | | | | | | | '89 | 299 | | 11% | | | | |
| | | | | | | | | | | | '97 | 780 | | 0% | | | | |
| | | | | | | | | | | | '02 | 780 | | 21% | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|---|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | - | - | - | 33 | | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| M | 83 | 5 | - | - | - | - | - | - | - | - | - | - | - | 166 | 60 | 44 | 5 | |
| | 89 | 5 | - | - | - | - | - | - | - | - | - | - | - | 166 | 73 | 55 | 5 | |
| | 97 | 4 | - | - | - | - | - | 1 | - | - | - | - | - | 100 | - | - | 5 | |
| | 02 | 8 | - | - | - | - | - | - | 1 | - | - | - | - | 180 | - | - | 9 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +17% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -50% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +44% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 166 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 199 | | - | | | |
| | | | | | | | | | | | | '97 | 100 | | - | | | |
| | | | | | | | | | | | | '02 | 180 | | - | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | 2 | - | - | - | - | - | - | - | - | - | - | - | 66 | | | 2 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 97 | 6 | - | - | - | - | - | - | - | - | - | - | - | 120 | 6 | 16 | 6 | |
| | 02 | 4 | - | - | - | - | - | - | - | - | - | - | - | 80 | 4 | 11 | 4 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | 20 | | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 50% | | | +45% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | -17% | | | | | | | |
| '02 | | 00% | | | 00% | | | 20% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 66 | | 0% | | | |
| | | | | | | | | | | | | '97 | 120 | | 0% | | | |
| | | | | | | | | | | | | '02 | 100 | | 20% | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|----|------|---|--------------------|--------------------------------|-------|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Pinus monophylla | | | | | | | | | | | | | | | | | | |
| M | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | - | - | 1 |
| | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | - | - | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 0 | Dec: | - | | | | |
| | | | | | | | | | | | '89 | 0 | | - | | | | |
| | | | | | | | | | | | '97 | 20 | | - | | | | |
| | | | | | | | | | | | '02 | 20 | | - | | | | |

Trend Study 18-15-02

Study site name: Upper Kessler Canyon.

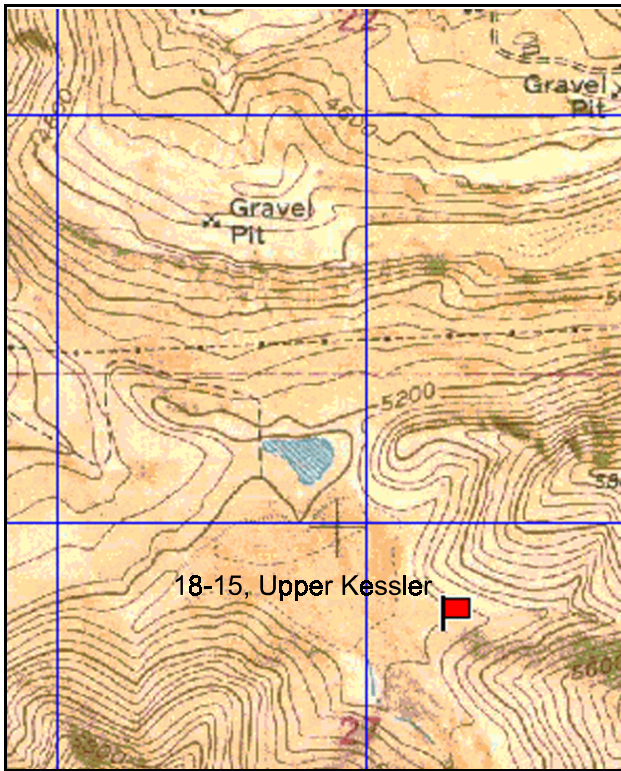
Vegetation type: Perennial Grass.

Compass bearing: frequency baseline 110 degrees magnetic (Lines 3-4 @ 91°M).

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

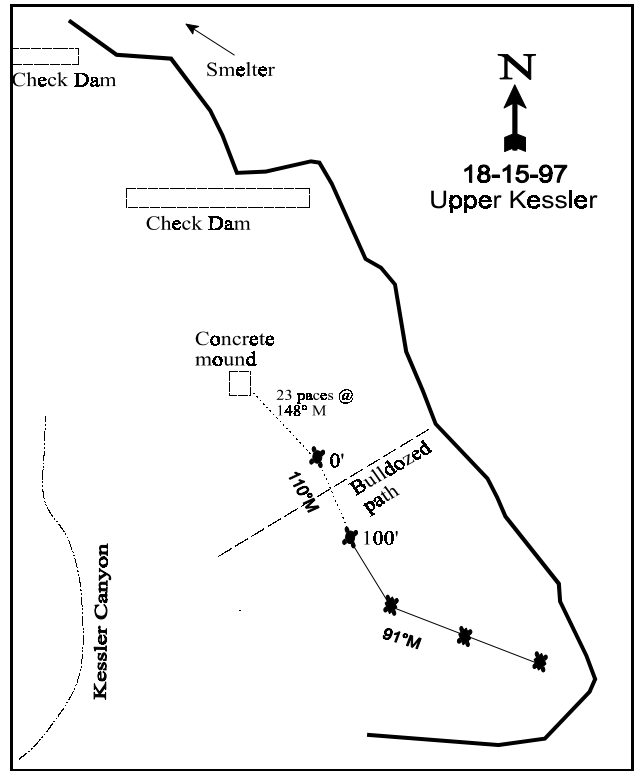
LOCATION DESCRIPTION

From Highway 201 turn left (south) at 1160 West to North Warehouse, Gate #24 of Kennecott. Travel to security shack and get permission and an escort to proceed up Kessler Canyon. Contact Paula at the Kennecott Environmental Office (569-7120) before reading the site. From the check dam in upper Kessler Canyon (Smelter Canyon) continue on into the valley for approximately 0.25 miles to a concrete mound. From the concrete mound, walk 23 paces bearing 148 degrees magnetic to the 0-foot baseline stake. The 0-foot stake is a short fencepost with a white top.



Map Name: Farnsworth Peak

Township 1S, Range 3W, Section 27



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4506664 N 401613 E

DISCUSSION

Upper Kessler Canyon - Trend Study No. 18-15

The Upper Kessler Canyon study is located in the upper canyon bottoms owned by Kennecott, just south of the smelter. Decades of pollution from the smelter has caused most of the vegetation on the surrounding hills to die and most of the soil has eroded down into the bottom of the canyon where the trend study is located. The site has been disked and seeded to mostly perennial grass species. The area has a slope of 3-5% with a northwest aspect and an elevation of 5,300 feet. Wildlife use on the site is mostly from elk with some deer use. Pellet group transect data from 2002 estimated 22 elk and 9 deer days use/acre (54 edu/ha and 22 ddu/ha).

The soil surface appears to be a hard-packed clay with a relatively large amount of rock and gravel on the surface and throughout the profile. Effective rooting depth is estimated at only 5 inches. The actual soil depth is obviously deeper but severe soil compaction prevents deeper soil penetrometer readings. Soil texture is a sandy clay loam with a neutral to slightly acid soil reaction (pH of 6.6). Soil temperature is high at 79°F at only about 6 inches in depth. The shallow effective rooting depth and high soil temperature would both be deterrents to the establishment of shrubs onto this site as illustrated by the fact that shrubs were seeded but very few became established. If shrubs are thought to be necessary to improve value as a winter range, interseeding or interplanting of shrubs would be necessary. There is little erosion occurring because of the protective cover from herbaceous species, litter, and lack of significant slope.

In a 1978 line-intercept study, the area was devoid of perennial vegetation and dominated by bare soil, rock, and annual species. By 1990, the study area had been disked, terraced, and seeded to perennial species. The dominant species in the canyon bottom at that time was a large and very robust intermediate wheatgrass. By 1997 and 2002, not much had changed, with intermediate wheatgrass still dominating the area and providing almost all of the total vegetation cover. Without the dominance of the perennial grasses, western ragweed could be more of a problem than it is. Ragweed is the only abundant perennial forb on the site. Other forbs are represented by weedy species such as curlycup gumweed, sunflower, toadflax, and wooly mullein.

1990 APPARENT TREND ASSESSMENT

Soil trend appears stable with a lack of significant slope and good protective cover from herbaceous species and litter. The browse trend is not applicable here for none were sampled and it is not considered a deer winter range. There are a few white-stemmed rabbitbrush and four-wing saltbush on the slopes surrounding the site. The herbaceous understory has improved from what was here before the treatment and seeding.

1997 TREND ASSESSMENT

Soil trend is stable with percent bare soil at 9% and good protective cover. Browse trend is not applicable here for none were sampled on the site. Pellet group data indicates that elk inhabit the area (32% quadrat frequency), but deer do not (no pellet groups were sampled). The herbaceous understory is stable with seeded grasses still dominating. However, 85% of the forb cover is contributed by western ragweed, yet forbs only make up 12% of the herbaceous understory.

TREND ASSESSMENT

soil - stable (3)

browse - not applicable, none were sampled (NA)

herbaceous understory - stable (3)

2002 TREND ASSESSMENT

Trend for soil is stable. Cover of bare ground has increased and litter cover has declined, but herbaceous cover is abundant and has remained stable since 1997. There is not a problem with erosion on the site due to the gentle terrain and the abundant protective ground cover. There is no shrubs sampled on the site so there is no browse trend. Trend for the herbaceous understory is also stable. Sum of nested frequency of perennial grasses has remained similar while frequency of perennial forbs has increased. Intermediate wheatgrass remains the dominant species as it provides 99% of the grass cover and 86% of the total vegetation cover. The forb composition is poor with several weedy species sampled including ragweed, thistle, curlycup gumweed, sunflower, toad flax, and wooly mullein.

TREND ASSESSMENT

soil - stable (3)

browse - not applicable, none were sampled (NA)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 15

| T y p e | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % | |
|-----------------------------|----------------------------|------------------|------------------|------------------|-------------------|-----|-----|-----------------|-------|
| | | '90 | '97 | '02 | '90 | '97 | '02 | '97 | '02 |
| G | Agropyron intermedium | _a 286 | _b 306 | _b 307 | 98 | 97 | 98 | 27.99 | 29.17 |
| G | Bromus tectorum (a) | - | 67 | 51 | - | 24 | 20 | .39 | .35 |
| G | Poa bulbosa | - | - | 5 | - | - | 3 | - | .04 |
| G | Poa fendleriana | 3 | 5 | - | 1 | 3 | - | .04 | - |
| G | Poa pratensis | _b 23 | _b 10 | _a - | 10 | 4 | - | .09 | - |
| Total for Annual Grasses | | 0 | 67 | 51 | 0 | 24 | 20 | 0.39 | 0.35 |
| Total for Perennial Grasses | | 312 | 321 | 312 | 109 | 104 | 101 | 28.13 | 29.21 |
| Total for Grasses | | 312 | 388 | 363 | 109 | 128 | 121 | 28.52 | 29.56 |
| F | Ambrosia psilostachya | _a - | _b 70 | _b 62 | - | 28 | 24 | 3.25 | 1.36 |
| F | Aster chilensis | _b 25 | _a 2 | _a - | 11 | 1 | - | .00 | - |
| F | Cirsium spp. | - | 2 | 3 | - | 1 | 3 | .00 | .04 |
| F | Comandra pallida | - | - | 1 | - | - | 1 | - | .00 |
| F | Epilobium brachycarpum (a) | - | _a 34 | _b 76 | - | 18 | 33 | .28 | .85 |
| F | Equisetum spp. | - | - | 2 | - | - | 1 | - | .00 |
| F | Eriogonum brevicale | _a - | _a - | _b 28 | - | - | 13 | - | .26 |
| F | Grindelia squarrosa | _b 27 | _a 4 | _{ab} 15 | 12 | 4 | 6 | .22 | .38 |
| F | Helianthus annuus (a) | - | _a - | _b 20 | - | - | 9 | - | .82 |
| F | Lactuca serriola | 2 | 14 | 9 | 1 | 6 | 4 | .06 | .02 |
| F | Linaria dalmatica | _a - | _a - | _b 36 | - | - | 15 | - | .63 |
| F | Mentzelia spp. | - | - | 1 | - | - | 1 | - | .38 |
| F | Medicago sativa | _b 11 | _a - | _{ab} 3 | 5 | - | 1 | - | .06 |
| F | Solidago spp. | _B 18 | _a - | _a - | 8 | - | - | - | - |
| F | Verbascum thapsus | - | - | 7 | - | - | 3 | - | .04 |

| Type | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % | |
|------|---------------------------|------------------|-----|-----|-------------------|-----|-----|-----------------|------|
| | | '90 | '97 | '02 | '90 | '97 | '02 | '97 | '02 |
| | Total for Annual Forbs | 0 | 34 | 96 | 0 | 18 | 42 | 0.28 | 1.68 |
| | Total for Perennial Forbs | 83 | 92 | 167 | 37 | 40 | 72 | 3.55 | 3.19 |
| | Total for Forbs | 83 | 126 | 263 | 37 | 58 | 114 | 3.84 | 4.87 |

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

BROWSE TRENDS --

Herd unit 18 , Study no: 15

| Type | Species | Strip Frequency | | Average Cover % | |
|------|------------------------|-----------------|-----|-----------------|------|
| | | '97 | '02 | '97 | '02 |
| B | Elaeagnus angustifolia | 0 | 0 | - | .15 |
| | Total for Browse | 0 | 0 | 0 | 0.15 |

BASIC COVER --

Herd unit 18 , Study no: 15

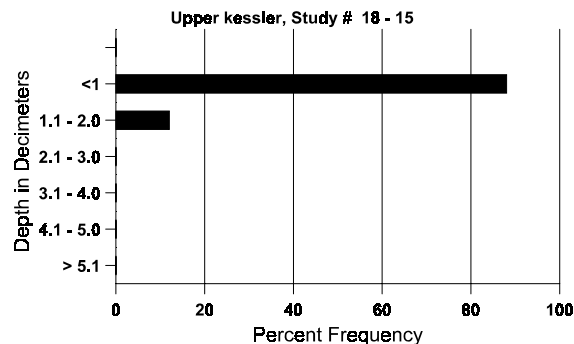
| Cover Type | Nested Frequency | | Average Cover % | | |
|-------------|------------------|-----|-----------------|-------|-------|
| | '97 | '02 | '90 | '97 | '02 |
| Vegetation | 321 | 322 | 0 | 33.99 | 33.88 |
| Rock | 261 | 237 | 0 | 23.40 | 21.96 |
| Pavement | 114 | 121 | 0 | 2.83 | 3.69 |
| Litter | 377 | 368 | 0 | 44.82 | 34.93 |
| Cryptogams | 105 | 102 | 0 | 2.83 | 4.77 |
| Bare Ground | 123 | 153 | 7.50 | 8.89 | 14.36 |

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 15, Upper Kessler

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 5.0 | 79.0 (5.9) | 6.6 | 52.3 | 26.2 | 21.6 | 1.0 | 28.4 | 134.4 | 0.7 |

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 18 , Study no: 15

| Type | Quadrat Frequency | |
|------|-------------------|-----|
| | '97 | '02 |
| Elk | 32 | 4 |
| Deer | - | 2 |

| Pellet Transect | |
|------------------------|------------------------|
| Pellet Groups per Acre | Days Use per Acre (ha) |
| '02 | '02 |
| 287 | 22 (55) |
| 113 | 9 (21) |

Trend Study 18-20-02

Study site name: Black Rock East .

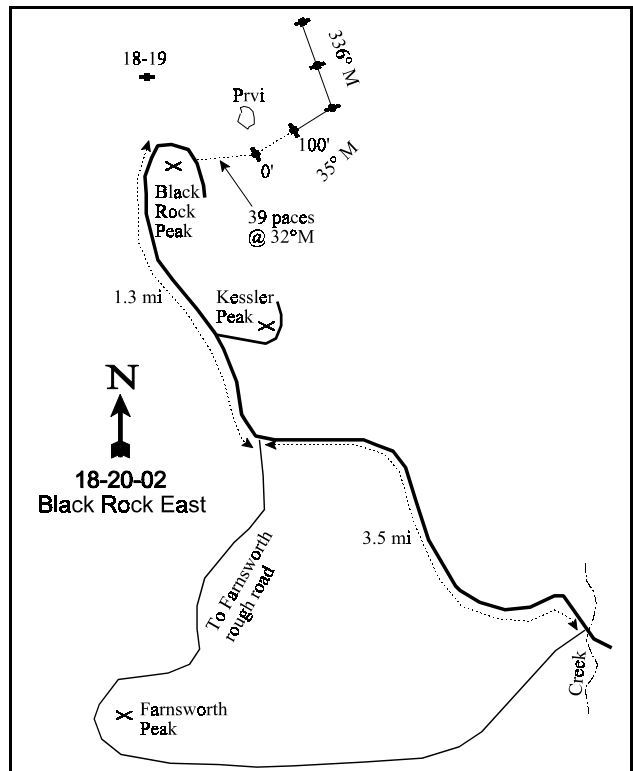
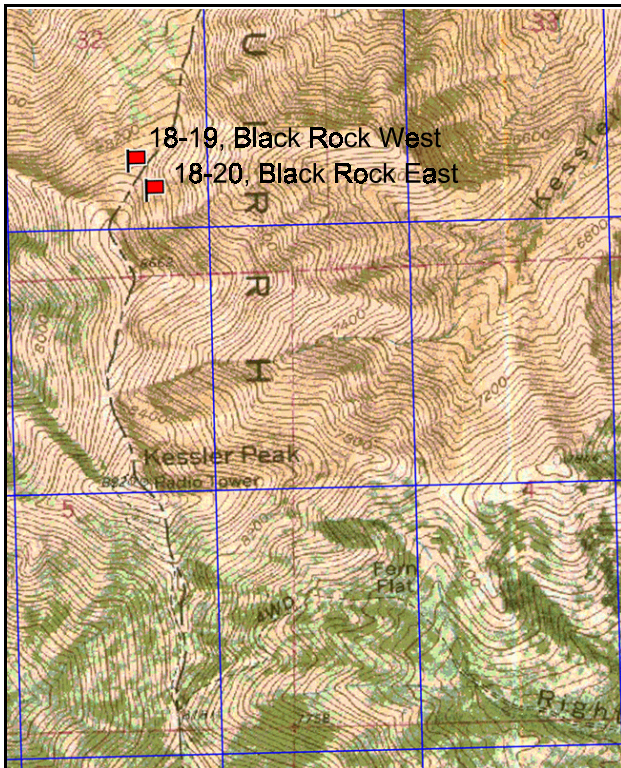
Vegetation type: Perennial Grass .

Compass bearing: frequency baseline 35 degrees magnetic (Line 3-4 @ 336°M).

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

LOCATION DESCRIPTION

Traveling north on Highway #111 turn left (West) (just before the Baccus west gate sign and overpass) on a dirt road which goes up Coon Canyon. Travel west for 0.2 miles to a gate. This gate (#39E) is controlled by Kennecott and you must get permission to have it opened. Contact Paula at the Kennecott Environmental Office (569-7120) before reading the site. From the gate continue up Coon Canyon for 3.9 miles to a fork. Turn right (north) off the main road and travel north west up the right fork of Coon Canyon for 3.5 miles to a saddle and an intersection. Stay right and continue 1.3 miles up a steep road around the west side of Kessler Peak to last switchback west of Black Rock Peak. Park here and walk onto the knoll to the east. From the knoll, walk 39 paces north (bearing approximately 32 degrees magnetic) to the 0-foot baseline stake. The study is marked by short fenceposts. The 100-foot end of the baseline is marked by rebar.



Map Name: Farnsworth Peak

Diagrammatic Sketch

Township 1S, Range 3W, Section 32

GPS: NAD 27, UTM 12S 4504129 N 398339 E

DISCUSSION

Black Rock East - Trend Study No. 18-20

The Black Rock East study is at about the same elevation as the Black Rock West study (18-19). This site has a moderate slope of 35% and a northeast aspect. In 1997, it was noted that the site had been poorly located as it was placed on the ecotone between a thick stand of spike fescue and the noticeably drier eastern aspect dominated by needlegrass and slender wheatgrass. It was suggested that the site should be moved further to the north where elk pellet groups indicated that elk preferred the spike fescue, not the more dry east aspect. A pellet group transect read on site in 1997 estimated 48 elk days use/acre (119 edu/ha), but there were no deer pellets sampled. Pellet group data from 2002 estimated 64 elk days use/acre (159 edu/ha), while deer use was estimated at only 3 days use/acre (7 ddu/ha). Grasshoppers were common on the site in 2002.

The soils at the site are moderately deep with an effective rooting depth of almost 16 inches. The soil temperature was estimated at 50° F at 17 inches in depth. The soil textural analysis indicates a loam with a slightly acidic soil reaction (pH 6.4) The site has good protective herbaceous and litter cover, with little erosion taking place. The erosion condition class was determined as stable in 2002.

The Black Rock East site in the Smelter Canyon drainage was described as drier and originally more depleted of vegetation than the study in the Black Rock Canyon drainage. The community here is similar to the Black Rock West site in that spike fescue is also the dominant grass. There are few shrubs on the site with the most common species being isolated dense patches of chokecherry. There are also a few stickyleaf low rabbitbrush and snowberry shrubs on the slope. Total shrub cover is very low averaging only about 6% cover in 2002.

The herbaceous understory is abundant and very diverse. Spike fescue provided 75% of the total grass cover in 1997 and 37% of the total herbaceous cover. By 2002, it accounted for 81% of the grass cover and 47% of the total herbaceous cover. Several other perennial grasses occur on the site but only letterman and subalpine needlegrass are common. Grasshoppers were in very high numbers in 1997 and 2002 and were utilizing the grasses. The forb composition is very diverse with 23 species sampled in 2002. The more common perennial species include western yarrow, rose pussytoes, aster, lupine, and showy goldeneye.

1990 APPARENT TREND ASSESSMENT

The soil trend is thought to be stable with good protective cover from the herbaceous species and litter. The browse trend is not critical to this site because of the elevation. It is more of a summer range for elk. Although, the species that do occur on the site are generally in good vigor even though the sampling design did not pick up any shrubs. The herbaceous understory is thought to be in stable condition with most of the vegetative cover coming from the herbaceous species.

1997 TREND ASSESSMENT

The trend for soil is stable. Cover values for percent bare soil declined to 6%, but litter cover also declined. Protective cover from the herbaceous species is still high with 92% of the total vegetative cover coming from grasses and forbs. The much larger sampling design now picks up some browse species that were not sampled before. The numbers are relatively low and shrubs are still a minor component of the vegetative community. Trend is stable for the herbaceous species with similar sum of nested frequency values for grasses and forbs compared to 1997.

TREND ASSESSMENT

soil - stable (3)

browse - stable, but not a critical on this summer range (3)

herbaceous understory - stable (3)

2002 TREND ASSESSMENT

Trend for soil remains stable. Cover of bare ground did increase slightly while litter cover declined slightly. However, total herbaceous cover remained stable at about 45%. There is still adequate protective ground cover to prevent most erosion. There is little browse on the site which is of minor importance on this summer range. One thick patch of chokecherry located near the beginning of the baseline accounts for most of the shrub density. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses and forbs has remained stable. Spike fescue continues to dominate the site with subalpine and letterman needlegrass more common on the drier eastern aspect of the slope.

TREND ASSESSMENT

soil - stable (3)

browse - stable, but not a critical (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 20

| Type | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % | |
|-----------------------------|--------------------------|------------------|------------------|------------------|-------------------|-----|-----|-----------------|-------|
| | | '90 | '97 | '02 | '90 | '97 | '02 | '97 | '02 |
| G | Agropyron spicatum | 3 | 10 | 4 | 1 | 5 | 2 | .19 | .03 |
| G | Agropyron trachycaulum | _a 157 | _b 91 | _a 26 | 66 | 41 | 12 | .90 | .24 |
| G | Bromus carinatus | _b 102 | _a 8 | _a 22 | 47 | 4 | 7 | .22 | .66 |
| G | Leucopoa kingii | _a 21 | _b 153 | _b 163 | 9 | 49 | 49 | 17.10 | 20.87 |
| G | Melica bulbosa | 4 | 1 | - | 1 | 1 | - | .00 | - |
| G | Poa bulbosa | - | 1 | - | - | 1 | - | .00 | - |
| G | Poa fendleriana | - | 1 | 11 | - | 1 | 4 | .03 | .04 |
| G | Poa pratensis | 2 | 5 | 3 | 1 | 2 | 1 | .01 | .03 |
| G | Poa secunda | _a - | _a 1 | _b 15 | - | 1 | 7 | .00 | .13 |
| G | Stipa columbiana | _a 16 | _{ab} 36 | _b 43 | 8 | 18 | 24 | 1.09 | .53 |
| G | Stipa lettermani | 121 | 128 | 111 | 52 | 56 | 43 | 3.22 | 3.17 |
| Total for Annual Grasses | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total for Perennial Grasses | | 426 | 435 | 398 | 185 | 179 | 149 | 22.79 | 25.74 |
| Total for Grasses | | 426 | 435 | 398 | 185 | 179 | 149 | 22.79 | 25.74 |
| F | Achillea millefolium | 97 | 109 | 132 | 45 | 42 | 50 | 2.79 | 1.88 |
| F | Agoseris glauca | _b 26 | _{ab} 11 | _a 5 | 11 | 5 | 2 | .02 | .01 |
| F | Agastache urticifolia | _a - | _a 7 | _b 22 | - | 3 | 11 | .04 | .25 |
| F | Antennaria rosea | _a - | _b 51 | _b 45 | - | 17 | 18 | 4.00 | 3.40 |
| F | Arabis spp. | 13 | 9 | 8 | 7 | 5 | 5 | .02 | .02 |
| F | Aster spp. | _A - | _b 18 | _c 44 | - | 9 | 21 | .43 | .93 |
| F | Chaenactis douglasii | _b 21 | _a 1 | _a - | 10 | 1 | - | .00 | - |
| F | Cirsium spp. | _A - | _b 7 | _a - | - | 5 | - | .36 | .00 |
| F | Comandra pallida | - | - | - | - | - | - | - | .00 |
| F | Collinsia parviflora (a) | - | _a - | _b 10 | - | - | 6 | - | .03 |
| F | Crepis acuminata | _b 19 | _a - | _a - | 8 | - | - | - | - |

| Type | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % | |
|---------------------------|-----------------------------|------------------|------------------|------------------|-------------------|-----|-----|-----------------|-------|
| | | '90 | '97 | '02 | '90 | '97 | '02 | '97 | '02 |
| F | Delphinium nuttallianum | 5 | 3 | 1 | 3 | 3 | 1 | .06 | .03 |
| F | Epilobium brachycarpum (a) | - | 10 | 7 | - | 4 | 2 | .07 | .01 |
| F | Eriogonum umbellatum | - | 6 | 6 | - | 2 | 2 | .15 | .03 |
| F | Erysimum spp. | 9 | - | - | 4 | - | - | - | - |
| F | Gayophytum ramosissimum (a) | - | _b 95 | _a 1 | - | 33 | 1 | 2.12 | .01 |
| F | Helianthus annuus (a) | 1 | - | - | 1 | - | - | - | - |
| F | Helianthella uniflora | _b 16 | _a - | _a - | 6 | - | - | - | - |
| F | Lathyrus brachycalyx | 9 | 17 | 14 | 5 | 6 | 6 | 1.24 | .60 |
| F | Lactuca serriola | 4 | - | - | 3 | - | - | - | - |
| F | Linaria dalmatICA | - | - | 1 | - | - | 1 | - | .16 |
| F | Lupinus argenteus | _b 68 | _a 31 | _b 49 | 26 | 14 | 22 | 2.46 | 3.95 |
| F | Machaeranthera canescens | 1 | 7 | 7 | 1 | 4 | 3 | .07 | .04 |
| F | Madia glomerata (a) | - | - | 5 | - | - | 3 | - | .04 |
| F | Osmorhiza occidentalis | _b 12 | _a - | _a - | 6 | - | - | - | - |
| F | Penstemon spp. | _A - | _b 13 | _a - | - | 7 | - | .11 | - |
| F | Polygonum douglasii (a) | - | _b 209 | _a 159 | - | 61 | 49 | 5.67 | 1.72 |
| F | Potentilla spp. | - | 4 | - | - | 2 | - | .03 | - |
| F | Stellaria jamesiana | _a - | _c 121 | _b 25 | - | 45 | 9 | 1.61 | .07 |
| F | Taraxacum officinale | - | 5 | - | - | 2 | - | .15 | - |
| F | Thalictrum fendleri | 8 | 3 | 7 | 3 | 1 | 3 | .15 | .18 |
| F | Tragopogon dubius | _b 13 | _a 1 | _{ab} 2 | 7 | 1 | 2 | .00 | .01 |
| F | Unknown forb-perennial | - | 5 | - | - | 3 | - | .09 | - |
| F | Viguiera multiflora | _b 197 | _a 80 | _b 176 | 76 | 33 | 57 | 1.33 | 5.66 |
| F | Viola spp. | - | 2 | - | - | 1 | - | .03 | - |
| Total for Annual Forbs | | 1 | 314 | 182 | 1 | 98 | 61 | 7.87 | 1.81 |
| Total for Perennial Forbs | | 518 | 511 | 544 | 221 | 211 | 213 | 15.23 | 17.27 |
| Total for Forbs | | 519 | 825 | 726 | 222 | 309 | 274 | 23.11 | 19.09 |

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

BROWSE TRENDS --

Herd unit 18 , Study no: 20

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|----------------------------------------------|-----------------|-----|-----------------|------|
| | | '97 | '02 | '97 | '02 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 0 | 2 | - | .03 |
| B | Prunus virginiana | 12 | 13 | 4.06 | 5.65 |
| B | Symphoricarpos oreophilus | 1 | 1 | .15 | - |
| Total for Browse | | 13 | 16 | 4.21 | 5.69 |

CANOPY COVER -- LINE INTERCEPT

Herd unit 18 , Study no: 20

| Species | Percent Cover | |
|-------------------|---------------|------|
| | '97 | '02 |
| Prunus virginiana | - | 5.80 |

BASIC COVER --

Herd unit 18 , Study no: 20

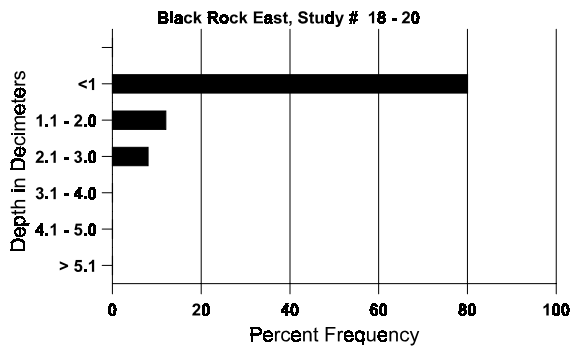
| Cover Type | Nested Frequency | | Average Cover % | | |
|-------------|------------------|-----|-----------------|-------|-------|
| | '97 | '02 | '90 | '97 | '02 |
| Vegetation | 368 | 376 | 7.75 | 55.12 | 54.47 |
| Rock | 217 | 220 | 11.75 | 6.25 | 8.47 |
| Pavement | 291 | 240 | 16.00 | 14.37 | 8.39 |
| Litter | 396 | 378 | 51.50 | 42.15 | 36.38 |
| Cryptogams | - | 5 | .25 | 0 | .01 |
| Bare Ground | 181 | 216 | 12.75 | 5.88 | 9.26 |

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 20, Black Rock East

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 15.7 | 50.0 (17.4) | 6.4 | 36.4 | 46.1 | 17.5 | 8.9 | 43.9 | 252.8 | 0.4 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 18, Study no: 20

| Type | Quadrat Frequency | | Pellet Transect | | | |
|------|-------------------|-----|------------------------|-----|------------------------|----------|
| | '97 | '02 | Pellet Groups per Acre | | Days Use per Acre (ha) | |
| | | | '97 | '02 | '97 | '02 |
| Elk | 21 | 25 | 626 | 835 | 48 (119) | 64 (159) |
| Deer | - | 2 | - | 35 | - | 3 (7) |

BROWSE CHARACTERISTICS --
Herd unit 18 , Study no: 20

| A G R E | Y R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|--------------------------------------------------|-------------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | | | | | | | | | | | |
| M | 90 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | 9 | 12 | 2 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '90 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '90 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 40 | | - | | | |
| <i>Prunus virginiana</i> | | | | | | | | | | | | | | | | | | |
| Y | 90 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 52 | - | - | - | - | - | - | - | - | 52 | - | - | - | 1040 | | | 52 |
| | 02 | 380 | - | - | - | - | - | - | - | - | 380 | - | - | - | 9240 | | | 462 |
| M | 90 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 51 | 2 | - | - | - | - | - | - | - | 53 | - | - | - | 1060 | 30 | 14 | 53 |
| | 02 | 23 | 1 | - | - | - | - | - | - | - | 23 | 1 | - | - | 480 | 34 | 19 | 24 |
| D | 90 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | 1 | - | - | - | - | - | - | - | - | - | - | 1 | 20 | | | 1 |
| | 02 | 12 | - | - | - | - | - | - | - | - | 4 | - | - | 8 | 240 | | | 12 |
| X | 90 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 140 | | | 7 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 160 | | | 8 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '90 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 03% | | | 00% | | | .94% | | | +79% | | | | | | | |
| '02 | | .20% | | | 00% | | | 02% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '90 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | | '97 | 2120 | | 1% | | | |
| | | | | | | | | | | | | '02 | 9960 | | 2% | | | |
| <i>Symphoricarpos oreophilus</i> | | | | | | | | | | | | | | | | | | |
| Y | 90 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| M | 90 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 7 | 5 | 1 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '90 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '90 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |
| | | | | | | | | | | | | '02 | 20 | | - | | | |

Trend Study 18-23-02

Study site name: South Palmer Point .

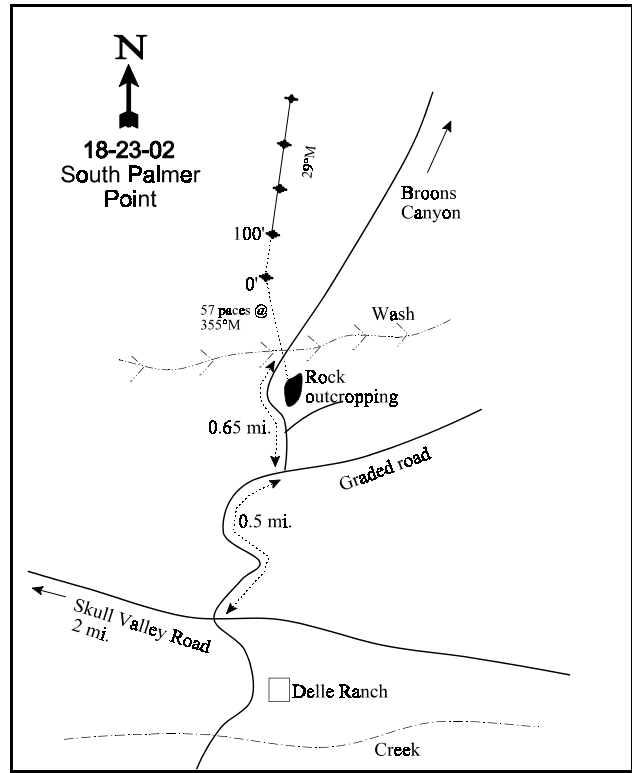
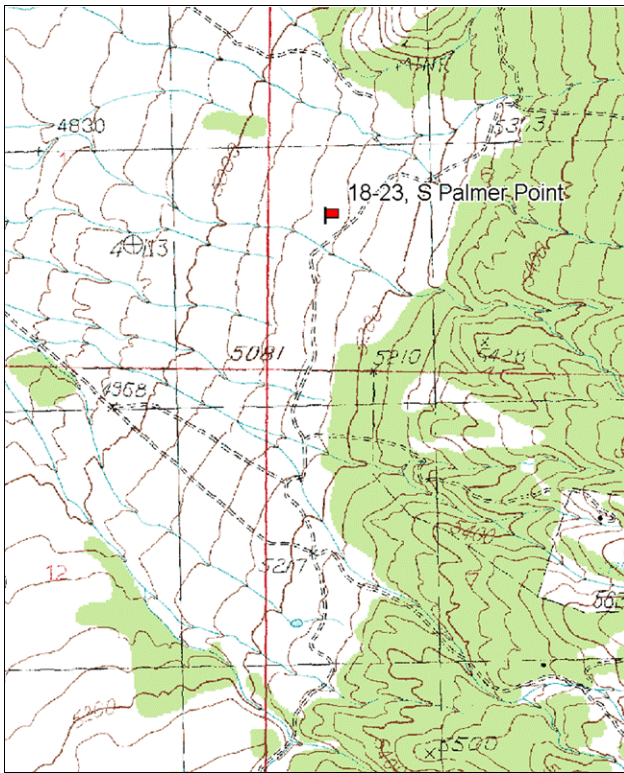
Vegetation type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 14 degrees magnetic.

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

LOCATION DESCRIPTION

From the site where the creek crosses the road at Delle Ranch, proceed north towards Broons Canyon for 0.05 miles to an intersection. Turn left, and go 0.65 miles until you reach a rock outcropping on the right hand side of the road. From the base of the rock outcropping, walk 57 paces at an azimuth of 355 degrees magnetic (across the road and a dry wash), to the 0-foot baseline stake. The baseline runs at an azimuth of 29 degrees magnetic, and is marked by green steel "T" fenceposts approximately 12 to 19 inches high. The 0-foot baseline stake has a red browse tag, number 3984, attached.



Map Name: Salt Mountain

Diagrammatic Sketch

Township 3S, Range 7W, Section 6

GPS: NAD 27, UTM 12S 4493694 N 357589 E

DISCUSSION

South Palmer Point - Trend Study No. 18-23

The South Palmer Point trend study samples a Wyoming big sagebrush-grass deer winter range. This study was said to be used heavily by wintering deer in the past. The study is on a west aspect with only a slight slope (0-3%) and an elevation of about 5,100 feet. Land management authority is with the Bureau of Land Management. Deer use was judged to be light to moderate in 1997, with some light cattle use also evident. Pellet group transect data from 2002 estimated 23 deer days use/acre (57 ddu/ha). No cattle sign was noted.

Soils are derived from fine textured alluvial deposits with many large rocks on the soil surface. Effective rooting depth is estimated at 14 inches. In 1997, soil temperature was relatively high averaging nearly 72° F at that depth. Parent material consists of a combination of quartzite, limestone, and some conglomerate rock which were alluvially deposited from the canyon to the east. Soil textural analysis indicates it to be a loam with a moderately alkaline reaction (pH 7.9). The high temperature and pH could be limiting to the establishment of some species. The amount of phosphorus in the soil is low at only 3.4 ppm. Values less than 10 ppm could limit establishment and development of some plant species. Cover of bare ground has declined from 30% in 1983 to 17% in 2002. Cryptogams are abundant with its cover increasing from less than 1% in 1983 to 12% in 2002. Vegetative cover consists primarily of cheatgrass brome, Wyoming big sagebrush, broom snakeweed, and scattered Utah juniper. This has not changed much through the years. Protective ground cover is abundant enough to prevent most erosion. The erosion condition class was determined as stable in 2002.

Browse cover comes primarily from two species, Wyoming big sagebrush and Utah juniper. These combined to provide 98% of the browse cover in 1997 and 93% in 2002. Wyoming big sagebrush is the key browse species with a density of 3,820 plants/acre in 2002. Utilization was heavy in 1983 and nearly half of the population was decadent (47%). Use was moderate in 1989 and the number of decadent plants increased to 83% of the population. Population density declined from 2,399 plants/acre in 1983 to 966 plants/acre in 1989. Use was mostly light in 1997 and 2002. The population displayed normal vigor on most plants. Percent decadence declined to about 20% while young recruitment was excellent during both readings (38% and 24%). Dead plants, which were first sampled in 1997, were abundant in 1997 and 2002 indicating that a die-off occurred in the past. The population appears to have bounced back somewhat and displays an upward trend. Vigor was normal on most plants in 2002 and average leader growth was excellent averaging 3.4 inches.

Broom snakeweed and Utah juniper are both increasers with heavy grazing. Total canopy cover of juniper averaged 11% in 2002. Point quarter data estimated 72 trees/acre with an average diameter of 7 inches. Age class analysis indicated a slowly expanding juniper population. Broom snakeweed has a stable population estimated at 2,600 plants/acre in 2002.

The most common grasses are Sandberg bluegrass and cheatgrass brome. However, neither provides much forage. Other grasses occur infrequently. Cheatgrass is dense enough in most places to create a fire hazard. If a wildfire occurred, it would mean the immediate loss of the sagebrush population. Where the cheatgrass is dense, competition from this winter annual is suppressing the establishment and growth of succulent forbs. The forbs that are present are mostly low growing species of rather poor forage value.

1983 APPARENT TREND ASSESSMENT

Although some sheet and gully erosion is occurring, overall the soil appears basically stable. The dense cheatgrass cover isn't especially effective at preventing runoff, but at least it provides some litter cover. The slope is also gentle which lessens erosion potential. Vegetatively, there are distinct problems. The key browse species, Wyoming big sagebrush, is over-utilized and appears to be in a state of decline. Increasing populations of Utah juniper and broom snakeweed, along with a high fire potential are unfavorable trends.

1989 TREND ASSESSMENT

Trend for soil is stable. Cover of bare soil has declined from 30% to 20%. Herbaceous cover and the lack of any significant slope help mitigate the effects of erosion. The trend for browse, primarily the preferred Wyoming big sagebrush, is down. This is indicated by the increase in the percentage of plants rated with poor vigor, from 47% to 72%. Percent decadence is also increasing from 47% to 83%. The herbaceous understory is slightly up for the perennial component, although there is still too many weedy species in the composition.

TREND ASSESSMENT

soil - stable (3)

browse - downward (1)

herbaceous understory - slightly upward (4)

1997 TREND ASSESSMENT

The trend for soil is slightly improving, with a decrease in percent bare soil (20% to 10%), a significant increase in cryptogamic cover (4% to 10%), and a decrease in percent rock and pavement cover. The trend for the key browse, Wyoming big sagebrush, is up with moderate use declining from 83% to 13%, those plants classified as having poor vigor declining from 72% to 11%, and percent decadence decreasing from 83% to 24%. Also of great importance is that seedling recruitment for sagebrush has increased to 37% and the percentage of young plants in the population has increased to 38%. All measured parameters have improved. The trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses and forbs has declined slightly but not enough to warrant a downward trend. However, most of the grass and forb cover for this site is derived from annuals and weedy species. Cheatgrass accounts for 50% of the total grass cover and 41% of the total herbaceous cover.

TREND ASSESSMENT

soil - slightly improved (4)

browse - upward (5)

herbaceous understory - stable but poor (3)

2002 TREND ASSESSMENT

Trend for soil is stable. Cover of bare ground has increased slightly and litter cover has declined, but total herbaceous cover has increased slightly and total vegetation cover has remained stable. There is little active erosion occurring on site and the erosion condition class was determined to be stable in 2002. Trend for Wyoming big sagebrush is up slightly. Density has increased 34% since 1997, average vigor has improved, percent decadence has declined to 19%, and young plants remain abundant. Utilization remains light and it appears that deer have not used this area heavily since 1989. Juniper trees appear to be slowly increasing and may warrant treatment in the future. The herbaceous understory is poor and continues to be dominated by cheatgrass, a winter annual. It now provides 58% of the total grass cover and 55% of the total herbaceous cover. Average cover of cheatgrass is estimated at about 13%. The only abundant perennial grass is Sandberg bluegrass which accounts for 36% of the total grass cover. However, it provides little forage. Forbs are fairly diverse but produce less than 2% total cover. The most common species is the annual bur buttercup. Trend for the herbaceous understory is considered stable. Grasses, which account for the majority of the herbaceous cover, have remained at similar frequencies compared to 1997 estimates.

TREND ASSESSMENT

soil - stable (3)

browse - up slightly (4)

herbaceous understory - stable but poor (3)

HERBACEOUS TRENDS --
Herd unit 18 , Study no: 23

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|------------------------------------|------------------|------------------|------------------|------------------|-------------------|-----|-----|-----|-----------------|-------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | <i>Agropyron spicatum</i> | 12 | 6 | 11 | 21 | 5 | 2 | 5 | 9 | .61 | .93 |
| G | <i>Aristida purpurea</i> | - | - | - | 3 | - | - | - | 1 | - | .03 |
| G | <i>Bromus tectorum</i> (a) | - | - | 308 | 301 | - | - | 97 | 93 | 8.61 | 12.80 |
| G | <i>Poa secunda</i> | _a 160 | _b 244 | _b 224 | _b 236 | 63 | 88 | 79 | 80 | 7.65 | 7.92 |
| G | <i>Sitanion hystrix</i> | _a 9 | _b 31 | _{ab} 21 | _{ab} 10 | 3 | 12 | 11 | 6 | .29 | .39 |
| Total for Annual Grasses | | 0 | 0 | 308 | 301 | 0 | 0 | 97 | 93 | 8.61 | 12.80 |
| Total for Perennial Grasses | | 181 | 281 | 256 | 270 | 71 | 102 | 95 | 96 | 8.56 | 9.28 |
| Total for Grasses | | 181 | 281 | 564 | 571 | 71 | 102 | 192 | 189 | 17.17 | 22.09 |
| F | <i>Agoseris glauca</i> | - | - | - | 1 | - | - | - | 1 | - | .00 |
| F | <i>Antennaria rosea</i> | 12 | 18 | 5 | 6 | 7 | 8 | 3 | 4 | .06 | .19 |
| F | <i>Astragalus cibarius</i> | _b 9 | _b 12 | _c 36 | _a - | 8 | 5 | 16 | - | 1.39 | - |
| F | <i>Astragalus utahensis</i> | 7 | 13 | 15 | 1 | 5 | 6 | 6 | 1 | .23 | .00 |
| F | <i>Castilleja chromosa</i> | 3 | - | - | - | 1 | - | - | - | - | - |
| F | <i>Calochortus nuttallii</i> | 11 | 19 | 10 | 4 | 7 | 9 | 6 | 2 | .03 | .01 |
| F | <i>Chaenactis douglasii</i> | _{ab} 1 | _{ab} 4 | _b 8 | _a - | 1 | 2 | 5 | - | .02 | - |
| F | <i>Cirsium undulatum</i> | _{ab} 5 | _{ab} 2 | _b 10 | _a - | 2 | 2 | 7 | - | .13 | - |
| F | <i>Comandra pallida</i> | - | - | 3 | 6 | - | - | 2 | 2 | .01 | .03 |
| F | <i>Collinsia parviflora</i> (a) | - | - | 4 | 3 | - | - | 2 | 1 | .01 | .00 |
| F | <i>Cryptantha</i> spp. | - | 3 | - | - | - | 1 | - | - | - | - |
| F | <i>Draba</i> spp. (a) | - | - | - | 4 | - | - | - | 1 | - | .00 |
| F | <i>Erodium cicutarium</i> (a) | - | - | _a 1 | _b 11 | - | - | 1 | 6 | .03 | .25 |
| F | <i>Holosteum umbellatum</i> (a) | - | - | _b 34 | _a 18 | - | - | 14 | 8 | .31 | .09 |
| F | <i>Lathyrus brachycalyx</i> | _a 10 | _b 24 | _a - | _a - | 4 | 8 | - | - | - | - |
| F | <i>Lactuca serriola</i> | _a - | _{ab} 7 | _b 8 | _a - | - | 5 | 4 | - | .04 | - |
| F | <i>Lygodesmia</i> spp. | - | - | 3 | - | - | - | 2 | - | .01 | - |
| F | <i>Microsteris gracilis</i> (a) | - | - | 1 | 4 | - | - | 1 | 2 | .00 | .01 |
| F | <i>Phlox longifolia</i> | _a 10 | _b 32 | _{ab} 24 | _{ab} 29 | 4 | 17 | 10 | 12 | .25 | .16 |
| F | <i>Ranunculus testiculatus</i> (a) | - | - | 154 | 122 | - | - | 56 | 44 | 1.09 | .44 |
| F | <i>Tragopogon dubius</i> | - | - | 7 | - | - | - | 3 | - | .04 | - |
| F | <i>Zigadenus paniculatus</i> | - | - | 1 | 2 | - | - | 1 | 2 | .03 | .06 |
| Total for Annual Forbs | | 0 | 0 | 194 | 162 | 0 | 0 | 74 | 62 | 1.45 | 0.80 |
| Total for Perennial Forbs | | 68 | 134 | 130 | 49 | 39 | 63 | 65 | 24 | 2.28 | 0.47 |
| Total for Forbs | | 68 | 134 | 324 | 211 | 39 | 63 | 139 | 86 | 3.73 | 1.27 |

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

BROWSE TRENDS --

Herd unit 18 , Study no: 23

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|-------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | Artemisia tridentata wyomingensis | 66 | 77 | 11.78 | 9.55 |
| B | Chrysothamnus nauseosus albicaulis | 1 | 0 | .03 | - |
| B | Chrysothamnus viscidiflorus viscidiflorus | 1 | 0 | .00 | - |
| B | Gutierrezia sarothrae | 38 | 45 | .34 | 2.18 |
| B | Juniperus osteosperma | 6 | 9 | 7.68 | 8.89 |
| Total for Browse | | 112 | 131 | 19.85 | 20.63 |

CANOPY COVER -- LINE INTERCEPT

Herd unit 18 , Study no: 23

| Species | Percent Cover | |
|-----------------------------------|---------------|-------|
| | '97 | '02 |
| Artemisia tridentata wyomingensis | - | 9.67 |
| Gutierrezia sarothrae | - | 1.42 |
| Juniperus osteosperma | 5 | 10.92 |

Key Browse Annual Leader Growth

Herd unit 18 , Study no: 23

| Species | Average leader growth (in) |
|-----------------------------------|----------------------------|
| | '02 |
| Artemisia tridentata wyomingensis | 3.4 |

Point-Quarter Tree Data

Herd unit 18 , Study no: 23

| Species | Trees per Acre | Average diameter (in) |
|-----------------------|----------------|-----------------------|
| | '02 | '02 |
| Juniperus osteosperma | 72 | 7.1 |

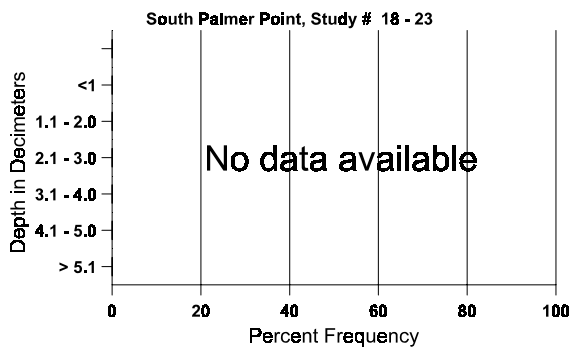
BASIC COVER --
Herd unit 18 , Study no: 23

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 354 | 361 | 1.50 | 6.00 | 39.91 | 42.34 |
| Rock | 89 | 103 | 3.25 | 6.25 | 2.59 | 2.93 |
| Pavement | 256 | 257 | 1.25 | 10.00 | 5.13 | 5.51 |
| Litter | 385 | 367 | 63.50 | 53.75 | 43.77 | 37.09 |
| Cryptogams | 228 | 236 | .25 | 3.75 | 10.16 | 12.06 |
| Bare Ground | 218 | 266 | 30.25 | 20.25 | 10.21 | 16.87 |

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 23, South Palmer Point

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 14 | 71.6 (14.5) | 7.9 | 42.0 | 33.1 | 24.9 | 2.1 | 3.4 | 259.2 | 0.5 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 18 , Study no: 23

| Type | Quadrat Frequency | | Pellet Transect | |
|--------|-------------------|-----|------------------------|------------------------|
| | '97 | '02 | Pellet Groups per Acre | Days Use per Acre (ha) |
| Rabbit | 18 | 3 | 0 | 0 |
| Deer | 16 | 5 | 296 | 23 (56) |
| Cattle | 2 | - | - | - |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 23

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|----|------------------|---|---|-------------------|---|---|----------------|------|------|-----|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Artemisia tridentata wyomingensis</i> | | | | | | | | | | | | | | | | | | |
| S | 83 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 45 | - | - | - | - | - | - | - | - | 45 | - | - | - | 940 | | 47 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 89 | 2 | - | - | - | - | - | - | - | - | 1 | - | 1 | - | 66 | | 2 | |
| | 97 | 46 | 2 | - | - | - | - | - | - | - | 48 | - | - | - | 960 | | 48 | |
| | 02 | 45 | - | - | - | - | - | - | - | - | 45 | - | - | - | 900 | | 45 | |
| M | 83 | - | 10 | 27 | - | - | - | - | - | - | 37 | - | - | - | 1233 | 19 26 | 37 | |
| | 89 | 1 | 2 | - | - | - | - | - | - | - | 2 | - | 1 | - | 100 | 39 29 | 3 | |
| | 97 | 40 | 9 | - | - | - | - | - | - | - | 47 | - | 2 | - | 980 | 28 45 | 49 | |
| | 02 | 101 | 7 | - | 2 | - | - | - | - | - | 110 | - | - | - | 2200 | 21 31 | 110 | |
| D | 83 | - | 11 | 23 | - | - | - | - | - | - | - | - | 34 | - | 1133 | | 34 | |
| | 89 | 2 | 22 | - | - | - | - | - | - | - | 5 | - | 19 | - | 800 | | 24 | |
| | 97 | 16 | 6 | - | 2 | - | - | - | - | - | 12 | - | 1 | 11 | 600 | | 30 | |
| | 02 | 32 | 2 | - | 2 | - | - | - | - | - | 19 | 3 | 1 | 13 | 720 | | 36 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 2080 | | 104 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1560 | | 78 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 29% | | | 69% | | | 47% | | | -60% | | | | | | | |
| '89 | | 83% | | | 00% | | | 72% | | | +62% | | | | | | | |
| '97 | | 13% | | | 00% | | | 11% | | | +34% | | | | | | | |
| '02 | | 05% | | | 00% | | | 07% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 2399 | Dec: | 47% | | | | |
| | | | | | | | | | | | '89 | 966 | | 83% | | | | |
| | | | | | | | | | | | '97 | 2540 | | 24% | | | | |
| | | | | | | | | | | | '02 | 3820 | | 19% | | | | |
| <i>Chrysothamnus nauseosus albicaulis</i> | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 15 18 | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 0 | Dec: | - | | | | |
| | | | | | | | | | | | '89 | 0 | | - | | | | |
| | | | | | | | | | | | '97 | 20 | | - | | | | |
| | | | | | | | | | | | '02 | 0 | | - | | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | |
|--------------------------------------------------|----------------------------|---------------------|---|------------------|---|--------------------|--------------------------------|----------------|-------|---|----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | |
| Chrysothamnus viscidiflorus viscidiflorus | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 1 | - | - | - | - | - | - | 20 | | 1 |
| | 02 | - | - | - | - | - | - | - | 0 | | 0 |
| M | 83 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 97 | - | - | - | - | - | - | - | 0 | 6 | 5 |
| | 02 | - | - | - | - | - | - | - | 0 | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 00% | | 00% | | 00% | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | |
| '97 | | 00% | | 00% | | 00% | | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 0 | Dec: | - | | |
| | | | | | | '89 | 0 | | - | | |
| | | | | | | '97 | 20 | | - | | |
| | | | | | | '02 | 0 | | - | | |
| Gutierrezia sarothrae | | | | | | | | | | | |
| S | 83 | 59 | - | - | - | - | - | - | 59 | - | 59 |
| | 89 | 1 | - | - | - | - | - | - | 1 | - | 1 |
| | 97 | 3 | - | - | - | - | - | - | 3 | - | 3 |
| | 02 | - | - | - | - | - | - | - | 0 | - | 0 |
| Y | 83 | 38 | - | - | - | - | - | - | 38 | - | 38 |
| | 89 | 23 | - | - | - | - | - | - | 22 | 1 | 23 |
| | 97 | 34 | 4 | - | - | - | - | - | 38 | - | 38 |
| | 02 | 1 | - | - | - | - | - | - | 1 | - | 1 |
| M | 83 | 58 | - | - | - | - | - | - | 58 | - | 58 |
| | 89 | 88 | - | - | - | - | - | - | 87 | 1 | 88 |
| | 97 | 88 | - | - | - | - | - | - | 88 | - | 88 |
| | 02 | 92 | - | - | - | - | - | - | 92 | - | 92 |
| D | 83 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 89 | 1 | - | - | - | - | - | - | 1 | - | 1 |
| | 97 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 02 | 37 | - | - | - | - | - | - | 29 | - | 37 |
| X | 83 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 97 | - | - | - | - | - | - | - | 60 | - | 3 |
| | 02 | - | - | - | - | - | - | - | 800 | - | 40 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 00% | | 00% | | 00% | | +14% | | | |
| '89 | | 00% | | 00% | | 03% | | -32% | | | |
| '97 | | 03% | | 00% | | 00% | | + 3% | | | |
| '02 | | 00% | | 00% | | 06% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 3199 | Dec: | 0% | | |
| | | | | | | '89 | 3732 | | 1% | | |
| | | | | | | '97 | 2520 | | 0% | | |
| | | | | | | '02 | 2600 | | 28% | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|---|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| S | '83 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| Y | '83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | '89 | 6 | - | - | - | - | - | - | - | - | 6 | - | - | - | 200 | | 6 | |
| | '97 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | '02 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | | 3 | |
| M | '83 | 2 | - | - | 2 | - | - | - | - | - | 4 | - | - | - | 133 | 62 44 | 4 | |
| | '89 | - | - | - | 2 | - | - | - | - | - | 2 | - | - | - | 66 | 335 118 | 2 | |
| | '97 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | - - | 5 | |
| | '02 | 5 | - | - | - | - | - | 2 | - | - | 7 | - | - | - | 140 | - - | 7 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +38% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -55% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +40% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 166 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 266 | | - | | | |
| | | | | | | | | | | | | '97 | 120 | | - | | | |
| | | | | | | | | | | | | '02 | 200 | | - | | | |

Trend Study 18-24-02

Study site name: Salt Mountain Stock Pond.

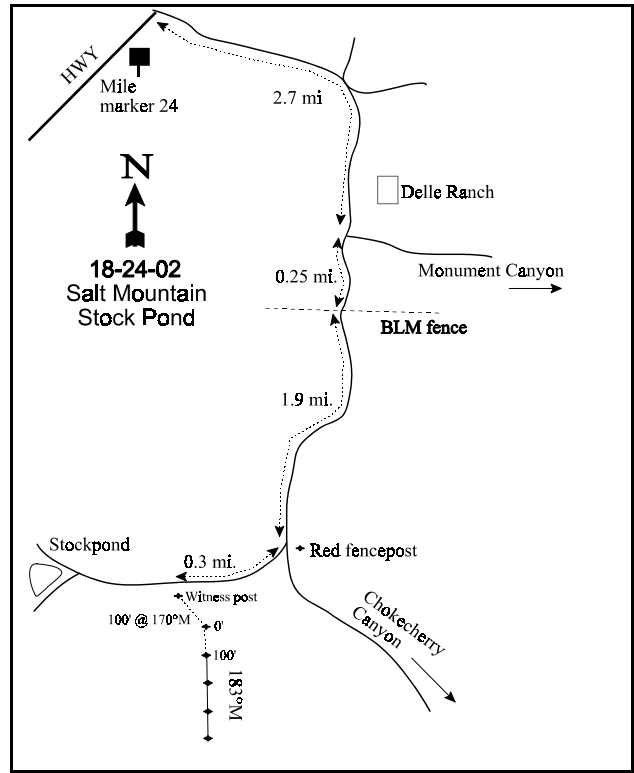
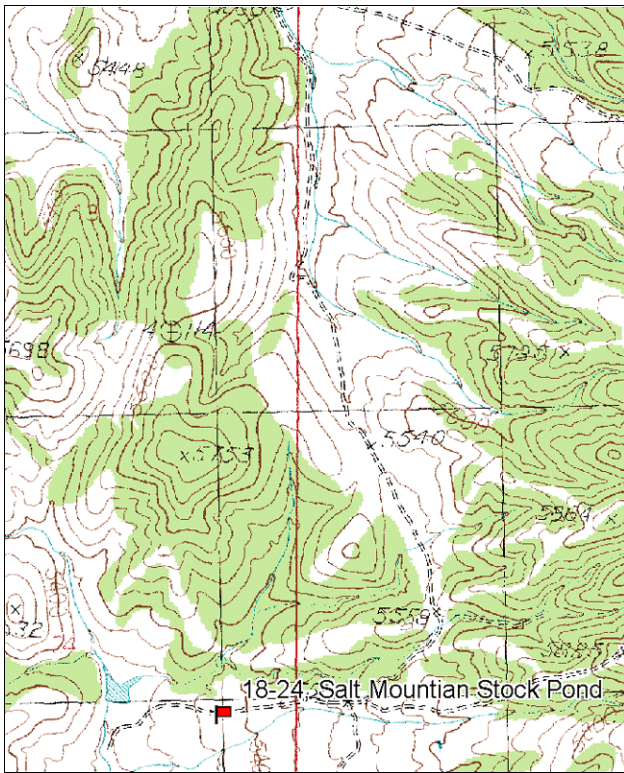
Vegetation type: Chained, Seeded PJ.

Compass bearing: frequency baseline 183 degrees magnetic.

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

LOCATION DESCRIPTION

Turn off highway between mile mark 24 and 25. From the highway, go 2.7 miles staying right on the main road to Delle Ranch ponds and trees. The road then turns south. From Delle Ranch, proceed south towards Salt Mountain, to an intersection to the right (west) heading to Salt Mountain. There will be a red post on the east side of the intersection. Turn right and proceed 0.30 miles to a witness post on the left side of the road. From the witness post, the 0-foot baseline stake is 21 paces away at an azimuth of 185 degrees magnetic. The study is marked by green steel "T" fenceposts approximately 12 to 18 inches in height. The 0-foot baseline stake has a browse tag, number 5926, attached.



Map Name: Salt Mountain

Diagrammatic Sketch

Township 3S, Range 8W, Section 24

GPS: NAD 27, UTM 12S 4488909 N 356979 E

DISCUSSION

Salt Mountain Stock Pond - Trend Study No. 18-24

The Salt Mountain Stock Pond study is located on a chained and seeded juniper-pinyon woodland immediately east of Salt Mountain. The area was retreated between the 1983 and 1989 readings to remove most of the remaining juniper trees. In the past, the area has been important deer winter range and also provides summer grazing for cattle. An old pellet group transect traverses the immediate study area. The site slopes very gently to the southwest at an elevation of approximately 5,400 feet. Pellet group transect data from 2002 estimated 27 deer days use/acre (74 ddu/ha). There was no cattle use on site in 2002, but cow use from the previous summer (2001) was estimated at 8 cow days use/acre (22 cdu/ha).

Soil has been alluvially deposited and is medium to fine textured. The soil textural analysis indicates a sandy clay loam with a moderately alkaline soil reaction (pH 7.9). Effective rooting depth is estimated at almost 13 inches. However, the soil temperature was relatively high averaging 70° F at 13 inches in depth. The high soil temperature could be limiting to the germination and establishment of cool season perennial species. The amount of phosphorus is low at only 4.8 ppm which could be a limiting factor for the establishment of plant species. Values of at least 10 ppm are thought to be the minimum. A few large rocks are present on the soil surface. The area initially showed evidence of moderate sheet erosion. This resulted largely from trampling by cattle and a general lack of good protective ground cover. Cover of bare soil was quite high in 1983, averaging nearly 34%. This has declined to only 16% in 1997 and 2002. Currently, there is minimal erosion occurring and the erosion condition class was determined to be slight in 2002.

Vegetative composition is dominated by a relatively sparse stand of Wyoming big sagebrush interspersed with Utah juniper trees. Antelope bitterbrush occurs infrequently and is heavily hedged. During the 1983 reading, sagebrush vigor was generally poor. Eighty-six percent of the plants were classified as having moderate to heavy use. This was somewhat surprising in view of the fact that relatively few deer pellet groups were present. Many plants had a yellow or chlorotic appearance, which may be indicative of a shallow hardpan, a serious iron deficiency, or an insect or disease problem. Initially, sagebrush age structure included a large number of decadent plants (40%), probably resulting from the combination of poor vigor and heavy use. Since 1983, sagebrush has maintained a stable density of about 3,000 plants/acre. Utilization was mostly light to moderate from 1989-2002. The number of decadent plants has remained relatively high ranging from 43% in 1989 to 31% in 2002. Vigor was poor on the majority of the decadent plants in 1989 and 2002. The number of dead plants sampled in 1997 and 2002 was low, while young recruitment was good with 18% and 22% of the population respectively consisting of young plants. As stated earlier, the population has remained stable since 1989, but it appears that this may be a marginal site for Wyoming big sagebrush. Even with light use, the population maintains moderately high rates of decadency and poor vigor. Annual leader growth was relatively good in 2002 averaging 1.5 inches.

Although the area was seeded, Sandberg bluegrass, a native species, was the most abundant (89% quadrat frequency) perennial grass in 1983. Fairway crested wheatgrass was the only seeded species encountered and it had a quadrat frequency of 42%. Initial forage production was rather low. Crested wheatgrass has increased significantly in frequency with each reading. By 2002, it accounted for 82% of the total grass cover and 81% of the total herbaceous cover. Sandberg bluegrass is still abundant but declined significantly in nested frequency in 2002. Forb composition is diverse but most species occur infrequently. It is composed entirely of native species which offer little forage value to wintering deer.

1983 APPARENT TREND ASSESSMENT

In spite of nearly level terrain, this site has noticeably eroded. The trampling effect of cattle and lack of a vigorous herbaceous component has resulted in an excessive amount of erosion pavement and bare ground. Vigor of seeded grasses and native shrubs is less than desirable. These conditions have all contributed to apparent increases in cheatgrass brome, broom snakeweed, and annual forbs. Status of the key browse species, Wyoming big sagebrush, is questionable. It has poor vigor and an unfavorable age structure. However, our opinion is that it could recover quickly if granted some respite from use.

1989 TREND ASSESSMENT

Since the reading in 1983, portions of the old chaining have been retreated for the removal of most of the young trees. The trend for soil is slightly improved with more vegetative cover and less bare soil. The key shrub for the site is Wyoming big sagebrush which shows a slightly downward trend due to an increase in percent decadence to 43% and a loss of about one-third of the population. Those classified with poor vigor have decreased, but not substantially. The trend for sagebrush is still slightly downward with the added depressing effects of extended drought. For the herbaceous understory, it shows a slight improvement with significantly improved values for crested wheatgrass. The forbs are still a very minor component of the understory.

TREND ASSESSMENT

soil - slightly upward (4)

browse - slightly downward (2)

herbaceous understory - slightly upward (4)

1997 TREND ASSESSMENT

Percent bare soil has been decreasing since 1983 when it was at its highest (34%). Now percent bare soil is at its lowest level (16%), while rock and pavement cover have remained about the same. With an increase in herbaceous cover, trend for soil is slightly improved. Trend for the key browse species, Wyoming big sagebrush, is considered stable at this time. However, this would be dependent on what happens to the decadent portion of the population in which 58% of them were classified as dying. The noxious increaser, broom snakeweed, has shown an alarming increase in its density, from 200 to 4,540 plants/acre. This higher density could be mostly reflective of the much larger sample size giving a greatly increased accuracy for estimating browse populations. However, the population also has the characteristics of an increasing population with a high proportion of young plants in the population (29%). The herbaceous understory (perennial component) has shown slight improvements through time, but only minimally. The most significant improvement has come from crested wheatgrass where its sum of nested frequency has almost doubled since 1989. There has also been some improvement in the forbs, but they still make up an almost insignificant portion of the herbaceous understory (12%) and 55% of the forb cover comes from bur buttercup.

TREND ASSESSMENT

soil - slightly improved (4)

browse - stable (3)

herbaceous understory - slightly improved (4)

2002 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1997. There is adequate protective ground cover to prevent most erosion. Trend for the key browse species, Wyoming big sagebrush, is stable. Density is unchanged, use is mostly light, and percent decadence is similar to 1997 levels at 31%. The number of decadent plants is still moderately high and half of them were classified as dying in 2002. Young recruitment remains good with 22% of the population consisting of young plants. This is adequate to maintain the stand at current levels. The increaser, broom snakeweed, has remained stable at 4,680 plants/acre in 2002. The population is mostly mature. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses has remained stable, while frequency of perennial forbs has declined. However, forbs are not abundant and contribute little forage. Composition of perennial grasses has changed with the nested frequency of crested wheatgrass increasing significantly and frequency of Sandberg bluegrass declined significantly. Crested wheatgrass now provides 82% of the total grass cover or 81% of the total herbaceous cover. Cheatgrass is present but not abundant.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 24

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|---------------------------------|------------------|------------------|-------------------|------------------|-------------------|-----|-----|-----|-----------------|-------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | <i>Agropyron cristatum</i> | _a 102 | _b 145 | _c 267 | _d 283 | 42 | 58 | 87 | 88 | 16.01 | 23.15 |
| G | <i>Agropyron spicatum</i> | 10 | 3 | - | 12 | 5 | 1 | - | 3 | - | .68 |
| G | <i>Bromus japonicus</i> (a) | - | - | 25 | 27 | - | - | 8 | 12 | .11 | .09 |
| G | <i>Bromus tectorum</i> (a) | - | - | 134 | 152 | - | - | 44 | 55 | 1.77 | 2.19 |
| G | <i>Poa secunda</i> | _b 239 | _b 221 | _{ab} 205 | _a 169 | 89 | 80 | 79 | 68 | 3.64 | 2.03 |
| G | <i>Sitanion hystrix</i> | _a 1 | _b 18 | _a - | _a 3 | 1 | 6 | - | 1 | - | .15 |
| G | <i>Vulpia octoflora</i> (a) | - | - | - | 1 | - | - | - | 1 | - | .00 |
| Total for Annual Grasses | | 0 | 0 | 159 | 180 | 0 | 0 | 52 | 68 | 1.88 | 2.28 |
| Total for Perennial Grasses | | 352 | 387 | 472 | 467 | 137 | 145 | 166 | 160 | 19.65 | 26.02 |
| Total for Grasses | | 352 | 387 | 631 | 647 | 137 | 145 | 218 | 228 | 21.54 | 28.30 |
| F | <i>Agoseris glauca</i> | 10 | 12 | 8 | 4 | 7 | 8 | 4 | 3 | .02 | .01 |
| F | <i>Alyssum alyssoides</i> (a) | - | - | 5 | 2 | - | - | 2 | 2 | .01 | .01 |
| F | <i>Antennaria rosea</i> | _b 25 | _b 24 | _a 6 | _a 2 | 11 | 15 | 2 | 1 | .03 | .00 |
| F | <i>Astragalus cibarius</i> | _b 36 | _a - | _b 29 | _a 3 | 17 | - | 13 | 2 | .35 | .01 |
| F | <i>Astragalus convallarius</i> | - | - | - | - | - | - | - | - | - | - |
| F | <i>Astragalus</i> spp. | - | - | 1 | - | - | - | 1 | - | .00 | - |
| F | <i>Astragalus utahensis</i> | 1 | 2 | 2 | - | 1 | 1 | 2 | - | .07 | - |
| F | <i>Castilleja linariaefolia</i> | 2 | - | 2 | - | 1 | - | 1 | - | .00 | - |
| F | <i>Camelina microcarpa</i> (a) | - | - | 12 | 2 | - | - | 5 | 1 | .02 | .00 |
| F | <i>Calochortus nuttallii</i> | _b 17 | _a - | _{ab} 17 | _a 1 | 12 | - | 7 | 1 | .04 | .00 |
| F | <i>Castilleja</i> spp. | - | - | 3 | - | - | - | 1 | - | .00 | - |
| F | <i>Chaenactis douglasii</i> | _{ab} 5 | _a 1 | _b 18 | _a - | 3 | 1 | 8 | - | .06 | - |

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|---------------------------|------------------------------------|------------------|-----------------|------------------|-----------------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| F | <i>Cirsium neomexicanum</i> | 6 | 5 | 5 | - | 2 | 3 | 3 | - | .06 | - |
| F | <i>Collinsia parviflora</i> (a) | - | - | 3 | 10 | - | - | 1 | 4 | .00 | .02 |
| F | <i>Crepis acuminata</i> | - | - | 2 | - | - | - | 1 | - | .00 | - |
| F | <i>Cryptantha</i> spp. | - | 2 | - | - | - | 1 | - | - | - | - |
| F | <i>Descurainia pinnata</i> (a) | - | - | - | 3 | - | - | - | 1 | - | .00 |
| F | <i>Draba</i> spp. (a) | - | - | 5 | - | - | - | 2 | - | .01 | - |
| F | <i>Epilobium brachycarpum</i> (a) | - | - | 9 | - | - | - | 4 | - | .07 | - |
| F | <i>Erodium cicutarium</i> (a) | - | - | - | 6 | - | - | - | 2 | - | .03 |
| F | <i>Eriogonum</i> spp. | 2 | - | - | - | 1 | - | - | - | - | - |
| F | <i>Helianthus annuus</i> (a) | - | 9 | - | - | - | 4 | - | - | - | - |
| F | <i>Holosteum umbellatum</i> (a) | - | - | _a 5 | _b 42 | - | - | 2 | 20 | .01 | .12 |
| F | <i>Lactuca serriola</i> | - | - | 1 | - | - | - | 1 | - | .00 | - |
| F | <i>Machaeranthera canescens</i> | _a 4 | _a 3 | _b 20 | _a - | 2 | 1 | 8 | - | .06 | - |
| F | <i>Microsteris gracilis</i> (a) | - | - | 4 | 8 | - | - | 1 | 4 | .00 | .02 |
| F | <i>Oenothera</i> spp. | 2 | - | - | - | 1 | - | - | - | - | - |
| F | <i>Penstemon</i> spp. | _A - | _{ab} 2 | _b 10 | _a - | - | 2 | 6 | - | .08 | - |
| F | <i>Phlox longifolia</i> | - | - | 8 | 1 | - | - | 3 | 1 | .01 | .00 |
| F | <i>Ranunculus testiculatus</i> (a) | - | - | _b 167 | _a 48 | - | - | 53 | 20 | 1.67 | .15 |
| F | <i>Senecio multilobatus</i> | 6 | - | - | 1 | 2 | - | - | 1 | - | .00 |
| F | <i>Tragopogon dubius</i> | _{ab} 4 | _a - | _b 7 | _a - | 2 | - | 5 | - | .07 | - |
| F | <i>Trifolium</i> spp. | - | - | 1 | - | - | - | 1 | - | .00 | - |
| F | <i>Zigadenus paniculatus</i> | - | - | 2 | - | - | - | 1 | - | .00 | - |
| Total for Annual Forbs | | 0 | 9 | 210 | 121 | 0 | 4 | 70 | 54 | 1.81 | 0.37 |
| Total for Perennial Forbs | | 120 | 51 | 142 | 12 | 62 | 32 | 68 | 9 | 0.92 | 0.04 |
| Total for Forbs | | 120 | 60 | 352 | 133 | 62 | 36 | 138 | 63 | 2.74 | 0.41 |

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

BROWSE TRENDS --
Herd unit 18 , Study no: 24

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|-------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | Artemisia tridentata wyomingensis | 73 | 63 | 9.63 | 8.08 |
| B | Atriplex canescens | 0 | 1 | - | - |
| B | Chrysothamnus nauseosus | 1 | 0 | .00 | - |
| B | Chrysothamnus viscidiflorus viscidiflorus | 1 | 1 | - | .15 |
| B | Gutierrezia sarothrae | 63 | 70 | 1.08 | 2.32 |
| B | Juniperus osteosperma | 5 | 5 | - | 1.62 |
| B | Opuntia spp. | 2 | 2 | - | - |
| Total for Browse | | 145 | 142 | 10.71 | 12.18 |

CANOPY COVER -- LINE INTERCEPT
Herd unit 18 , Study no: 24

| Species | Percent Cover | |
|-----------------------------------|---------------|------|
| | '97 | '02 |
| Artemisia tridentata wyomingensis | - | 9.00 |
| Gutierrezia sarothrae | - | 2.75 |
| Juniperus osteosperma | - | 1.33 |

Key Browse Annual Leader Growth
Herd unit 18 , Study no: 24

| Species | Average leader growth (in) |
|-----------------------------------|----------------------------|
| | '02 |
| Artemisia tridentata wyomingensis | 1.5 |

Point-Quarter Tree Data
Herd unit 18 , Study no: 24

| Species | Trees per Acre | Average diameter (in) |
|-----------------------|----------------|-----------------------|
| | '02 | '02 |
| Juniperus osteosperma | 51 | 1.9 |

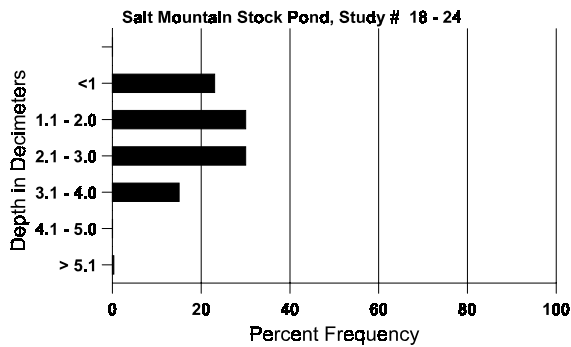
BASIC COVER --
Herd unit 18 , Study no: 24

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 361 | 357 | 2.25 | 15.00 | 36.75 | 41.09 |
| Rock | 80 | 83 | .25 | .50 | .83 | 1.85 |
| Pavement | 268 | 222 | 10.00 | 7.25 | 7.19 | 4.97 |
| Litter | 391 | 389 | 52.00 | 49.50 | 45.63 | 48.98 |
| Cryptogams | 160 | 122 | 2.00 | .50 | 3.69 | 2.94 |
| Bare Ground | 270 | 254 | 33.50 | 27.25 | 16.01 | 16.11 |

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 24, Salt Mountain Stock Pond

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 12.73 | 69.5 (12.8) | 7.6 | 52.0 | 20.4 | 27.6 | 2.1 | 4.8 | 224.0 | 0.5 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 18 , Study no: 24

| Type | Quadrat Frequency | | Pellet Transect | |
|--------|-------------------|-----|------------------------------|------------------------------|
| | '97 | '02 | Pellet Groups per Acre 02 | Days Use per Acre (ha) 02 |
| Sheep | 2 | - | - | - |
| Rabbit | 12 | 49 | - | - |
| Deer | 18 | 12 | 357 | 27 (74) |
| Cattle | 2 | 4 | 96 | 8 (22) |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 24

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|----|------------------|---|---|-------------------|---|---|----------------|------|------|-----|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Artemisia tridentata wyomingensis</i> | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | 43 | - | - | - | - | - | 11 | - | - | 54 | - | - | - | 1800 | | | 54 |
| | 97 | 26 | - | - | - | - | - | - | - | - | 26 | - | - | - | 520 | | | 26 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| Y | 83 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | | 2 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 26 | 2 | - | - | - | - | - | - | - | 25 | - | 1 | - | 560 | | | 28 |
| | 02 | 32 | - | - | 1 | - | - | - | - | - | 33 | - | - | - | 660 | | | 33 |
| M | 83 | 16 | 29 | 38 | - | - | - | - | - | - | 24 | 37 | 22 | - | 2766 | 24 | 42 | 83 |
| | 89 | 46 | 5 | 1 | - | - | - | - | - | - | 49 | 1 | 2 | - | 1733 | 19 | 25 | 52 |
| | 97 | 41 | 26 | 8 | - | - | - | - | - | - | 74 | - | 1 | - | 1500 | 20 | 36 | 75 |
| | 02 | 61 | 12 | - | - | - | - | - | - | - | 72 | 1 | - | - | 1460 | 19 | 28 | 73 |
| D | 83 | 2 | 31 | 24 | - | - | - | - | - | - | 21 | 25 | 10 | 1 | 1900 | | | 57 |
| | 89 | 37 | 3 | - | - | - | - | - | - | - | 28 | - | 7 | 5 | 1333 | | | 40 |
| | 97 | 29 | 13 | 2 | - | 3 | 3 | - | - | - | 21 | - | - | 29 | 1000 | | | 50 |
| | 02 | 37 | 10 | - | - | - | - | - | - | - | 22 | - | - | 25 | 940 | | | 47 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 360 | | | 18 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 580 | | | 29 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 42% | | | 44% | | | 23% | | | -35% | | | | | | | |
| '89 | | 09% | | | 01% | | | 15% | | | - 0% | | | | | | | |
| '97 | | 29% | | | 08% | | | 20% | | | + 0% | | | | | | | |
| '02 | | 14% | | | 00% | | | 16% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 4732 | Dec: | 40% | | | | |
| | | | | | | | | | | | '89 | 3066 | | 43% | | | | |
| | | | | | | | | | | | '97 | 3060 | | 33% | | | | |
| | | | | | | | | | | | '02 | 3060 | | 31% | | | | |
| <i>Atriplex canescens</i> | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | - | - | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 0 | Dec: | - | | | | |
| | | | | | | | | | | | '89 | 0 | | - | | | | |
| | | | | | | | | | | | '97 | 0 | | - | | | | |
| | | | | | | | | | | | '02 | 20 | | - | | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|--------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|----|------|--------------------|--------------------------------|---|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Chrysothamnus nauseosus | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| | '83 | 00% | | | 00% | | | 00% | | | | | | | | | | |
| | '89 | 00% | | | 00% | | | 00% | | | | | | | | | | |
| | '97 | 00% | | | 00% | | | 00% | | | | | | | | | | |
| | '02 | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |
| Chrysothamnus viscidiflorus viscidiflorus | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 6 | 9 | 1 |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 7 | 7 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| | '83 | 00% | | | 00% | | | 00% | | | | | | | | | | |
| | '89 | 00% | | | 00% | | | 00% | | | | | | | | | | |
| | '97 | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| | '02 | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |
| | | | | | | | | | | | | '02 | 20 | | - | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|---|--------------------|--------------------------------|----------------|-----|----|-----|
| | | 1 | 2 | 3 | 4 | | | | | | |
| Gutierrezia sarothrae | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 15 | - | - | 1 | - | - | - | 16 | - | 16 |
| | 02 | - | - | - | - | - | - | - | 0 | | 0 |
| Y | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 65 | 1 | - | - | - | - | - | 66 | - | 66 |
| | 02 | 1 | - | - | - | - | - | - | 1 | - | 1 |
| M | 83 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 89 | 6 | - | - | - | - | - | - | 6 | 10 | 6 |
| | 97 | 157 | - | - | - | - | - | - | 157 | 11 | 157 |
| | 02 | 204 | - | - | 1 | - | - | - | 194 | 1 | 205 |
| D | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 4 | - | - | - | - | - | - | 2 | - | 4 |
| | 02 | 28 | - | - | - | - | - | - | 9 | 9 | 28 |
| X | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | - | - | - | - | - | - | - | 0 | | 0 |
| | 02 | - | - | - | - | - | - | - | 560 | | 28 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 00% | | 00% | | 00% | | | | | |
| '89 | | 00% | | 00% | | 00% | | +96% | | | |
| '97 | | .44% | | 00% | | .88% | | + 3% | | | |
| '02 | | 00% | | 00% | | 12% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 0 | Dec: | 0% | | |
| | | | | | | '89 | 200 | | 0% | | |
| | | | | | | '97 | 4540 | | 2% | | |
| | | | | | | '02 | 4680 | | 12% | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | | | | | | | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|---|--------------------|--------------------------------|----------------|-------|-----|-----|------|---|-----|----|----|---|--|--|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | | | | | | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | | |
| | 97 | - | - | - | 1 | - | - | - | - | 1 | - | - | - | 20 | | 1 | | | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | | |
| Y | 83 | 3 | - | - | - | - | - | - | - | 3 | - | - | - | 100 | | 3 | | | |
| | 89 | 3 | - | - | - | - | - | - | - | 3 | - | - | - | 100 | | 3 | | | |
| | 97 | 4 | - | - | - | - | - | - | - | 4 | - | - | - | 80 | | 4 | | | |
| | 02 | - | - | - | 1 | - | - | - | - | 1 | - | - | - | 20 | | 1 | | | |
| M | 83 | 6 | - | - | - | - | - | - | - | 4 | - | 2 | - | 200 | 56 | 56 | 6 | | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | | |
| | 97 | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 20 | - | - | 1 | | |
| | 02 | 4 | - | - | - | - | - | - | - | 4 | - | - | - | 80 | - | - | 4 | | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 140 | | 7 | | | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 220 | | 11 | | | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | | | | | | | |
| '83 | | 00% | | 00% | | 22% | | -67% | | | | | | | | | | | |
| '89 | | 00% | | 00% | | 00% | | + 0% | | | | | | | | | | | |
| '97 | | 00% | | 00% | | 00% | | + 0% | | | | | | | | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 300 | Dec: | - | | | | | | |
| | | | | | | | | | | '89 | 100 | | - | | | | | | |
| | | | | | | | | | | '97 | 100 | | - | | | | | | |
| | | | | | | | | | | '02 | 100 | | - | | | | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | | |
| | 97 | 2 | - | - | - | - | - | - | - | 2 | - | - | - | 40 | 4 | 9 | 2 | | |
| | 02 | 2 | - | - | - | - | - | - | - | 2 | - | - | - | 40 | - | - | 2 | | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | | | | | | | |
| '83 | | 00% | | 00% | | 00% | | | | | | | | | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | | | | | | | | | |
| '97 | | 00% | | 00% | | 00% | | + 0% | | | | | | | | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 0 | Dec: | - | | | | | | |
| | | | | | | | | | | '89 | 0 | | - | | | | | | |
| | | | | | | | | | | '97 | 40 | | - | | | | | | |
| | | | | | | | | | | '02 | 40 | | - | | | | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|---|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Purshia tridentata | | | | | | | | | | | | | | | | | | |
| M | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 8 | 28 | 0 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 10 | 54 | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |

Trend Study 18-25-02

Study site name: Below Chokecherry Spring .

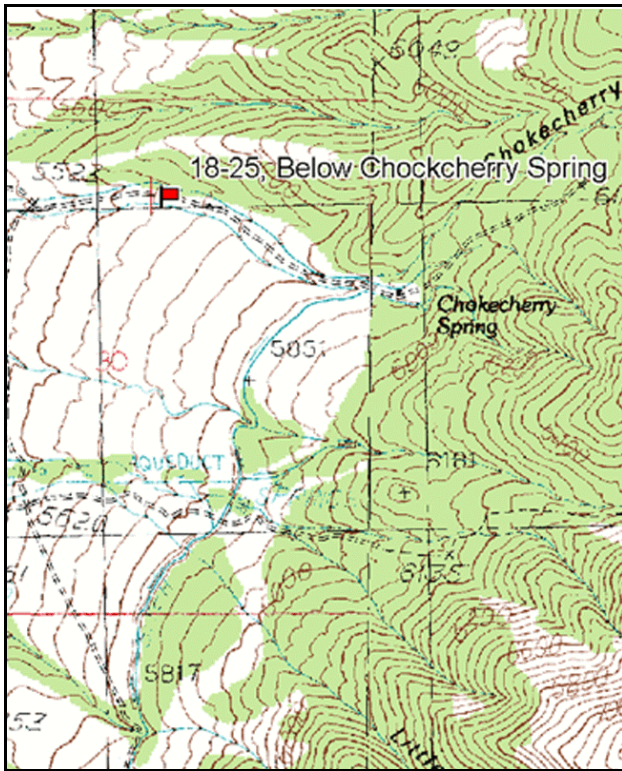
Vegetation type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 143 degrees magnetic.

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

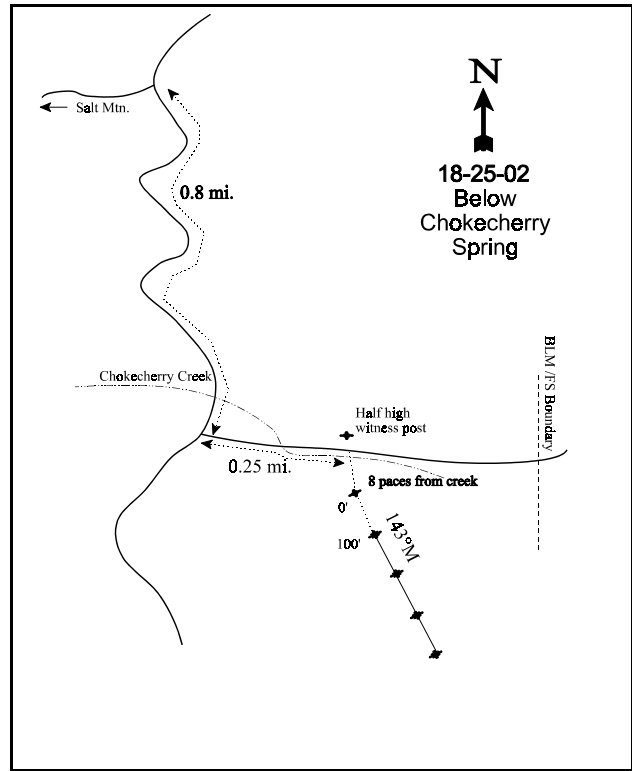
LOCATION DESCRIPTION

Turn off the highway between mile mark 24 and 25. From the highway, go 2.7 miles staying right on the main road to Delle Ranch ponds and trees. The road then turns south. From Delle Ranch, proceed south towards Salt Mountain for 0.25 miles a fence. Continue for 1.9 miles to an intersection to the left (east) heading to Chokecherry Springs. There will be a red post on the east side of the intersection. Go 0.25 miles along the creek. From this point, walk south across the creek bed into the chaining where the study is located. From a large juniper growing down in the creek bed, the 0-foot baseline stake is 8 paces away bearing 171 degrees magnetic. Browse tag number 3924 is attached to the 0-foot marker of the baseline.



Map Name: Salt Mountain

Township 3S, Range 7W, Section 30



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4487997 N 358200 E

DISCUSSION

Below Chokecherry Spring - Trend Study No. 18-25

This study is located one-half mile west of Chokecherry Spring on a low lying alluvial site near an intermittent drainage channel. The site has a gently sloping (5%) west aspect and an elevation of 5,600 feet. The study samples a large mountain big sagebrush site surrounded by pinyon and juniper trees. The pinyon-juniper woodland was apparently chained and seeded in the past. However, the site in 1983 was thought to resemble more a pure mountain big sagebrush stand with a dense understory of cheatgrass brome. In 1983, frequency of pellet groups indicated a moderate intensity of winter deer use. According to the local conservation officer at the time, 400 to 500 deer customarily wintered in this area. In 1997, this was not the case with mostly light wildlife use noted on sagebrush and a low frequency of deer pellet groups (11%). Summer cattle grazing was noted as heavy in 1983, although little succulent forage was available after cheatgrass brome had cured. Now, it appears that grazing is not as intense as it has been in the past. Pellet group transect data from 2002 estimated 29 deer days use/acre (73 ddu/ha) and 14 cow days use/acre (34 cdu/ha). Cattle pats encountered appeared to be from the previous grazing season (2001).

Soil is alluvially deposited and gravelly in texture. Textural analysis indicates a loam with a neutral to mildly alkaline reaction (pH 7.3). Effective rooting depth is almost 13 inches deep with an average soil temperature of 61° F. Phosphorus is low at only 6.3 ppm. Values less than 10 ppm could be a limiting factor to plant establishment and development. Litter cover is moderately high and there is little exposed bare ground. Erosion is not a significant problem because of gentle slope and protective herbaceous cover. The erosion condition class was determined as stable in 2002.

In 1983, browse composition was described as consisting of a "sparse," but nonetheless ecologically dominant stand of mountain big sagebrush. Its density at that time was only estimated at 966 plants/acre. In 1989, density was estimated at only 1,332 plants/acre. Because of the previous poor location and size of the sampling grid, the baseline was lengthened in 1997, providing a much larger more accurate sample. The mountain big sagebrush population was estimated at 10,840 plants/acre in 1997 and 10,920 plants/acre in 2002. Quite a change in what was originally estimated on the site. The structure of the population is dynamic with abundant young plants sampled in 1997 and 2002. Utilization of sagebrush has been mostly light since 1983. Plants are vigorous and there are few decadent individuals. Annual leader growth was good in 2002 averaging two inches.

Broom snakeweed was very abundant in 1983 and 1989 with densities of 15,556 and 12,999 plants/acre respectively. The dynamic young population has become mostly mature and density was estimated at 2,900 plants/acre in 1997 and 2,120 in 2002. Some of the change in density is due to the much larger sample used in 1997 and 2002. Other browse that occur occasionally or rarely are white-stemmed rubber rabbitbrush, stickyleaf low rabbitbrush, and antelope bitterbrush.

Although there is a moderate density of perennial grasses, they initially produced relatively little forage and vigor was somewhat suppressed as a result of heavy grazing use by cattle. The most abundant grass on the site was originally cheatgrass brome, but in 2002, crested wheatgrass contributed the most cover. Forbs, especially perennials, have a diverse composition yet most species occur only occasionally. The only abundant species is peavine which provided 78% of the total forb cover in 2002. All forbs combined provided only 15% and 16% of the total herbaceous cover respectively in 1997 and 2002.

1983 APPARENT TREND ASSESSMENT

Soil trend appears stable, principally because of the gentle terrain. Vegetative trend indicators suggest a slowly improving mountain big sagebrush population, a rapidly increasing population of broom snakeweed, and a depleted herbaceous understory dominated by a thick cover of cheatgrass. The cheatgrass represents a significant and distinct fire hazard. Perennial grasses are doing poorly and show little evidence of improvement.

1989 TREND ASSESSMENT

The increase in vegetation and cryptogamic cover, and the decrease in percent bare soil to 10% all point to an improving soil trend. Sagebrush has good vigor, fair production and cover averages 16%. It appears to have increased significantly along the baseline, while the density plots related a slower growth in the population. The 1989 density estimates remain relatively low for a sagebrush stand (1,333 plants/acre) with 73% classified as mature plants. There are a few young plants (10%) and although not encountered on the density plots, many large sagebrush were observed to have high number of seedlings nearby. Considering the number of pellet groups and the apparent importance of this area as deer winter range, there is light browsing on the sagebrush. Broom snakeweed shows a slight decrease in numbers, but changes in age structure for this short-lived shrub suggest a decline in the future. Trend for browse is believed to be stable at this time. The trend for the herbaceous understory is slightly improving with a decrease in the dominance of cheatgrass and an increase for crested wheatgrass and Sandberg bluegrass. Forbs are still a minor component of the herbaceous understory.

TREND ASSESSMENT

soil - up (5)

browse - stable (3)

herbaceous understory - slightly upward (4)

1997 TREND ASSESSMENT

The trend for soil is continuing to show improvement with increased cryptogamic cover and decreased bare soil (down to 3%). Herbaceous cover now makes up 65% of the total vegetative cover. The trend for mountain big sagebrush which makes up 83% of the browse cover is up. Decadence decreased, vigor remains good, and use is mostly light. Young plants make up 68% of the population. The trend for the herbaceous species is stable but the composition has changed. Crested wheatgrass has increased significantly in nested frequency and now is the most abundant grass. Sandberg bluegrass has declined significantly in frequency. Cheatgrass is still abundant, providing 32% of the total grass cover. The perennial component for forbs has remained stable.

TREND ASSESSMENT

soil - up (5)

browse - up (5)

herbaceous understory - stable (3)

2002 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1997. There is little bare soil (3%) and ample protective ground cover to prevent erosion. Trend for mountain big sagebrush is also stable. Density remains moderately high at 10,920 plants/acre with a total cover value of almost 19%. Utilization is light, vigor good, and decadence low. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses has remained stable with frequency of perennial forbs declining. Nested frequency of crested wheatgrass increased significantly while frequency of Sandberg bluegrass declined significantly. Crested wheatgrass now provides 62% of the total grass cover. Cheatgrass is still abundant but it declined significantly in nested frequency. Forbs are diverse but few are common. Twenty-three forb species were sampled in 1997, but due to drought conditions, only 11 species were sampled in 2002. However, the most abundant forb, peavine, which provided 78% of the forb cover in 2002, remained stable.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 18 , Study no: 25

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|-----------------------------------|------------------|------------------|------------------|------------------|-------------------|-----|-----|-----|-----------------|-------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | <i>Agropyron cristatum</i> | _a 57 | _a 96 | _b 169 | _c 241 | 26 | 36 | 58 | 77 | 12.91 | 20.81 |
| G | <i>Agropyron spicatum</i> | _{ab} 7 | _{ab} 4 | _b 14 | _a - | 3 | 1 | 6 | - | .27 | - |
| G | <i>Bromus japonicus</i> (a) | - | - | 3 | 9 | - | - | 1 | 3 | .00 | .01 |
| G | <i>Bromus tectorum</i> (a) | - | - | _b 261 | _a 163 | - | - | 80 | 49 | 9.35 | 6.71 |
| G | <i>Poa bulbosa</i> | _a - | _a - | _a - | _b 45 | - | - | - | 18 | - | 2.37 |
| G | <i>Poa fendleriana</i> | _a - | _b 37 | _a 2 | _a - | - | 14 | 1 | - | .03 | - |
| G | <i>Poa secunda</i> | _b 184 | _c 281 | _b 214 | _a 131 | 68 | 95 | 77 | 50 | 6.39 | 3.82 |
| G | <i>Sitanion hystrix</i> | 7 | 6 | 2 | - | 3 | 5 | 1 | - | .03 | - |
| G | <i>Sporobolus cryptandrus</i> | - | 2 | 1 | - | - | 1 | 1 | - | .03 | - |
| Total for Annual Grasses | | 0 | 0 | 264 | 172 | 0 | 0 | 81 | 52 | 9.36 | 6.72 |
| Total for Perennial Grasses | | 255 | 426 | 402 | 417 | 100 | 152 | 144 | 145 | 19.69 | 27.00 |
| Total for Grasses | | 255 | 426 | 666 | 589 | 100 | 152 | 225 | 197 | 29.05 | 33.73 |
| F | <i>Agoseris glauca</i> | - | 4 | - | 3 | - | 2 | - | 2 | .00 | .03 |
| F | <i>Alyssum alyssoides</i> (a) | - | - | - | 3 | - | - | - | 1 | - | .00 |
| F | <i>Allium</i> spp. | _A 8 | _b 81 | _b 73 | _a 3 | 5 | 30 | 36 | 2 | .61 | .01 |
| F | <i>Antennaria rosea</i> | - | 3 | - | - | - | 1 | - | - | - | - |
| F | <i>Artemisia ludoviciana</i> | 3 | 1 | - | - | 1 | 1 | - | - | - | - |
| F | <i>Astragalus</i> spp. | - | - | 7 | - | - | - | 3 | - | .04 | - |
| F | <i>Astragalus utahensis</i> | - | - | 3 | - | - | - | 1 | - | .03 | - |
| F | <i>Calochortus nuttallii</i> | 7 | 6 | 6 | - | 4 | 4 | 3 | - | .02 | - |
| F | <i>Cirsium neomexicanum</i> | 3 | - | 7 | - | 1 | - | 3 | - | .19 | - |
| F | <i>Collinsia parviflora</i> (a) | - | - | 85 | 97 | - | - | 37 | 34 | .18 | .52 |
| F | <i>Crepis acuminata</i> | - | 2 | - | - | - | 2 | - | - | - | - |
| F | <i>Descurainia</i> spp. (a) | - | - | 11 | - | - | - | 4 | - | .02 | - |
| F | <i>Draba</i> spp. (a) | - | - | _b 22 | _a 3 | - | - | 10 | 1 | .05 | .00 |
| F | <i>Epilobium brachycarpum</i> (a) | - | - | 5 | - | - | - | 3 | - | .01 | - |
| F | <i>Erodium cicutarium</i> (a) | - | - | 5 | 8 | - | - | 2 | 3 | .01 | .01 |
| F | <i>Hackelia patens</i> | 4 | 4 | 10 | - | 2 | 2 | 5 | - | .35 | - |
| F | <i>Helianthus</i> spp. | - | 4 | - | - | - | 2 | - | - | - | - |
| F | <i>Holosteum umbellatum</i> (a) | - | - | 55 | 56 | - | - | 22 | 22 | .13 | .33 |
| F | <i>Lathyrus brachycalyx</i> | _b 207 | _a 149 | _a 139 | _a 150 | 86 | 65 | 56 | 58 | 3.36 | 5.82 |
| F | <i>Lactuca serriola</i> | _a - | _b 26 | _a - | _a - | _a - | 11 | - | - | - | - |
| F | <i>Lomatium</i> spp. | _A - | _a - | _a - | _b 31 | - | - | - | 11 | .00 | .57 |
| F | <i>Lygodesmia</i> spp. | - | - | 2 | - | - | - | 1 | - | .00 | - |
| F | <i>Microsteris gracilis</i> (a) | - | - | 2 | 3 | - | - | 1 | 2 | .00 | .01 |
| F | <i>Phlox longifolia</i> | _a 13 | _b 55 | _b 54 | _{ab} 37 | 5 | 26 | 22 | 19 | .40 | .14 |
| F | <i>Polygonum douglasii</i> (a) | - | - | 3 | - | - | - | 2 | - | .01 | - |

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|---------------------------|-----------------------------|------------------|-----------------|-----------------|----------------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| F | Ranunculus testiculatus (a) | - | - | 19 | - | - | - | 7 | - | .03 | - |
| F | Taraxacum officinale | _{ab} 3 | _{ab} 4 | _b 14 | _a - | 1 | 3 | 5 | - | .05 | - |
| F | Tragopogon dubius | _a 3 | _b 23 | _b 33 | _a - | 2 | 13 | 18 | - | .17 | - |
| F | Veronica biloba (a) | - | - | _b 19 | _a - | - | - | 6 | - | .05 | - |
| Total for Annual Forbs | | 0 | 0 | 226 | 170 | 0 | 0 | 94 | 63 | 0.51 | 0.88 |
| Total for Perennial Forbs | | 251 | 362 | 348 | 224 | 107 | 162 | 153 | 92 | 5.25 | 6.58 |
| Total for Forbs | | 251 | 362 | 574 | 394 | 107 | 162 | 247 | 155 | 5.77 | 7.46 |

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

BROWSE TRENDS --

Herd unit 18 , Study no: 25

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|-------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | Artemisia tridentata vaseyana | 85 | 89 | 15.28 | 18.18 |
| B | Chrysothamnus nauseosus albicaulis | 10 | 8 | .40 | .36 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 26 | 17 | 1.98 | 1.09 |
| B | Gutierrezia sarothrae | 50 | 41 | .79 | 1.90 |
| B | Juniperus osteosperma | 2 | 0 | - | .56 |
| Total for Browse | | 173 | 155 | 18.47 | 22.11 |

CANOPY COVER -- LINE INTERCEPT

Herd unit 18 , Study no: 25

| Species | Percent Cover | |
|-------------------------------------------|---------------|-------|
| | '97 | '02 |
| Artemisia tridentata vaseyana | - | 18.58 |
| Chrysothamnus nauseosus albicaulis | - | .33 |
| Chrysothamnus viscidiflorus viscidiflorus | - | 1.08 |
| Gutierrezia sarothrae | - | 1.92 |
| Juniperus osteosperma | - | 2.33 |

Key Browse Annual Leader Growth

Herd unit 18 , Study no: 25

| Species | Average leader growth (in) |
|-------------------------------|----------------------------|
| | '02 |
| Artemisia tridentata vaseyana | 2.0 |

BASIC COVER --

Herd unit 18 , Study no: 25

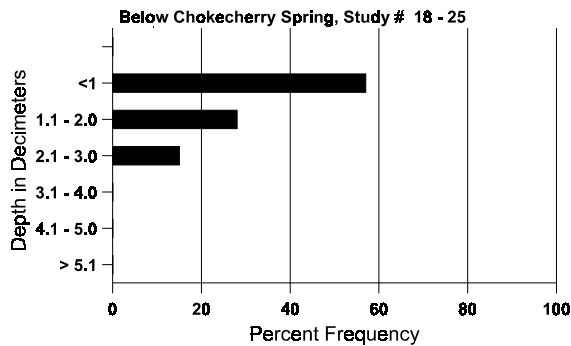
| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 371 | 384 | .25 | 10.25 | 53.84 | 60.31 |
| Rock | 86 | 94 | 1.75 | 3.00 | 2.17 | 3.63 |
| Pavement | 168 | 153 | 1.75 | 1.50 | 1.57 | 1.81 |
| Litter | 396 | 391 | 70.00 | 71.75 | 54.59 | 50.27 |
| Cryptogams | 190 | 133 | 0 | 3.25 | 6.73 | 2.73 |
| Bare Ground | 118 | 117 | 26.25 | 10.25 | 2.66 | 2.91 |

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 25, Below Chokecherry Spring

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 12.5 | 60.5 (10.5) | 7.3 | 44.0 | 31.4 | 24.6 | 3.2 | 6.3 | 236.8 | 0.6 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 18 , Study no: 25

| Type | Quadrat Frequency | | Pellet Transect | |
|--------|-------------------|-----|------------------------------|------------------------------|
| | '97 | '02 | Pellet Groups per Acre 02 | Days Use per Acre (ha) 02 |
| Rabbit | 44 | 31 | - | - |
| Elk | 1 | 1 | - | - |
| Deer | 11 | 16 | 383 | 29 (73) |
| Cattle | 11 | 4 | 165 | 14 (34) |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 25

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|-------|------|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Artemisia tridentata vaseyana | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 121 | - | - | - | - | - | - | - | - | 121 | - | - | - | 2420 | | 121 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | 10 | - | - | - | - | - | - | - | - | 10 | - | - | - | 333 | | 10 | |
| | 89 | 4 | - | - | - | - | - | - | - | - | 2 | 2 | - | - | 133 | | 4 | |
| | 97 | 344 | 23 | - | - | - | - | - | - | - | 367 | - | - | - | 7340 | | 367 | |
| | 02 | 140 | 7 | - | - | - | - | - | - | - | 146 | 1 | - | - | 2940 | | 147 | |
| M | 83 | 19 | - | - | - | - | - | - | - | - | 19 | - | - | - | 633 | 29 37 | 19 | |
| | 89 | 25 | 3 | 1 | - | - | - | - | - | - | 25 | 4 | - | - | 966 | 27 38 | 29 | |
| | 97 | 81 | 79 | 1 | - | - | - | - | - | - | 155 | - | 6 | - | 3220 | 26 41 | 161 | |
| | 02 | 342 | 33 | 3 | - | - | - | - | - | - | 375 | 3 | - | - | 7560 | 20 23 | 378 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 2 | 5 | - | - | - | - | - | - | - | 4 | 3 | - | - | 233 | | 7 | |
| | 97 | 8 | 5 | - | - | - | 1 | - | - | - | 10 | - | - | 4 | 280 | | 14 | |
| | 02 | 16 | 1 | - | - | 4 | - | - | - | - | 12 | - | - | 9 | 420 | | 21 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 140 | | 7 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 420 | | 21 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +27% | | | | | | | |
| '89 | | 20% | | | 03% | | | 00% | | | +88% | | | | | | | |
| '97 | | 20% | | | .36% | | | 02% | | | + 1% | | | | | | | |
| '02 | | 08% | | | .54% | | | 02% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 966 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 1332 | | 17% | | | |
| | | | | | | | | | | | | '97 | 10840 | | 3% | | | |
| | | | | | | | | | | | | '02 | 10920 | | 4% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Chrysothamnus nauseosus albicaulis | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | | 1 |
| | 89 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | - | 33 | | | 1 |
| | 97 | 13 | - | - | - | - | - | - | - | - | 13 | - | - | - | 260 | | | 13 |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| M | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 39 | 77 | 1 |
| | 89 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 100 | 41 | 63 | 3 |
| | 97 | 9 | - | - | - | - | - | - | - | - | 9 | - | - | - | 180 | 21 | 23 | 9 |
| | 02 | 3 | - | 1 | - | - | - | - | - | - | 4 | - | - | - | 80 | 25 | 31 | 4 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| | 02 | 1 | - | - | - | 1 | - | 1 | - | - | 2 | - | - | 1 | 60 | | | 3 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +50% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +71% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | -65% | | | | | | | |
| '02 | | 13% | | | 13% | | | 13% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 66 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 133 | | 0% | | | |
| | | | | | | | | | | | | '97 | 460 | | 4% | | | |
| | | | | | | | | | | | | '02 | 160 | | 38% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Chrysothamnus viscidiflorus viscidiflorus | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 100 | | 3 | |
| | 97 | 8 | - | - | - | - | - | - | - | - | 8 | - | - | - | 160 | | 8 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | - | 20 | | 1 | |
| M | 83 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | 16 | 14 | 2 |
| | 89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | 15 | 23 | 2 |
| | 97 | 56 | 1 | - | - | - | - | - | - | - | 57 | - | - | - | 1140 | 16 | 25 | 57 |
| | 02 | 32 | - | - | 2 | - | - | - | - | - | 26 | 6 | 2 | - | 680 | 18 | 22 | 34 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | 7 | - | - | - | - | - | - | - | - | 2 | - | 1 | 4 | 140 | | 7 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | 2 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +60% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +87% | | | | | | | |
| '97 | | 02% | | | 00% | | | 00% | | | -36% | | | | | | | |
| '02 | | 00% | | | 00% | | | 19% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 66 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 166 | | 0% | | | |
| | | | | | | | | | | | | '97 | 1320 | | 2% | | | |
| | | | | | | | | | | | | '02 | 840 | | 17% | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | | | | | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|---|--------------------|--------------------------------|-------|----|----------------|-------|-------|-------|-----|
| | | 1 | 2 | 3 | 4 | | | | | | | | | |
| Gutierrezia sarothrae | | | | | | | | | | | | | | |
| S | 83 | 52 | - | - | - | - | - | 52 | - | - | - | 1733 | | 52 |
| | 89 | 24 | - | - | - | - | - | 24 | - | - | - | 800 | | 24 |
| | 97 | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| Y | 83 | 405 | - | - | - | - | - | 405 | - | - | - | 13500 | | 405 |
| | 89 | 70 | - | - | - | - | - | 67 | - | 3 | - | 2333 | | 70 |
| | 97 | 15 | - | - | - | - | - | 15 | - | - | - | 300 | | 15 |
| | 02 | 1 | - | - | - | - | - | 1 | - | - | - | 20 | | 1 |
| M | 83 | 62 | - | - | - | - | - | 61 | 1 | - | - | 2066 | 13 13 | 62 |
| | 89 | 232 | - | - | - | - | - | 216 | 16 | - | - | 7733 | 13 11 | 232 |
| | 97 | 126 | - | - | - | - | - | 126 | - | - | - | 2520 | 10 10 | 126 |
| | 02 | 72 | - | - | - | - | - | 72 | - | - | - | 1440 | 9 10 | 72 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 88 | - | - | - | - | - | 46 | 3 | - | 39 | 2933 | | 88 |
| | 97 | 4 | - | - | - | - | - | 4 | - | - | - | 80 | | 4 |
| | 02 | 32 | 1 | - | - | - | - | 14 | - | 11 | 8 | 660 | | 33 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | 20 | | 1 |
| | 02 | - | - | - | - | - | - | - | - | - | - | 280 | | 14 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | | | <u>%Change</u> | | | | |
| '83 | | 00% | | 00% | | 00% | | | | -16% | | | | |
| '89 | | 00% | | 00% | | 11% | | | | -78% | | | | |
| '97 | | 00% | | 00% | | 00% | | | | -27% | | | | |
| '02 | | .94% | | 00% | | 18% | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 15566 | Dec: | 0% | |
| | | | | | | | | | | '89 | 12999 | | 23% | |
| | | | | | | | | | | '97 | 2900 | | 3% | |
| | | | | | | | | | | '02 | 2120 | | 31% | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| Y | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | '97 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | 20 | - | 1 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 80 | | 4 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 50% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 40 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |
| Purshia tridentata | | | | | | | | | | | | | | | | | | |
| M | '83 | - | - | 2 | - | - | - | - | - | - | 1 | - | 1 | - | 66 | 14 | 24 | 2 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 15 | 55 | 0 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | 1 | - | - | - | - | - | - | - | - | - | 1 | 33 | | 1 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 100% | | | 50% | | | -50% | | | | | | | |
| '89 | | 00% | | | 100% | | | 100% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 66 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 33 | | 100% | | | |
| | | | | | | | | | | | | '97 | 0 | | 0% | | | |
| | | | | | | | | | | | | '02 | 0 | | 0% | | | |

Trend Study 18-26-02

Study site name: Salt Mountain .

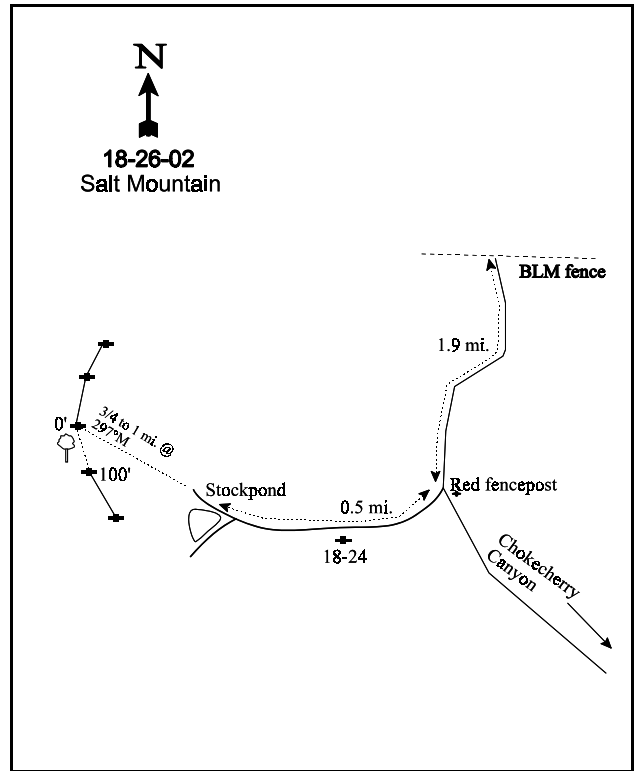
Vegetation type: Stansbury Cliffrose .

Compass bearing: frequency baseline 0 degrees magnetic (Line 1 @ 360°M, line 2 @ 343°M and line 3 @ 205°M).

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

LOCATION DESCRIPTION

From study site 18-24, continue on the Salt Mountain road for another 0.2 miles to the stock ponds on the east side of the road. From the right fork or road to the north of the stock ponds, walk at 297 degrees magnetic for 0.75 to 1.0 miles to the study area. An old, marked browse study runs along the ridge at the top of this slope, while the trend study is located among the sparse junipers and cliffrose below the ridge. The baseline runs north across the slope. The 0-foot stake is marked with browse tag #169.



Map Name: Salt Mountain

Diagrammatic Sketch

Township 3S, Range 8W, Section 24

GPS: NAD 27, UTM 12S 4489249 N 355739 E

DISCUSSION

Salt Mountain - Trend Study No. 18-26

This trend study, located on the east side of Salt Mountain, samples critical deer winter range within the Stansbury cliffrose range type. The study site lies immediately below a small ridge top on a moderately steep (55%) southeast slope. Elevation is approximately 5,600 feet. There is also a browse transect located within the immediate vicinity of the study. Utilization of the principal browse species was initially moderate to heavy with large numbers of pellet groups present during the 1983 reading. Pellet group data from 2002 estimate moderate deer use at 56 days use/acre (139 ddu/ha). All deer pellet groups appeared to be from winter use.

Soil is weathered in place from dark colored metamorphic rock. Soil depth is moderately shallow and very rocky on the surface. Effective rooting depth was estimated at almost 10 inches in 2002. Due to the shallow depth of the soil, combined with the amount of dark colored rock on the surface, soil temperature was high averaging 74° F at a depth of nearly 10 inches. Litter and vegetation cover are marginal and come principally from cheatgrass. However, erosion is not a significant problem on site and the erosion condition class was determined as stable in 2002.

Browse composition consists of a sparse stand of Stansbury cliffrose, Wyoming big sagebrush, and occasional individuals of spiny horsebrush and Utah juniper. A small population of broom snakeweed is also present. Stansbury cliffrose plants vary in height from about six inches high to individuals well above the reach of deer. However, tall plants are the exception, making most cliffrose foliage available. Cliffrose density was relatively low in 1983 (600/acre), but age structure was indicative of a stable population. Vigor was good even though the level of utilization was moderate to heavy. Between 1983 and 1989, the cliffrose population declined to only 133 plants/acre and all of these were classified as decadent. Use remained moderate to heavy. Density remained stable in 2002 at 120 plants/acre. Utilization was light to moderate with some plants heavily hedged. Dead plants first sampled in 2002, numbered 220 plants/acre, most of which appeared to have died after the 1983 reading. There were many small mature plants sampled which were vigorous and producing flowers and seed. Annual leader growth was good averaging 4.3 inches in 2002. The population appears to be rebounding with 33% of the population consisting of young plants and no decadent plants being sampled.

Wyoming big sagebrush had a low density of about 200 plants/acre in 1983 and 1989. Use was extremely heavy in 1983 and vigor was poor on about one-third of the population. Use was light and vigor good in 1989. Density was estimated at 960 plants/acre in 2002 with the much larger sample. Utilization was light to moderate but vigor was good and decadence low.

Grasses comprise the bulk of herbaceous plants on the site. Cheatgrass, although not included in the 1983 and 1989 samples, was abundant and provided more cover than perennial grasses. In 2002, cheatgrass provided 42% of the total grass cover or 39% of the total herbaceous cover. Perennial grasses occur as scattered bunches within the uniform carpet of cheatgrass. They include bluebunch wheatgrass, Sandberg bluegrass, and Indian ricegrass. Grasses show no evidence of use. Forbs are nearly nonexistent. The few perennial or biennial species which do occur are rare and have little value for forage or watershed protection.

1983 APPARENT TREND ASSESSMENT

Soil condition is poor. Erosion has been heavy, exposing a lot of rock and erosion pavement. Vegetation and litter cover come primarily from cheatgrass, which has only minimal soil holding capabilities. Vegetation trend appears more stable but at a low condition level. The principal browse species, Stansbury cliffrose, is maintaining itself at a low density. Wyoming big sagebrush, the most heavily used plant on the area, appears to be declining. Except for an increasing population of broom snakeweed, the other browse species seem stable. Perennial herbaceous plants are seriously depleted which has resulted in a heavy infestation of cheatgrass and annual mustards. When dry, these are a dangerous fire hazard.

1989 TREND ASSESSMENT

The trend study on Salt Mountain is an example of the mid 1980's shrub die-off that affected different locations within the Great Basin. Cliffrose happens to be the casualty on the east side of this mountain. The Wyoming big sagebrush does not appear to have been as adversely impacted. For cliffrose there are many more dead than live. Density estimates included standing dead shrubs, which numbered approximately 400/acre. Live, mostly decadent, cliffrose have a density of 133/acre. All age classes were affected by the die-off. Over-utilization was not the cause of death. Current browsing on the remaining available parts is moderate to heavy. Some cliffrose are growing out of reach. Those out of reach have good seed production this year, but no seedling or young plants could be found. The sparse population of big sagebrush displays heavy utilization. The severely hedged individuals have a clubbed form, low growth, and no seed production. Smaller sagebrush, such as the few mature shrubs sampled by the density plots, have excellent growth and vigor. The very limited available browse is heavily used, even with moderate deer numbers. This condition is exacerbated by the extended drought since 1985. Observations indicate less cheatgrass on the site in this dry year. The data show an increase in the two species of perennial grass, bluebunch wheatgrass and Sandberg bluegrass. Perennial forbs are almost non-existent, as was the case in 1983. Ground cover is mostly related to the ephemeral cheatgrass. The 1989 reading found less litter, but more vegetative ground cover. There is less bare soil because more rock and pavement is exposed. Soil and rock movement is natural on this steep, shallow, rocky site, but it still indicates a slightly downward soil trend.

TREND ASSESSMENT

soil - slightly downward (2)

browse - slightly downward (2)

herbaceous understory - slightly upward (4)

2002 TREND ASSESSMENT

Trend for soil is stable. Cover of bare ground has increased slightly but the ratio of protective ground cover to bare ground is good for a dry site like this. The soil erosion condition class was determined as stable in 2002. Trend for browse is up. Wyoming big sagebrush has increased in density from 200 plants/acre to 960 plants/acre. Use is mostly light, vigor good and there are few decadent plants. Plants are vigorous with annual leader growth averaging 2 inches. Stansbury cliffrose has maintained a similar density compared to 1989. However, it displays lighter use, good vigor and no decadent plants were sampled. Young plants account for 33% of the population indicating an expanding population. Cliffrose are now vigorous with many plants flowering and producing seeds. Annual leader growth is excellent averaging over 4 inches. Trend for the herbaceous understory is down slightly. Cheatgrass is still abundant, occurring in nearly every quadrat and producing 42% of the total grass cover. Bluebunch wheatgrass and Sandberg bluegrass are the only other grasses on the site. Bluebunch wheatgrass declined significantly in nested frequency while Sandberg bluegrass remained stable. Forbs are rare in their occurrence and provide little forage.

TREND ASSESSMENT

soil - stable (3)

browse - up (5)

herbaceous understory - down slightly (2)

HERBACEOUS TRENDS --
Herd unit 18 , Study no: 26

| T y p e | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|-----------------------------|-----------------------------|------------------|------------------|------------------|-------------------|-----|-----|--------------------|
| | | '83 | '89 | '02 | '83 | '89 | '02 | '02 |
| G | Agropyron spicatum | _a 183 | _b 222 | _a 160 | 75 | 86 | 62 | 6.60 |
| G | Bromus tectorum (a) | - | - | 306 | - | - | 96 | 8.57 |
| G | Oryzopsis hymenoides | 1 | - | - | 1 | - | - | - |
| G | Poa secunda | _a 73 | _b 198 | _b 224 | 37 | 76 | 80 | 5.32 |
| Total for Annual Grasses | | 0 | 0 | 306 | 0 | 0 | 96 | 8.57 |
| Total for Perennial Grasses | | 257 | 420 | 384 | 113 | 162 | 142 | 11.93 |
| Total for Grasses | | 257 | 420 | 690 | 113 | 162 | 238 | 20.51 |
| F | Agoseris glauca | - | 4 | - | - | 2 | - | - |
| F | Allium spp. | - | 4 | 3 | - | 2 | 2 | .02 |
| F | Calochortus nuttallii | 1 | - | - | 1 | - | - | - |
| F | Cirsium neomexicanum | 4 | - | - | 4 | - | - | - |
| F | Delphinium nuttallianum | - | 1 | - | - | 1 | - | - |
| F | Erodium cicutarium (a) | - | - | 67 | - | - | 26 | 1.22 |
| F | Gilia spp. (a) | - | - | 1 | - | - | 1 | .00 |
| F | Lappula occidentalis (a) | - | - | 4 | - | - | 2 | .01 |
| F | Lactuca serriola | - | 8 | 2 | - | 3 | 2 | .01 |
| F | Ranunculus testiculatus (a) | - | - | 10 | - | - | 4 | .02 |
| F | Senecio spp. | 2 | - | - | 1 | - | - | - |
| Total for Annual Forbs | | 0 | 0 | 82 | 0 | 0 | 33 | 1.25 |
| Total for Perennial Forbs | | 7 | 17 | 5 | 6 | 8 | 4 | 0.02 |
| Total for Forbs | | 7 | 17 | 87 | 6 | 8 | 37 | 1.28 |

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

BROWSE TRENDS --
Herd unit 18 , Study no: 26

| T y p e | Species | Strip Frequency | Average Cover % |
|------------------|--------------------------------------|--------------------|--------------------|
| | | '02 | '02 |
| B | Artemisia tridentata wyomingensis | 28 | 3.55 |
| B | Cowania mexicana stansburiana | 6 | .21 |
| B | Gutierrezia sarothrae | 1 | - |
| B | Juniperus osteosperma | 2 | 2.23 |
| B | Opuntia spp. | 4 | .15 |
| B | Tetradymia canescens | 0 | .18 |
| Total for Browse | | 41 | 6.32 |

CANOPY COVER -- LINE INTERCEPT
Herd unit 18 , Study no: 26

| Species | Percent Cover '02 |
|-----------------------------------|-------------------|
| Artemisia tridentata wyomingensis | 4.42 |
| Cowania mexicana stansburiana | 2.42 |
| Gutierrezia sarothrae | .08 |
| Juniperus osteosperma | 2.58 |
| Tetradymia canescens | .03 |

Key Browse Annual Leader Growth
Herd unit 18 , Study no:26

| Species | Average leader growth (in) '02 |
|-----------------------------------|--------------------------------|
| Artemisia tridentata wyomingensis | 1.9 |
| Cowania mexicana stansburiana | 4.3 |

Point-Quarter Tree Data
Herd unit 18 , Study no: 26

| Species | Trees per Acre '02 | Average diameter (in) '02 |
|-----------------------|--------------------|---------------------------|
| Juniperus osteosperma | 42 | 8.5 |

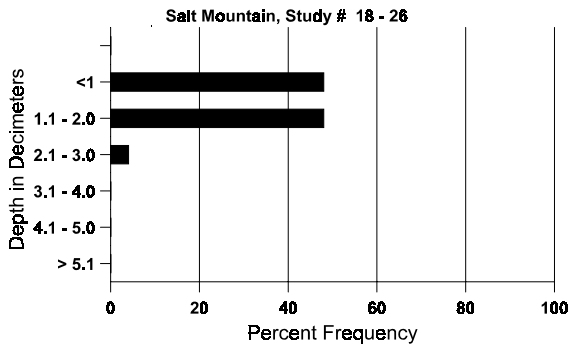
BASIC COVER --
Herd unit 18 , Study no: 26

| Cover Type | Nested Frequency '02 | Average Cover % | | |
|-------------|----------------------|-----------------|-------|-------|
| | | '83 | '89 | '02 |
| Vegetation | 353 | .50 | 10.75 | 29.36 |
| Rock | 304 | 19.00 | 8.50 | 16.42 |
| Pavement | 303 | 15.50 | 33.25 | 7.93 |
| Litter | 361 | 41.75 | 34.50 | 30.76 |
| Cryptogams | 184 | 5.00 | .50 | 5.21 |
| Bare Ground | 288 | 18.25 | 12.50 | 18.84 |

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 26, Salt Mountain

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %0M | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 8.6 | 73.8 (9.6) | 7.4 | 47.3 | 20.7 | 32.0 | 1.7 | 6.0 | 156.8 | 0.7 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 18 , Study no: 26

| Type | Quadrat Frequency | Pellet Transect | |
|--------|-------------------|------------------------|------------------------|
| | | Pellet Groups per Acre | Days Use per Acre (ha) |
| | '02 | 02 | 02 |
| Rabbit | 19 | - | - |
| Deer | 17 | 731 | 56 (139) |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 26

| A G R E | Y | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) | | Total |
|------------------------------------------------|----|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|-----------------|------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | Ht. Cr. | | |
| Artemisia tridentata wyomingensis | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | | | 5 |
| M | 83 | - | - | 4 | - | - | - | - | - | - | 2 | 1 | 1 | - | 133 | 12 | 17 | 4 |
| | 89 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 133 | 15 | 16 | 4 |
| | 02 | 23 | 10 | - | 1 | 5 | - | - | - | - | 39 | - | - | - | 780 | 22 | 31 | 39 |
| D | 83 | - | - | 2 | - | - | - | - | - | - | 1 | - | 1 | - | 66 | | | 2 |
| | 89 | - | - | - | 2 | - | - | - | - | - | - | 2 | - | - | 66 | | | 2 |
| | 02 | 2 | 1 | - | 1 | - | - | - | - | - | 4 | - | - | - | 80 | | | 4 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 180 | | | 9 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 100% | | | 33% | | | + 0% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +79% | | | | | | | |
| '02 | | 33% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 199 | Dec: | 33% | | | |
| | | | | | | | | | | | | '89 | 199 | | 33% | | | |
| | | | | | | | | | | | | '02 | 960 | | 8% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|------|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Cowania mexicana stansburiana</i> | | | | | | | | | | | | | | | | | | |
| Y | 83 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 100 | | | 3 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | | 2 |
| M | 83 | - | 9 | 5 | - | - | - | - | - | - | 13 | - | 1 | - | 466 | 56 | 47 | 14 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | 2 | 1 | 1 | - | - | - | - | - | - | 4 | - | - | - | 80 | 50 | 57 | 4 |
| D | 83 | - | - | 1 | - | - | - | - | - | - | - | - | 1 | - | 33 | | | 1 |
| | 89 | - | 3 | 1 | - | - | - | - | - | - | 4 | - | - | - | 133 | | | 4 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 220 | | | 11 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 50% | | | 33% | | | 11% | | | -78% | | | | | | | |
| '89 | | 75% | | | 25% | | | 00% | | | -10% | | | | | | | |
| '02 | | 17% | | | 17% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 599 | Dec: | 6% | | | | |
| | | | | | | | | | | | '89 | 133 | | 100% | | | | |
| | | | | | | | | | | | '02 | 120 | | 0% | | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | | |
| Y | 83 | 20 | - | - | - | - | - | - | - | - | 20 | - | - | - | 666 | | | 20 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| M | 83 | 22 | - | - | - | - | - | - | - | - | 21 | - | 1 | - | 733 | 14 | 16 | 22 |
| | 89 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 100 | 8 | 12 | 3 |
| | 02 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | 13 | 19 | 3 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 02% | | | -93% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -40% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 1399 | Dec: | - | | | | |
| | | | | | | | | | | | '89 | 100 | | - | | | | |
| | | | | | | | | | | | '02 | 60 | | - | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | - | - | 1 | - | - | - | 1 | - | 2 | - | - | - | 40 | - | - | 2 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 40 | | - | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 80 | 4 | 11 | 4 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 80 | | - | | | |
| Tetradymia canescens | | | | | | | | | | | | | | | | | | |
| M | 83 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 100 | 22 | 30 | 3 |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 22 | 23 | 1 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 26 | 51 | 0 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | 2 | - | - | - | - | - | - | - | - | 1 | - | 1 | - | 66 | | | 2 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | - 1% | | | | | | | |
| '89 | | 00% | | | 00% | | | 33% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 100 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 99 | | 67% | | | |
| | | | | | | | | | | | | '02 | 0 | | 0% | | | |

Trend Study 18-27-02

Study site name: South of Broons Canyon .

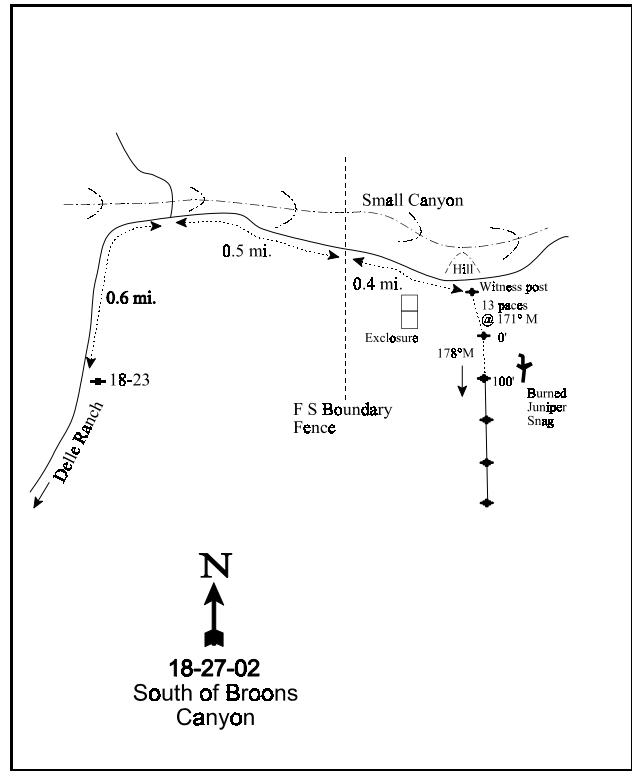
Vegetation type: Antelope bitterbrush .

Compass bearing: frequency baseline 178 degrees magnetic.

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

LOCATION DESCRIPTION

Approximately 11 miles south of the Timpie interchange on I-80, turn east off the Skull Valley highway onto the graded Delle Ranch road. Take this road 1.9 miles to a major intersection. Bear left (right fork goes to Delle Ranch) and go 0.5 miles to a fork. Bear left off the graded road and go 0.65 miles to the location of Study #12-1. Continue 0.6 miles to a fork, go right. Continue approximately 0.5 miles to the Forest Service boundary fence. From the fence, go 0.4 miles to a witness post on the right side of the road. From this short fencepost, walk 13 paces south to the 0-foot baseline stake.



Map Name: Salt Mountain

Diagrammatic Sketch

Township 3S, Range 7W, Section 5

GPS: NAD 27, UTM 12S 4493829 N 359422 E

DISCUSSION

South of Broons Canyon - Trend Study No. 18-27

This study lies just above the Forest Service enclosure located in the first drainage south of Broons Canyon. The range type is antelope bitterbrush with lesser amounts of mountain big sagebrush interspersed throughout. The area slopes gently (5%) to the west and appears to have been the site of an old burn. The site elevation is approximately 5,800 feet, which reportedly is near the upper limit of deer winter range. However, during the 1983 reading, deer pellet groups were abundant and there was moderate utilization of the principle browse plants. In 1997, deer pellet group quadrat frequency was moderately high at 27%. Cattle also graze the area and were observed at the time the study was established. Cattle use in 1997 was considered light. A pellet group transect read on site in 2002 estimated 56 deer days use/acre (139 ddu/ha). Rabbit pellets were also common. Most of the deer pellet groups encountered in 2002 were from winter use, but about 5% were from spring use.

Soil is derived from igneous alluvium and is gravelly to sandy in texture. Soil textural analysis indicates a sand clay loam with a neutral reaction (pH 6.7). Effective rooting depth was estimated at 12 inches with a soil temperature of 68° F. This moderately high of a soil temperature could be very detrimental to the establishment of cool season perennial plants during long periods of summer drought. Large to medium sized rocks are common on the soil surface. There is a fair amount of protective cover from the herbaceous species, but most of the vegetation cover comes from shrub crowns. Some sheet erosion is occurring but it is not excessive. Cheatgrass remains the principle understory component. The erosion condition class was stable in 2002.

This area has always possessed an especially hardy and productive population of antelope bitterbrush. This ecotype exhibits a semi-erect growth form with some "stem layering" apparent. There is also noticeable evidence of natural hybridization with Stansbury cliffrose. Utilization was mostly moderate (83%) in 1983 with excellent seed production. This area could be a potentially important seed collection site where seeds mature sometime in the last half of July, depending upon local weather. The proportion of the population that was classified as having moderate use steadily declined between 1983 and 1997 (83% to 15%). Utilization was moderate to heavy in 2002. Bitterbrush is very thick providing 62% of the total browse cover in 1997 and 70% in 2002. Total canopy cover was estimated at 39% in 2002. Density of this thick layering stand is difficult to estimate. In some places it is hard to walk through. Density was estimated at around 670 plants/acre in 1989 and 1997 increasing to 1,580 in 2002. Some of this increase is obviously sampling error, but bitterbrush did also increase in strip frequency and average cover. Vigor remains good and there are few decadent plants on site. Annual leader growth was excellent in 2002, averaging 4.6 inches. Flowering and seed production were variable in 2002 due to drought.

Mountain big sagebrush is present in moderate numbers and is of secondary importance. It made up 35% of the browse cover in 1997 and 26% in 2002. It has steadily increased in density since 1989. Utilization has been mostly light, vigor generally good, and decadence low. A few other less desirable shrubs comprise the remainder of the browse composition. With the exception of a moderately sparse but decreasing population of broom snakeweed, all appear to have relatively low but stable populations.

Herbaceous composition consists chiefly of grasses, especially cheatgrass brome which made up 57% of the grass cover in 1997, increasing to 94% in 2002. Sandberg bluegrass and bluebunch wheatgrass make up the majority of the remaining grass cover, although both have declined significantly in nested frequency between 1997 and 2002. The potential fire hazard depends primarily on abundance and growth of cheatgrass. Current fire potential is moderately high. The site supports a diverse composition of forbs but only a few species occur more than occasionally. However, a few good to moderately palatable species provide a small amount of forage. Some of these in the past have shown evidence of utilization. Most important are common stickseed, Indian paintbrush, gray lomatium, arrowleaf balsamroot, and redroot eriogonum.

1983 APPARENT TREND ASSESSMENT

Both soil and vegetative trend appear stable to improving. This is a favorable site that should be managed to at least maintain the present plant composition. Further improvement could be realized if cheatgrass brome were replaced by a more dense and diverse perennial herbaceous composition.

1989 TREND ASSESSMENT

Trend for soil is considered stable. Cover of bare ground is low with abundant protective ground cover to prevent most erosion. There was a slight increase in the percentage of decadence in bitterbrush and mountain big sagebrush, but this is still not considered very high. The densities of both populations have shown slight decreases in their respective populations, however this could mostly be reflective of the extended drought and the relatively small sample taken for browse species. Trend for browse would be assessed as stable. The trend for the herbaceous understory is also stable.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

1997 TREND ASSESSMENT

Trend for soil is slightly improved with good protective plant cover and percent bare soil has decreased to 4%. The trend for browse, primarily bitterbrush and mountain big sagebrush, is slightly improved with decreases in percent decadence and a lower proportion of plants showing moderate use. The herbaceous understory has shown little change through time with the majority of the grass production (cover) coming from cheatgrass. Trend for the herbaceous species is stable. However, the amount of cheatgrass in the understory still poses a major problem for fire.

TREND ASSESSMENT

soil - slightly up (4)

browse - slightly up (4)

herbaceous understory - stable, but still too much cheatgrass in the understory (3)

2002 TREND ASSESSMENT

Trend for soil is stable. Litter cover has declined but vegetation cover has increased and there is little exposed bare ground. There is abundant protective ground cover and little erosion occurring on site. Trend for browse is up slightly for bitterbrush and mountain big sagebrush. Utilization of bitterbrush was moderate to heavy in 2002, but vigor remained good and there were few decadent plants sampled. Density of bitterbrush increased. However, some of the increase is likely due to sampling error due to the thick nature of the bitterbrush stand which is also reproducing by layering. Average cover and strip frequency increased and annual leader growth was excellent averaging 4.5 inches. Density of sagebrush also increased. They show mostly light use, good vigor and low decadence. Trend for the herbaceous understory is down. Sum of nested frequency for perennial grasses declined including a significant decline in the nested frequency of the primary perennial species, bluebunch wheatgrass and Sandberg bluegrass. Cheatgrass is abundant and remained stable in frequency while average cover doubled. Cheatgrass now provides 94% of the total grass cover with a cover value of 25%. Nested frequency for perennial forbs also declined dramatically and the number of species sampled fell from 29 in 1997 to only 15 in 2002.

TREND ASSESSMENT

soil - stable (3)

browse - slightly up (4)

herbaceous understory - down (1)

HERBACEOUS TRENDS --
Herd unit 18 , Study no: 27

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|------------------------------------|------------------|------------------|------------------|-----------------|-------------------|-----|-----|-----|-----------------|-------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | <i>Agropyron spicatum</i> | _b 138 | _b 109 | _b 124 | _a 45 | 52 | 40 | 40 | 22 | 3.69 | .96 |
| G | <i>Bromus tectorum</i> (a) | - | - | 338 | 339 | - | - | 99 | 97 | 10.86 | 25.41 |
| G | <i>Melica bulbosa</i> | - | - | 20 | 7 | - | - | 7 | 2 | .30 | .36 |
| G | <i>Poa fendleriana</i> | - | 5 | 4 | 4 | - | 3 | 1 | 1 | .00 | .15 |
| G | <i>Poa secunda</i> | _b 138 | _b 159 | _b 141 | _a 21 | 62 | 60 | 54 | 10 | 4.19 | .22 |
| Total for Annual Grasses | | 0 | 0 | 338 | 339 | 0 | 0 | 99 | 97 | 10.86 | 25.41 |
| Total for Perennial Grasses | | 276 | 273 | 289 | 77 | 114 | 103 | 102 | 35 | 8.20 | 1.70 |
| Total for Grasses | | 276 | 273 | 627 | 416 | 114 | 103 | 201 | 132 | 19.07 | 27.11 |
| F | <i>Agoseris glauca</i> | _a - | _b 18 | _a 3 | _a - | - | 9 | 1 | - | .00 | - |
| F | <i>Alyssum alyssoides</i> (a) | - | - | 41 | 26 | - | - | 14 | 8 | .16 | .12 |
| F | <i>Allium</i> spp. | _A 3 | _a 24 | _b 63 | _a 27 | 2 | 10 | 26 | 14 | .53 | .49 |
| F | <i>Antennaria rosea</i> | 2 | - | - | - | 1 | - | - | - | - | - |
| F | <i>Astragalus</i> spp. | _A 2 | _b 17 | _a 1 | _a - | 1 | 12 | 1 | - | .00 | - |
| F | <i>Balsamorhiza sagittata</i> | - | 1 | 2 | 1 | - | 1 | 2 | 1 | .21 | .03 |
| F | <i>Castilleja linariaefolia</i> | - | - | 5 | - | - | - | 2 | - | .01 | - |
| F | <i>Calochortus nuttallii</i> | 3 | 3 | 5 | - | 1 | 1 | 4 | - | .02 | - |
| F | <i>Chenopodium</i> spp. (a) | - | - | 4 | - | - | - | 1 | - | .00 | - |
| F | <i>Cirsium neomexicanum</i> | _{ab} 6 | _b 12 | _{ab} 5 | _a - | 3 | 5 | 4 | - | .20 | - |
| F | <i>Comandra pallida</i> | - | - | - | - | - | - | - | - | .00 | - |
| F | <i>Collinsia parviflora</i> (a) | - | - | 31 | 27 | - | - | 13 | 12 | .11 | .13 |
| F | <i>Crepis acuminata</i> | 5 | 7 | 4 | 11 | 2 | 3 | 3 | 5 | .09 | .15 |
| F | <i>Descurainia</i> spp. (a) | - | - | 3 | - | - | - | 1 | - | .00 | - |
| F | <i>Epilobium brachycarpum</i> (a) | - | - | _b 15 | _a - | - | - | 7 | - | .06 | - |
| F | <i>Erodium cicutarium</i> (a) | - | - | _b 32 | _a 5 | - | - | 14 | 2 | .31 | .03 |
| F | <i>Eriogonum racemosum</i> | - | 1 | 2 | - | - | 1 | 2 | - | .03 | - |
| F | <i>Galium boreale</i> | _a - | _c 33 | _b 17 | _a - | - | 13 | 7 | - | .37 | - |
| F | <i>Hackelia patens</i> | _a 39 | _a 28 | _b 88 | _a 40 | 18 | 16 | 38 | 19 | 3.30 | 1.24 |
| F | <i>Holosteum umbellatum</i> (a) | - | - | _b 99 | _a 13 | - | - | 38 | 6 | .66 | .05 |
| F | <i>Lactuca serriola</i> | _a - | _a - | _b 11 | _a - | - | - | 7 | - | .06 | - |
| F | <i>Lithospermum ruderale</i> | 3 | 2 | 3 | 2 | 3 | 1 | 3 | 2 | .56 | .30 |
| F | <i>Lomatium grayi</i> | 17 | 22 | 19 | 9 | 9 | 12 | 11 | 5 | .38 | .10 |
| F | <i>Lygodesmia</i> spp. | _a - | _a - | _b 13 | _a - | - | - | 7 | - | .06 | - |
| F | <i>Machaeranthera canescens</i> | _a - | _a - | _b 14 | _a - | - | - | 8 | - | .04 | - |
| F | <i>Microsteris gracilis</i> (a) | - | - | _b 11 | _a 3 | - | - | 7 | 2 | .18 | .01 |
| F | <i>Phlox longifolia</i> | 23 | 56 | 56 | 31 | 13 | 24 | 25 | 15 | .25 | .22 |
| F | <i>Polygonum douglasii</i> (a) | - | - | 2 | - | - | - | 1 | - | .00 | - |
| F | <i>Ranunculus testiculatus</i> (a) | - | - | 5 | 7 | - | - | 2 | 3 | .03 | .01 |

| T y p e | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|---------------------------|---------------------------|------------------|----------------|-----------------|----------------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| F | Sisymbrium altissimum (a) | - | - | - | 2 | - | - | - | 1 | - | .03 |
| F | Tragopogon dubius | _b 48 | _a 4 | _a 11 | _a 3 | 22 | 2 | 6 | 1 | .08 | .03 |
| F | Zigadenus paniculatus | - | 4 | - | - | - | 2 | - | - | - | - |
| Total for Annual Forbs | | 0 | 0 | 243 | 83 | 0 | 0 | 98 | 34 | 1.54 | 0.40 |
| Total for Perennial Forbs | | 151 | 232 | 322 | 124 | 75 | 112 | 157 | 62 | 6.24 | 2.58 |
| Total for Forbs | | 151 | 232 | 565 | 207 | 75 | 112 | 255 | 96 | 7.79 | 2.99 |

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

BROWSE TRENDS --

Herd unit 18 , Study no: 27

| T y p e | Species | Strip Frequency | | Average Cover % | |
|------------------|-------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | Artemisia tridentata vaseyana | 50 | 54 | 13.35 | 12.59 |
| B | Chrysothamnus nauseosus albicaulis | 0 | 1 | - | - |
| B | Chrysothamnus viscidiflorus viscidiflorus | 5 | 4 | .06 | .33 |
| B | Gutierrezia sarothrae | 18 | 7 | .70 | .15 |
| B | Juniperus osteosperma | 0 | 1 | .03 | 1.00 |
| B | Purshia tridentata | 29 | 47 | 23.27 | 33.45 |
| Total for Browse | | 102 | 114 | 37.41 | 47.53 |

CANOPY COVER -- LINE INTERCEPT

Herd unit 18 , Study no: 27

| Species | Percent Cover | |
|-------------------------------|---------------|-------|
| | '97 | '02 |
| Artemisia tridentata vaseyana | - | 15.17 |
| Gutierrezia sarothrae | - | .33 |
| Juniperus osteosperma | 3 | .25 |
| Purshia tridentata | - | 39.33 |

Key Browse Annual Leader Growth

Herd unit 18 , Study no: 27

| Species | Average leader growth (in) |
|-------------------------------|----------------------------|
| | '02 |
| Artemisia tridentata vaseyana | 9.5 |
| Purshia tridentata | 11.6 |

Point-Quarter Tree Data
Herd unit 18 , Study no: 27

| Species | Trees per Acre | | Average diameter (in) |
|-----------------------|----------------|-----|-----------------------|
| | '97 | '02 | '02 |
| Juniperus osteosperma | | 62 | 4.3 |

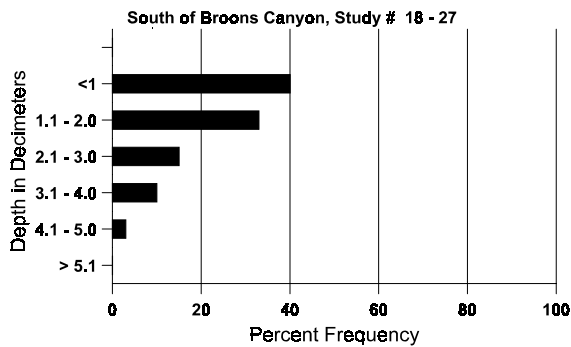
BASIC COVER --
Herd unit 18 , Study no: 27

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 376 | 364 | 2.75 | 16.00 | 56.69 | 66.97 |
| Rock | 172 | 127 | 5.00 | 8.75 | 7.96 | 8.05 |
| Pavement | 123 | 52 | .50 | 2.00 | 1.64 | .60 |
| Litter | 393 | 384 | 84.25 | 65.50 | 62.09 | 49.21 |
| Cryptogams | 77 | 41 | 1.00 | .75 | 1.17 | 1.01 |
| Bare Ground | 122 | 76 | 6.50 | 7.00 | 3.67 | 3.98 |

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 27, South Broons Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 12.1 | 68.0 (15.2) | 6.7 | 50.0 | 27.4 | 22.6 | 3.6 | 16.8 | 275.2 | 0.4 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 18 , Study no: 27

| Type | Quadrat Frequency | | Pellet Transect | |
|--------|-------------------|-----|----------------------------|----------------------------|
| | '97 | '02 | Pellet Groups per Acre '02 | Days Use per Acre (ha) '02 |
| Rabbit | 35 | 36 | - | - |
| Elk | 1 | - | - | - |
| Deer | 27 | 24 | 722 | 56 (137) |
| Cattle | 1 | - | - | - |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 27

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|------|------|-----|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 6 | - | - | 1 | - | - | - | - | - | 7 | - | - | - | 140 | | | 7 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| Y | 83 | 12 | - | - | - | - | - | - | - | - | 12 | - | - | - | 400 | | | 12 |
| | 89 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 33 | | | 1 |
| | 97 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 140 | | | 7 |
| | 02 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | | | 5 |
| M | 83 | 1 | 8 | - | - | - | - | - | - | - | 9 | - | - | - | 300 | 30 | 40 | 9 |
| | 89 | 6 | 4 | 1 | - | - | - | - | - | - | 9 | 2 | - | - | 366 | 21 | 24 | 11 |
| | 97 | 52 | 11 | - | 3 | - | - | - | - | - | 64 | - | 2 | - | 1320 | 27 | 37 | 66 |
| | 02 | 77 | 13 | - | 1 | - | - | - | - | - | 88 | 3 | - | - | 1820 | 29 | 38 | 91 |
| D | 83 | - | - | 1 | - | - | - | - | - | - | - | - | 1 | - | 33 | | | 1 |
| | 89 | 2 | 1 | - | - | 1 | - | - | - | - | 4 | - | - | - | 133 | | | 4 |
| | 97 | 8 | 4 | - | - | - | - | - | - | - | 10 | - | - | 2 | 240 | | | 12 |
| | 02 | 15 | - | - | - | - | - | - | - | - | 9 | - | - | 6 | 300 | | | 15 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 80 | | | 4 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 80 | | | 4 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 36% | | | 05% | | | 05% | | | -27% | | | | | | | |
| '89 | | 38% | | | 06% | | | 00% | | | +69% | | | | | | | |
| '97 | | 18% | | | 00% | | | 05% | | | +23% | | | | | | | |
| '02 | | 12% | | | 00% | | | 05% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 733 | Dec: | 5% | | | | |
| | | | | | | | | | | | '89 | 532 | | 25% | | | | |
| | | | | | | | | | | | '97 | 1700 | | 14% | | | | |
| | | | | | | | | | | | '02 | 2220 | | 14% | | | | |
| <i>Chrysothamnus nauseosus albicaulis</i> | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 15 | 20 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 100% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 0 | Dec: | - | | | | |
| | | | | | | | | | | | '89 | 0 | | - | | | | |
| | | | | | | | | | | | '97 | 0 | | - | | | | |
| | | | | | | | | | | | '02 | 20 | | - | | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|---|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Chrysothamnus viscidiflorus viscidiflorus | | | | | | | | | | | | | | | | | | |
| S | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 100 | | 3 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | '83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | '89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | '97 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | '83 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 20 | 31 | 1 |
| | '89 | 1 | 1 | - | - | - | - | - | - | - | 2 | - | - | - | 66 | 12 | 12 | 2 |
| | '97 | 3 | - | - | 1 | - | - | - | - | - | 4 | - | - | - | 80 | 16 | 29 | 4 |
| | '02 | 6 | - | - | - | - | - | - | - | - | 6 | - | - | - | 120 | 15 | 23 | 6 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 50% | | | 00% | | | 00% | | | +50% | | | | | | | |
| '89 | | 25% | | | 00% | | | 00% | | | -24% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +17% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 66 | Dec: | - | | | | |
| | | | | | | | | | | | '89 | 132 | | - | | | | |
| | | | | | | | | | | | '97 | 100 | | - | | | | |
| | | | | | | | | | | | '02 | 120 | | - | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|------|------|-----|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | | |
| S | '83 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 133 | | 4 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | '83 | 48 | - | - | - | - | - | - | - | - | 48 | - | - | - | 1600 | | 48 | |
| | '89 | 11 | - | - | - | - | - | - | - | - | 11 | - | - | - | 366 | | 11 | |
| | '97 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | | 5 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | '83 | 48 | - | - | - | - | - | - | - | - | 48 | - | - | - | 1600 | 13 14 | 48 | |
| | '89 | 27 | - | - | - | - | - | 1 | - | - | 28 | - | - | - | 933 | 8 10 | 28 | |
| | '97 | 28 | - | - | 9 | - | - | - | - | - | 37 | - | - | - | 740 | 12 12 | 37 | |
| | '02 | 8 | - | - | 1 | - | - | - | - | - | 9 | - | - | - | 180 | 10 12 | 9 | |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | 18 | 1 | - | - | - | - | - | - | - | 9 | - | 4 | 6 | 633 | | 19 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 120 | | 6 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | -40% | | | | | | | |
| '89 | | 02% | | | 00% | | | 17% | | | -57% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | -74% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 3200 | Dec: | 0% | | | | |
| | | | | | | | | | | | '89 | 1932 | | 33% | | | | |
| | | | | | | | | | | | '97 | 840 | | 0% | | | | |
| | | | | | | | | | | | '02 | 220 | | 18% | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| M | '83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 67 | 51 | 1 |
| | '89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 89 | 94 | 1 |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '02 | - | - | - | - | - | - | 1 | - | - | 1 | - | - | - | 20 | - | - | 1 |
| D | '83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | | 1 |
| | '89 | - | - | - | - | 1 | - | - | - | - | 1 | - | - | - | 33 | | | 1 |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '89 | | 50% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 66 | Dec: | 50% | | | |
| | | | | | | | | | | | | '89 | 66 | | 50% | | | |
| | | | | | | | | | | | | '97 | 0 | | 0% | | | |
| | | | | | | | | | | | | '02 | 20 | | 0% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|----|------------------|---|---|-------------------|---|---|----------------|------|------|-----|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Purshia tridentata | | | | | | | | | | | | | | | | | | |
| S | '83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | '83 | 2 | 2 | - | - | - | - | - | - | - | 4 | - | - | - | 133 | | 4 | |
| | '89 | - | - | 1 | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | '97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | '83 | - | 22 | 3 | - | - | - | - | - | - | 25 | - | - | - | 833 | 45 41 | 25 | |
| | '89 | 2 | 12 | 1 | - | - | - | 1 | - | - | 16 | - | - | - | 533 | 46 86 | 16 | |
| | '97 | 17 | 4 | - | 11 | 1 | - | - | - | - | 33 | - | - | - | 660 | 52 91 | 33 | |
| | '02 | 7 | 37 | 14 | 1 | 3 | 9 | - | - | - | 70 | 1 | - | - | 1420 | 54 94 | 71 | |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | 2 | 1 | - | - | - | - | - | - | 3 | - | - | - | 100 | | 3 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | 3 | 4 | - | - | - | - | - | - | - | 5 | - | - | 2 | 140 | | 7 | |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 83% | | | 10% | | | 00% | | | -31% | | | | | | | |
| '89 | | 70% | | | 15% | | | 00% | | | + 2% | | | | | | | |
| '97 | | 15% | | | 00% | | | 00% | | | +57% | | | | | | | |
| '02 | | 56% | | | 29% | | | 03% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 966 | Dec: | 0% | | | | |
| | | | | | | | | | | | '89 | 666 | | 15% | | | | |
| | | | | | | | | | | | '97 | 680 | | 0% | | | | |
| | | | | | | | | | | | '02 | 1580 | | 9% | | | | |

Trend Study 18-29-02

Study site name: Deadman Canyon .

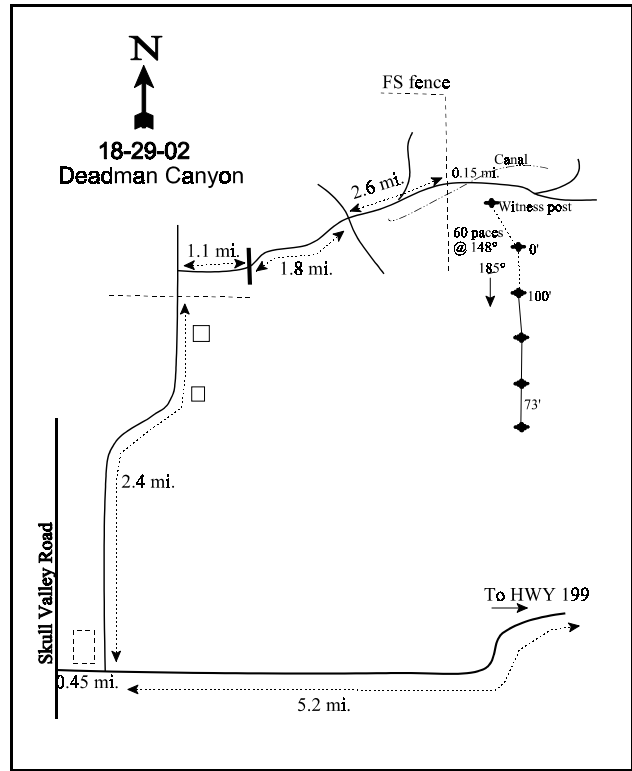
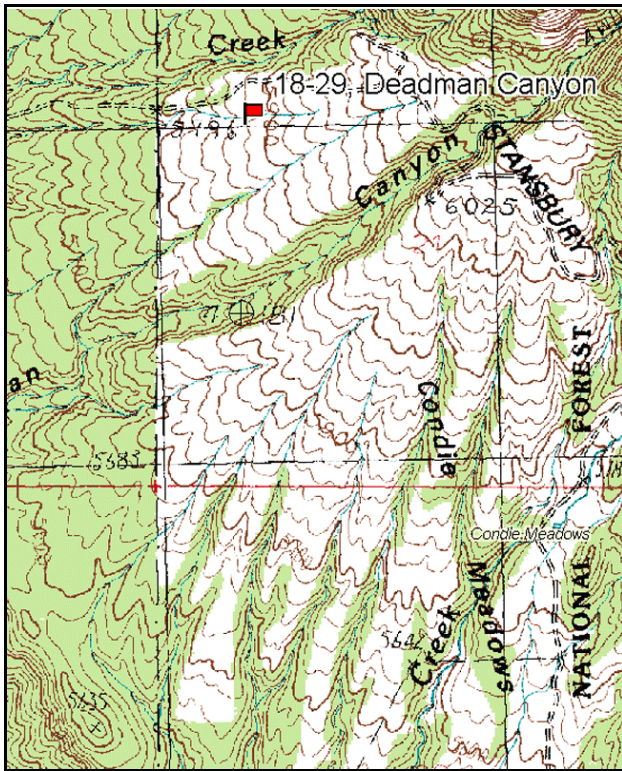
Vegetation type: Chained, Seeded PJ .

Compass bearing: frequency baseline 185 degrees magnetic.

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

LOCATION DESCRIPTION

From U-199, go 5.2 miles west on Old Lincoln Road. Turn north and go 2.0 miles to the Williams Ranch. Continue 0.4 mile and turn right at the fork just past a fence. Go 1.1 miles to a gate. Continue 1.8 miles to an intersection, continue northeasterly. Go 2.6 miles to the Forest Service boundary fence. From the cattle guard, go 0.15 miles to a witness post on the right side of the road. From this fence post, walk 60 paces south (148 degrees) to the 0-foot baseline stake. It is marked by a red browse tag, number 3927.



Map Name: Terra

Diagrammatic Sketch

Township 5S, Range 7W, Section 21

GPS: NAD 27, UTM 12S 4470005 N 360261 E

DISCUSSION

Deadman Canyon - Trend Study No. 18-29

The Deadman Canyon study, although located only a short distance from study 18-28, Condie Meadows, samples a markedly different community. This study occurs at an elevation of 5,880 feet with a 10% slope and a west aspect. The area is a former juniper-pinyon woodland site that has been chained and seeded with perennial grasses. Initially there was no evidence that any shrub or forb species was included in the seed mixture. Nevertheless a fair browse stand remains, while forbs occur infrequently. Deer use, as evidenced by pellet group frequency, was much heavier than at Condie Meadows in 1983. Deer use was moderate in 1997, with a quadrat frequency of 29%. Pellet group transect data from 2002 estimated 58 deer days use/acre (142 ddu/ha). Rabbit pellets were also very common.

Soil is moderately deep and rocky in the upper horizons. Effective rooting depth is estimated at a little over 10 inches with a soil temperature of 60° F at about 12 inches. The soil reaction is neutral (pH of 7.3). The amount of phosphorus in the soil is low at 6.8 ppm. Values less than 10 ppm could be a limiting factor for plant establishment and development. Seeded grasses have established well and provide valuable protection from erosion. Moderate erosion was thought to be occurring initially. Currently erosion is negligible and the soil erosion condition class was determined as slight in 2002.

Browse composition consists of a mixed stand of Stansbury cliffrose, Wyoming big sagebrush, and Utah juniper. Except for the occasionally abundant broom snakeweed, other shrub species occur infrequently. Both key browse species occur in relatively low numbers, but are vigorous. Population estimates for both species have remained relatively stable at about 800 plants/acre for sagebrush and 150 plants/acre for cliffrose. When the study was setup, browse utilization was light to moderate for sagebrush and heavy for cliffrose. In 1997, use was light for both species. Utilization increased for each in 2002, but both species show good vigor and low decadence. Annual leader growth was poor in 2002 due to drought conditions. It averaged only 1.2 inches for sagebrush and 1.4 inches for cliffrose. Utah juniper appeared to be increasing but not an immediate threat in 1983. Point quarter data from 2002 estimated 89 juniper trees/acre with an average diameter of 6.5 inches.

Perennial grasses comprise the bulk of the herbaceous cover. Initially, common species included the seeded types, crested and intermediate wheatgrass. Both of these species have steadily declined since. The natives, bluebunch wheatgrass and Sandberg bluegrass, provided most of the grass cover in 1997 and 2002. Cheatgrass was abundant in 1997, providing 29% of the total grass cover. Due to drought conditions, it declined significantly in nested frequency and cover in 2002. Forb composition and density continue to be poor. Forage production from this component is still low and few desirable species can be found. Due to drought conditions, forbs were essentially eliminated on this site in 2002.

1983 APPARENT TREND ASSESSMENT

Soil trend appears stable or perhaps slightly downward. Most soil parameters indicate a moderate level of ongoing erosion. This is essentially a less stable site than the area sampled by the Condie Meadow study. Vegetative condition for deer winter range is fair. Unless Utah juniper increases rapidly and becomes more competitive than expected, there should be a steady increase in browse production over the next 10 to 15 years.

1989 TREND ASSESSMENT

An obvious and significant change has occurred on the Deadman Canyon chaining since the initial reading. Sum of nested frequency shows a significant decline in intermediate wheatgrass and reciprocally a significant increase for crested wheatgrass. This will happen with drought. Native grass species, namely bluebunch wheatgrass and Sandberg bluegrass, are the most prevalent. Although still sparse, big sagebrush increased in density to 832 plants per acre. The majority of the population is young plants (56%). The mature plants have grown well and are vigorous and moderately hedged. The cliffrose was not as well sampled due to its relatively low density, but overall the largely mature population is vigorous though often unavailable due to its height. Ground cover shows a decrease in litter and an increase in pavement. The percentage of bare soil remains stable at around 15%. Erosion problems are spotty, but the soil trend is stable. The chaining provides good forage for both livestock and wildlife with vegetative trends continuing to improve.

TREND ASSESSMENT

soil - stable (3)

browse - slightly upward (4)

herbaceous understory - stable (3)

1997 TREND ASSESSMENT

The trend for soil is continuing to improve with percent bare soil now down to 8% and herbaceous cover providing 67% of the total vegetative cover. The trend for browse is stable for both key species, Wyoming big sagebrush and cliffrose. Both have improved vigor and use is mostly light at this time. The trend for the herbaceous understory is slightly improved overall with most of the herbaceous cover coming from bluebunch wheatgrass, Sandberg bluegrass, and intermediate wheatgrass. The forbs have improved also, but they still only provide about 13% of the total herbaceous cover.

TREND ASSESSMENT

soil - slightly up (4)

browse - stable (3)

herbaceous understory - slightly up (4)

2002 TREND ASSESSMENT

Trend for soil is down slightly. Cover of bare ground has increased from 8% to 20% and total herbaceous cover has declined slightly due to drought. Litter cover remains stable and the soil erosion condition class was determined as slight in 2002. Trend for the key browse species, Wyoming big sagebrush and cliffrose, is stable. Densities of these species have remained similar to 1997 estimates. Use has increased but vigor remains good and the number of decadent plants is low. Trend for the herbaceous understory is mixed. Sum of nested frequency for perennial grasses remained similar to 1997, but composition has changed to a more native grass dominated stand. Bluebunch wheatgrass increased significantly while intermediate wheatgrass declined significantly. Drought conditions have also caused a significant decline in cheatgrass. Sum of nested frequency for forbs has declined dramatically. Ten forb species were encountered in 1997 but only three annual forb species remained in 2002. Since forbs have never been very abundant on this site, the overall herbaceous understory trend is considered stable.

TREND ASSESSMENT

soil - slightly sown (2)

browse - stable (3)

herbaceous understory - stable for grasses (3)

HERBACEOUS TRENDS --
Herd unit 18 , Study no: 29

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|-----------------------------|------------------|------------------|------------------|------------------|-------------------|-----|-----|-----|-----------------|-------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | Agropyron cristatum | _b 50 | _c 133 | _{ab} 31 | _a 2 | 16 | 46 | 10 | 1 | 1.17 | .03 |
| G | Agropyron intermedium | _c 98 | _a 6 | _b 50 | _a 7 | 34 | 3 | 18 | 3 | 2.03 | .41 |
| G | Agropyron spicatum | _a 159 | _a 165 | _a 211 | _b 253 | 54 | 63 | 71 | 87 | 10.55 | 15.70 |
| G | Bromus tectorum (a) | - | - | _b 228 | _a 20 | - | - | 74 | 9 | 6.31 | .04 |
| G | Oryzopsis hymenoides | - | - | 2 | 3 | - | - | 1 | 1 | .03 | .15 |
| G | Poa bulbosa | _b 13 | _a - | _a - | _{ab} 2 | 5 | - | - | 1 | - | .00 |
| G | Poa secunda | _b 122 | _a 51 | _b 91 | _b 117 | 54 | 22 | 36 | 47 | 1.72 | 1.67 |
| G | Sitanion hystrix | _b 17 | _a 1 | _{ab} 8 | _a - | 9 | 1 | 4 | - | .07 | - |
| Total for Annual Grasses | | 0 | 0 | 228 | 20 | 0 | 0 | 74 | 9 | 6.31 | 0.04 |
| Total for Perennial Grasses | | 459 | 356 | 393 | 384 | 172 | 135 | 140 | 140 | 15.59 | 17.98 |
| Total for Grasses | | 459 | 356 | 621 | 404 | 172 | 135 | 214 | 149 | 21.90 | 18.02 |
| F | Agoseris glauca | 4 | - | - | - | 2 | - | - | - | - | - |
| F | Alyssum alyssoides (a) | - | - | _b 241 | _a 17 | - | - | 74 | 7 | 1.79 | .03 |
| F | Allium spp. | - | - | 1 | - | - | - | 1 | - | .03 | - |
| F | Antennaria rosea | 3 | - | - | - | 2 | - | - | - | - | - |
| F | Arabis spp. | _a - | _b 14 | _b 13 | _a - | - | 7 | 6 | - | .08 | - |
| F | Calochortus nuttallii | _b 19 | _a 4 | _a 3 | _a - | 12 | 2 | 2 | - | .05 | - |
| F | Chaenactis douglasii | 7 | - | - | - | 3 | - | - | - | - | - |
| F | Crepis acuminata | 3 | - | - | - | 2 | - | - | - | - | - |
| F | Cruciferae | - | 1 | - | - | - | 1 | - | - | - | - |
| F | Erigeron spp. | 2 | - | - | - | 1 | - | - | - | - | - |
| F | Erigeron pumilus | 2 | - | - | - | 1 | - | - | - | - | - |
| F | Holosteum umbellatum (a) | - | - | - | 2 | - | - | - | 1 | - | .00 |
| F | Lathyrus brachycalyx | _c 83 | _d 133 | _b 48 | _a - | 32 | 47 | 19 | - | .58 | - |
| F | Lactuca serriola | - | - | 1 | - | - | - | 1 | - | .00 | - |
| F | Petradoria pumila | _b 17 | _b 12 | _{ab} 5 | _a - | 9 | 6 | 2 | - | .02 | - |
| F | Phlox longifolia | 8 | 3 | 8 | - | 4 | 1 | 3 | - | .21 | - |
| F | Ranunculus testiculatus (a) | - | - | _b 107 | _a 2 | - | - | 39 | 1 | .39 | .00 |
| F | Sisymbrium altissimum (a) | - | - | 2 | - | - | - | 2 | - | .03 | - |
| Total for Annual Forbs | | 0 | 0 | 350 | 21 | 0 | 0 | 115 | 9 | 2.22 | 0.04 |
| Total for Perennial Forbs | | 148 | 167 | 79 | 0 | 68 | 64 | 34 | 0 | 0.98 | 0 |
| Total for Forbs | | 148 | 167 | 429 | 21 | 68 | 64 | 149 | 9 | 3.21 | 0.04 |

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

BROWSE TRENDS --

Herd unit 18 , Study no: 29

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|-----------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | Artemisia tridentata wyomingensis | 27 | 21 | 3.38 | 5.01 |
| B | Cowania mexicana stansburiana | 9 | 6 | 4.37 | 2.73 |
| B | Gutierrezia sarothrae | 36 | 4 | .77 | - |
| B | Juniperus osteosperma | 3 | 3 | 3.97 | 5.91 |
| Total for Browse | | 75 | 34 | 12.50 | 13.67 |

CANOPY COVER -- LINE INTERCEPT

Herd unit 18 , Study no: 29

| Species | Percent Cover | |
|-----------------------------------|---------------|------|
| | '97 | '02 |
| Artemisia tridentata wyomingensis | - | 5.25 |
| Cowania mexicana stansburiana | 3 | 5.00 |
| Juniperus osteosperma | 6 | 6.17 |

Key Browse Annual Leader Growth

Herd unit 18 , Study no: 29

| Species | Average leader growth (in) |
|-----------------------------------|----------------------------|
| | '02 |
| Artemisia tridentata wyomingensis | 1.2 |
| Cowania mexicana stansburiana | 1.4 |

Point-Quarter Tree Data

Herd unit 18 , Study no: 29

| Species | Trees per Acre | Average diameter (in) |
|-----------------------|----------------|-----------------------|
| | '02 | '02 |
| Juniperus osteosperma | 89 | 6.6 |

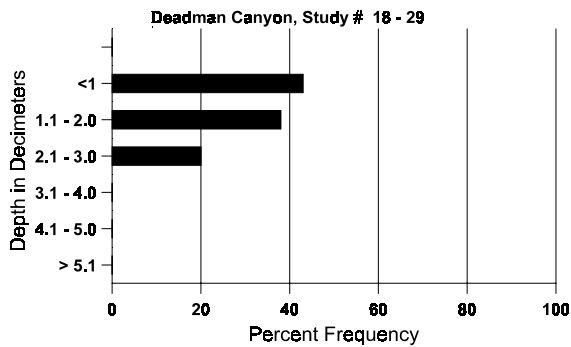
BASIC COVER --
Herd unit 18 , Study no: 29

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 365 | 293 | 3.25 | 6.00 | 34.40 | 31.05 |
| Rock | 137 | 165 | 1.50 | 3.75 | 1.70 | 3.20 |
| Pavement | 246 | 273 | 3.25 | 17.00 | 7.44 | 11.06 |
| Litter | 392 | 377 | 73.50 | 57.25 | 51.37 | 50.00 |
| Cryptogams | 150 | 97 | 1.50 | 1.50 | 1.52 | 2.13 |
| Bare Ground | 208 | 255 | 17.00 | 14.50 | 7.66 | 20.22 |

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 29, Deadman Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 10.6 | 59.5 | 7.3 | 42.7 | 28.7 | 28.6 | 3.7 | 6.8 | 198.4 | 0.6 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 18 , Study no: 29

| Type | Quadrat Frequency | |
|--------|-------------------|-----|
| | '97 | '02 |
| Rabbit | 47 | 55 |
| Deer | 29 | 22 |

| Pellet Transect | |
|------------------------|------------------------|
| Pellet Groups per Acre | Days Use per Acre (ha) |
| 02 | 02 |
| - | - |
| 748 | 58 (142) |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 29

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Artemisia tridentata wyomingensis | | | | | | | | | | | | | | | | | | |
| S | 83 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 233 | | 7 | |
| | 89 | 3 | 11 | - | - | - | - | - | - | - | 14 | - | - | - | 466 | | 14 | |
| | 97 | 18 | 1 | - | - | - | - | - | - | - | 19 | - | - | - | 380 | | 19 | |
| | 02 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 83 | 3 | 5 | - | - | - | - | - | - | - | 8 | - | - | - | 266 | 38 45 | 8 | |
| | 89 | - | 9 | 1 | - | - | - | - | - | - | 10 | - | - | - | 333 | 30 45 | 10 | |
| | 97 | 18 | 2 | - | - | - | - | - | - | - | 20 | - | - | - | 400 | 24 33 | 20 | |
| | 02 | 26 | 13 | - | - | - | - | - | - | - | 39 | - | - | - | 780 | 27 39 | 39 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | 2 | 1 | - | - | 1 | - | - | - | - | 4 | - | - | - | 80 | | 4 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 140 | | 7 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 60 | | 3 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 33% | | | 00% | | | 00% | | | +40% | | | | | | | |
| '89 | | 84% | | | 04% | | | 00% | | | - 4% | | | | | | | |
| '97 | | 08% | | | 00% | | | 00% | | | + 9% | | | | | | | |
| '02 | | 36% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 499 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 832 | | 4% | | | |
| | | | | | | | | | | | | '97 | 800 | | 3% | | | |
| | | | | | | | | | | | | '02 | 880 | | 9% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|---|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Cowania mexicana stansburiana | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | 2 | - | - | - | - | - | 3 | - | - | - | 60 | | 3 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| Y | 83 | - | - | 1 | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 83 | - | 1 | 3 | - | - | - | - | - | - | 4 | - | - | - | 133 | 38 33 | 4 | |
| | 89 | - | 2 | - | - | - | - | - | - | - | 2 | - | - | - | 66 | 33 38 | 2 | |
| | 97 | 5 | - | - | 1 | - | - | 2 | - | - | 8 | - | - | - | 160 | 77 75 | 8 | |
| | 02 | 1 | 2 | - | - | - | 1 | - | 1 | - | 5 | - | - | - | 100 | 74 82 | 5 | |
| D | 83 | - | - | 1 | - | - | - | - | - | - | - | - | 1 | - | 33 | | 1 | |
| | 89 | - | 2 | 1 | - | - | - | - | - | - | 2 | - | - | 1 | 100 | | 3 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | 2 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 17% | | | 83% | | | 17% | | | -17% | | | | | | | |
| '89 | | 80% | | | 20% | | | 20% | | | + 8% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | -33% | | | | | | | |
| '02 | | 33% | | | 17% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 199 | Dec: | 17% | | | |
| | | | | | | | | | | | | '89 | 166 | | 60% | | | |
| | | | | | | | | | | | | '97 | 180 | | 0% | | | |
| | | | | | | | | | | | | '02 | 120 | | 0% | | | |

| A Y G R E | Form Class (No. of Plants) | 1 | | | | 2 | | | | 3 | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | | |
|------------------------------------------------|----------------------------|---------------------|---|---|---|------------------|---|---|---|-------------------|---|-----|------|--------------------|--------------------------------|---|-------|------|----|----|----|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | | 4 | | | | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | | | | | |
| S | 83 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | - | - | - | - | 66 | | 2 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | 12 | - | - | - | - | - | - | - | - | - | - | 12 | - | - | - | - | 400 | | 12 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 18 | - | - | - | - | - | - | 1 | - | - | - | 19 | - | - | - | - | 380 | | 19 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 7 | - | - | - | - | - | - | - | - | - | - | 7 | - | - | - | - | 233 | 10 | 13 | 7 |
| | 89 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | 33 | 11 | 9 | 1 |
| | 97 | 56 | - | - | - | - | - | - | - | - | - | - | 56 | - | - | - | - | 1120 | 9 | 10 | 56 |
| | 02 | 4 | - | - | - | - | - | - | - | - | - | - | 4 | - | - | - | - | 80 | 5 | 9 | 4 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 10 | - | - | - | - | - | - | - | - | - | - | 4 | - | - | - | 6 | 200 | | 10 | |
| | 02 | 2 | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | 1 | 40 | | 2 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 240 | | 12 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | 2 | |
| % Plants Showing | | <u>Moderate Use</u> | | | | <u>Heavy Use</u> | | | | <u>Poor Vigor</u> | | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | | 00% | | | | 00% | | | | -95% | | | | | | | |
| '89 | | 00% | | | | 00% | | | | 00% | | | | +98% | | | | | | | |
| '97 | | 00% | | | | 00% | | | | 07% | | | | -93% | | | | | | | |
| '02 | | 00% | | | | 00% | | | | 17% | | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 633 | Dec: | 0% | | | | | | |
| | | | | | | | | | | | | '89 | 33 | | 0% | | | | | | |
| | | | | | | | | | | | | '97 | 1700 | | 12% | | | | | | |
| | | | | | | | | | | | | '02 | 120 | | 33% | | | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| Y | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | '89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 124 | 63 | |
| | '97 | - | - | - | - | - | - | 2 | - | - | 2 | - | - | - | 40 | - | 2 | |
| | '02 | 1 | - | - | - | - | - | 1 | - | - | 2 | - | - | - | 40 | - | 2 | |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | - | - | - | - | - | - | - | 1 | - | 1 | - | - | - | 20 | | 1 | |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 60 | | 3 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | 2 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +45% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 33 | | 0% | | | |
| | | | | | | | | | | | | '97 | 60 | | 0% | | | |
| | | | | | | | | | | | | '02 | 60 | | 33% | | | |

Trend Study 18-30-02

Study site name: Hatch Ranch.

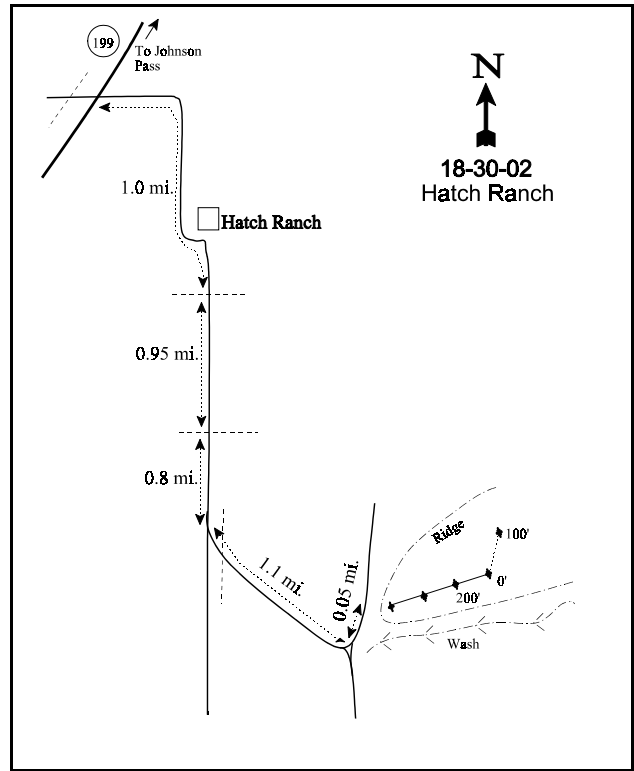
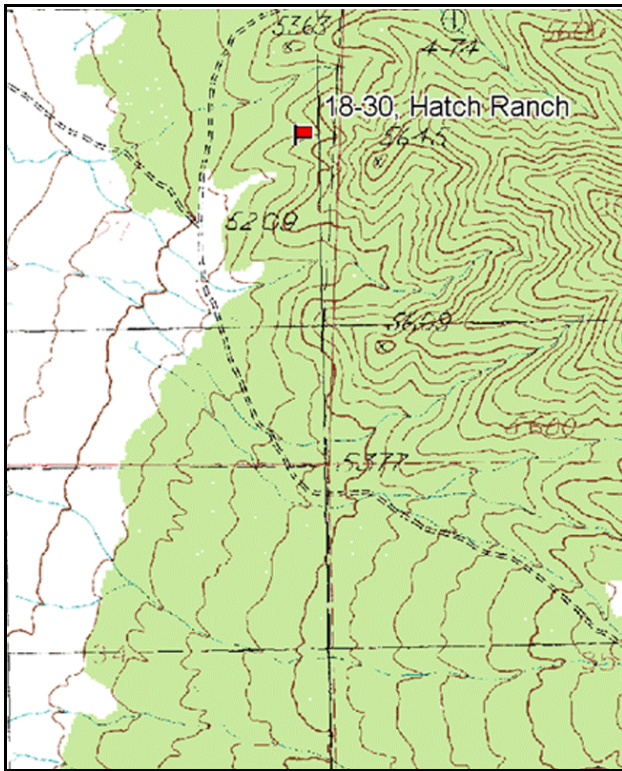
Vegetation type: Stansbury Cliffrose.

Compass bearing: frequency baseline 18 degrees magnetic (Lines 2-4 @ 250°M).

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

LOCATION DESCRIPTION

Across from the Old Lincoln Road, turn east off of U-199. Go east and south 1.0 mile to the Hatch Ranch. From the south gate, continue down the valley 0.95 miles to another gate. Continue 0.8 miles on the main road to a fork that angles southeast through a gate. Take this fork 1.1 miles to a fork at the base of the Onaqui Mountains. Bear left, going just 300 yards to the base of a ridge. From here, walk up the ridge about 400 yards to the 0-foot baseline stake on the ridge top. It is a short green fencepost marked with browse tab #9081.



Map Name: Johnson Pass

Diagrammatic Sketch

Township 6S, Range 7W, Section 26

GPS: NAD 27, UTM 12S 4458557 N 362933 E

DISCUSSION

Hatch Ranch - Trend Study No. 18-30

This study samples severe winter range located at the base of the Onaqui Mountains, approximately three miles south-southeast of Hatch Ranch. It is an area of low hills and ridges occupied by a scattered, relatively low density juniper-pinyon woodland and low density cliffrose mixed with Wyoming big sagebrush. The lower elevation flats are occupied by extensive areas of Wyoming big sagebrush and shadscale saltbush. Elevation of the study is 5,600 feet with a moderately steep slope (17%) and a southwest aspect. The entire area is rather depleted of understory herbs, especially forbs. Cheatgrass is widespread and often very dense. The area is administered by the BLM and is permitted for cattle grazing, which was underway at the time of study establishment in 1983. Little sign of cattle use was noted in 1997 or 2002. Deer use has been moderate during all sampling periods. Pellet group quadrat frequency was 40% in 1997. Pellet group transect data from 2002 estimated 31 deer days use/acre (76 ddu/ha). There was also sign of wild horses in the area but none on the site itself. Stud piles were found down slope from the site and 10 wild horses were seen on the sagebrush flat near the site during the 2002 reading.

Soil condition is poor with one-third of the ground covered with rock or pavement. Effective rooting depth is shallow averaging only 6 inches. The soil is obviously deeper but the rocky nature of the soil limited soil penetrometer readings. Soil temperature is high due to the rocky soil and shallow depth, averaging 74° F at 8 inches. Soil texture is a clay loam with a neutral reaction (pH 7.1). Only minimal herbaceous vegetation or litter cover is available to protect the shallow and extremely rocky soil. About 40% of the ground surface is occupied by rock, erosion pavement, or bare soil. Cryptogams comprise a significant amount of the ground cover. Although the rate of soil erosion has been severe in the past, it was considered negligible or quite low in 1997 and 2002. There is little bare ground exposed and the erosion condition class was determined as stable in 2002.

The key browse species are Stansbury cliffrose and Wyoming big sagebrush, which provide most of the browse cover. Wyoming big sagebrush has maintained a stable density of around 1,000 plants/acre since study site establishment in 1983. Utilization in 1983 was heavy but vigor remained good on most plants and percent decadence was low at only 9%. Use since then has been light with a few plants displaying moderate or heavy use. Vigor has been good with the exception of 1997 when 26% of the mature sagebrush were classified as chlorotic and nearly all of the decadent shrubs were classified as dying. By 2002, vigor has improved and the stand appears to be stable.

The site supports a mostly mature stand of cliffrose which has been moderately to heavily hedged on available plants during most years. Density was estimated at just under 600 plants/acre in 1983 and 1989. The much larger sample used in 1997 and 2002 estimated a higher density of respectively 780 plants/acre and 1,200 plants/acre. Vigor has been good on most plants during all readings and besides a moderately high number of decadent plants in 1989, percent decadence has remained relatively low. Young recruitment was good in 1997 and 2002 indicating a slowly expanding population.

Several other shrub species can also be found. However, most occur infrequently and are generally low in palatability. The most numerous is broom snakeweed, an aggressive increaser, which had a high density of 12,920 plants/acre in 1997. Drought conditions in 2002 have caused a dramatic decline to only 520 plants/acre.

Understory grasses, especially forbs, are sparse and generally of low forage value. Total herbaceous cover was estimated at only 15% in 1997, declining to 8% in 2002. Barren areas and patches of nearly pure cheatgrass brome occupied more surface area than any other class of vegetation in 1997. The most palatable and abundant perennial herbaceous species is bluebunch wheatgrass, a population which contains both the hairy and bearded subspecies. The fire hazard in this area varies from moderate to high, depending upon cheatgrass density. Several forbs are found on the site but only a few occur more than occasionally. Total cover of forbs is low averaging only 1% cover in 1997 and less than one-half of 1% cover in 2002.

1983 APPARENT TREND ASSESSMENT

Soil is poor. Very little effective litter or vegetational cover is available to hold soil in place. As a result, erosion is proceeding at a rapid rate. Aside from an apparent increase in broom snakeweed, trend for the major browse populations appears stable or perhaps even improving. Herbaceous understory condition is poor and not improving.

1989 TREND ASSESSMENT

These foothill ridges provide a diversity of browse forage not found in the large basins below where Wyoming big sagebrush dominates. Cliffrose is the preferred species and is heavily utilized by both deer and livestock. In 1983, the study was conducted when cattle were present. During the reading in 1989, evidence of sheep use was observed. Since 1983, the cliffrose has shown signs of increased decadence (from 6% to 38%). The majority are classified with heavy use (44%). Density has changed slightly downward from 599 plants/acre to 532 plants/acre. A few young and seedlings were counted. There are conflicting indicators of trend in the age class structure and the increase in frequency make it difficult to predict trends in the population that is relatively long-lived. The composition and populations of other browse species are essentially stable. Vigor and utilization of the Wyoming big sagebrush are acceptable, and density is slightly higher at 1,233 plants/acre. The herbaceous component appears to have improved somewhat, contrary to the 1983 assessment. There was an increase in grass frequency, due mainly to increases in Sandberg bluegrass. While the diversity of grasses is still low, the number of forb species identified increased from 4 to 10 and there is a higher frequency of forbs. The site is very rocky and steep, but erosion is not excessive for the type of site. Soil is definitely a limiting factor. There are cryptogams and mosses on the bare areas.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly upward (4)

1997 TREND ASSESSMENT

The trend for soil is improved, but still in poor condition. Percent bare soil has decreased to 6%, however rock and pavement still cover 33% of the surface. The two key browse species are cliffrose and Wyoming big sagebrush. The cliffrose which makes up 38% of the browse cover, appears to be experiencing an upward trend. Some of these characteristics include good biotic potential (number of seedlings), good age class structure (mature and young age classes) for a long-lived species, reduced decadence, mostly light use, and an increase in the population. For Wyoming big sagebrush, we see another scenario. We have a population that is slightly more decadent, an increased number of plants classified with poor vigor, the young age class has decreased to only 10%, while the mature age class has increased to 73%. This is not good for a relatively short-lived shrub. The ratio of dead to live plants is poor (1:3.3). The population has decreased by 22%, but this can be explained by the number of dead plants in the population. The one desirable characteristic the population has is that the biotic potential (# of seedlings) is relatively high at 33%. This one encouraging characteristic could compensate for its decrease in numbers, but it will not be readily recognizable until the next reading in 2002. Broom snakeweed is also another browse that is relatively abundant. It is not utilized, yet it can be an indicator of other problems. Currently it has increased to 12,920 plants/acre. There are no seedlings and the mature age class now makes up 83% of the population, indicating its population will eventually go down. Large swings in its population (either up or down) would be expected. Trend for key browse is considered stable, with the increases in cliffrose compensating for the losses in the sagebrush. The herbaceous understory trend is slightly downward with the perennial component showing losses. It is still in poor condition with two weedy species (cheatgrass and bur buttercup) making up more than 57% of the herbaceous cover.

TREND ASSESSMENT

soil - slightly improved, but still poor condition (4)

browse - stable (3)

herbaceous understory - slightly down (2)

2002 TREND ASSESSMENT

Trend for soil is down slightly and condition is poor. Rock and pavement cover over one-third of the surface. Cover of bare ground has increased slightly while cover of litter and vegetation have declined. Herbaceous vegetation cover has declined from 15% in 1997 to 8% in 2002. There is little erosion occurring. The erosion condition class was determined as stable in 2002. Trend for the key browse species, Wyoming big sagebrush and cliffrose is up slightly. Density of Wyoming big sagebrush has increased slightly as vigor has improved and young recruitment is good with 19% of the population consisting of young plants. Utilization remains mostly light. Cliffrose also shows an increase in density. It is more heavily utilized compared to 1997, but vigor remains good, young recruitment adequate, and there are few decadent plants. Trend for the herbaceous understory is mixed. Sum of nested frequency for perennial grasses has remained stable. Nested frequency of cheatgrass has declined significantly and average cover has dropped from 8% in 1997 to one-half of 1% in 2002. Sum of nested frequency for forbs has declined dramatically due to drought. Forbs were never very abundant although 16 species were identified in 1997, yet only three were sampled in 2002. Since Sandberg bluegrass, which provides 87% of the grass cover or 83% of the total herbaceous cover, has remained stable, overall trend for the herbaceous understory is considered stable.

TREND ASSESSMENT

soil - down slightly (2)

browse - up slightly (4)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 30

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|------------------------|------------------|------|------|------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | Agropyron spicatum | a17 | b39 | ab24 | a15 | 8 | 18 | 9 | 10 | .93 | .58 |
| G | Bromus tectorum (a) | - | - | b285 | a73 | - | - | 91 | 30 | 8.10 | .46 |
| G | Oryzopsis hymenoides | - | 3 | 6 | - | - | 1 | 3 | - | .07 | - |
| G | Poa secunda | a192 | b270 | b252 | b269 | 69 | 88 | 87 | 90 | 5.09 | 7.00 |
| Total for Annual Grasses | | 0 | 0 | 285 | 73 | 0 | 0 | 91 | 30 | 8.10 | 0.46 |
| Total for Perennial Grasses | | 209 | 312 | 282 | 284 | 77 | 107 | 99 | 100 | 6.09 | 7.59 |
| Total for Grasses | | 209 | 312 | 567 | 357 | 77 | 107 | 190 | 130 | 14.19 | 8.06 |
| F | Agoseris glauca | - | - | 3 | - | - | - | 1 | - | .03 | - |
| F | Alyssum alyssoides (a) | - | - | 10 | - | - | - | 4 | - | .02 | - |
| F | Allium spp. | b10 | ab6 | b12 | a- | 5 | 3 | 7 | - | .06 | - |
| F | Antennaria rosea | - | - | 4 | 3 | - | - | 2 | 1 | .01 | .00 |
| F | Astragalus utahensis | - | 1 | 3 | - | - | 1 | 1 | - | .00 | - |
| F | Calochortus nuttallii | 3 | 7 | 1 | - | 1 | 3 | 1 | - | .00 | - |
| F | Chaenactis douglasii | - | 2 | - | - | - | 1 | - | - | - | - |
| F | Cirsium spp. | - | - | 1 | - | - | - | 1 | - | .00 | - |
| F | Erodium cicutarium (a) | - | - | 2 | - | - | - | 1 | - | .01 | - |
| F | Erigeron pumilus | a1 | b10 | ab6 | a- | 1 | 7 | 2 | - | .03 | - |
| F | Euphorbia spp. | - | - | 5 | - | - | - | 3 | - | .01 | - |
| F | Haplopappus acaulis | - | 6 | - | - | - | 2 | - | - | - | - |
| F | Lactuca serriola | a- | b27 | a2 | a- | - | 16 | 1 | - | .03 | - |

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|---------------------------|-----------------------------|------------------|-----------------|------------------|-----------------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| F | Lomatium spp. | - | 6 | - | - | - | 3 | - | - | - | - |
| F | Microsteris gracilis (a) | - | - | 2 | - | - | - | 1 | - | .00 | - |
| F | Oenothera caespitosa | - | 2 | - | - | - | 1 | - | - | - | - |
| F | Phlox hoodii | - | - | 9 | 9 | - | - | 4 | 4 | .21 | .36 |
| F | Phlox longifolia | 2 | 8 | 1 | - | 2 | 4 | 1 | - | .00 | - |
| F | Ranunculus testiculatus (a) | - | - | _b 149 | _a 11 | - | - | 53 | 6 | .74 | .03 |
| F | Townsendia incana | _a - | _b 37 | _a 4 | _a - | - | 16 | 2 | - | .06 | - |
| Total for Annual Forbs | | 0 | 0 | 163 | 11 | 0 | 0 | 59 | 6 | 0.77 | 0.03 |
| Total for Perennial Forbs | | 16 | 112 | 51 | 12 | 9 | 57 | 26 | 5 | 0.47 | 0.36 |
| Total for Forbs | | 16 | 112 | 214 | 23 | 9 | 57 | 85 | 11 | 1.25 | 0.39 |

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

BROWSE TRENDS --

Herd unit 18 , Study no: 30

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | Artemisia tridentata wyomingensis | 34 | 36 | 3.10 | 3.30 |
| B | Chrysothamnus viscidiflorus stenophyllus | 13 | 0 | .09 | - |
| B | Cowania mexicana stansburiana | 32 | 38 | 9.34 | 12.03 |
| B | Gutierrezia sarothrae | 87 | 13 | 7.50 | .30 |
| B | Juniperus osteosperma | 5 | 5 | 4.09 | 4.52 |
| B | Leptodactylon pungens | 2 | 1 | - | .03 |
| B | Pinus monophylla | 0 | 1 | - | .00 |
| B | Sclerocactus | 1 | 1 | - | - |
| B | Tetradymia canescens | 2 | 2 | .15 | - |
| B | Tetradymia nuttallii | 18 | 11 | .38 | .09 |
| Total for Browse | | 194 | 108 | 24.66 | 20.29 |

CANOPY COVER -- LINE INTERCEPT

Herd unit 18 , Study no: 30

| Species | Percent Cover | |
|------------------------------------------|---------------|-------|
| | '97 | '02 |
| Artemisia tridentata wyomingensis | - | 4.17 |
| Chrysothamnus viscidiflorus stenophyllus | - | .03 |
| Cowania mexicana stansburiana | - | 14.67 |
| Gutierrezia sarothrae | - | .02 |
| Juniperus osteosperma | 3 | 6.25 |
| Tetradymia nuttallii | - | .17 |

Key Browse Annual Leader Growth

Herd unit 18 , Study no: 30

| Species | Average leader growth (in) |
|-----------------------------------|----------------------------|
| | '02 |
| Artemisia tridentata wyomingensis | 1.4 |
| Cowania mexicana stansburiana | 1.7 |

Point-Quarter Tree Data

Herd unit 18 , Study no: 30

| Species | Trees per Acre | Average diameter (in) |
|-----------------------|----------------|-----------------------|
| | '02 | '02 |
| Juniperus osteosperma | 63 | 5.3 |

BASIC COVER --

Herd unit 18 , Study no: 30

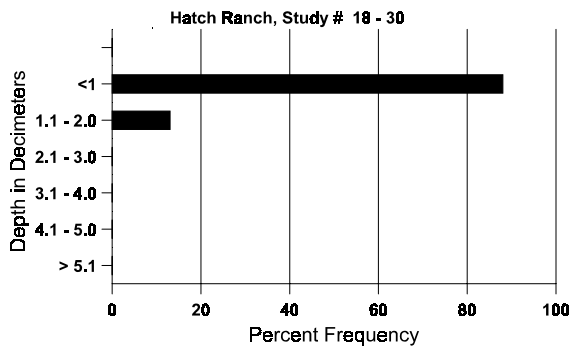
| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 354 | 303 | 2.00 | 3.25 | 34.68 | 27.06 |
| Rock | 291 | 296 | 22.75 | 23.00 | 16.75 | 19.56 |
| Pavement | 280 | 285 | 12.00 | 21.25 | 16.10 | 15.42 |
| Litter | 376 | 354 | 33.75 | 27.25 | 28.58 | 25.79 |
| Cryptogams | 283 | 264 | 15.50 | 16.00 | 17.79 | 22.27 |
| Bare Ground | 180 | 193 | 14.00 | 9.25 | 6.42 | 9.96 |

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 30, Hatch Ranch

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %0M | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 6.1 | 74.3 (8.4) | 7.1 | 35.1 | 32.7 | 32.2 | 2.5 | 9.5 | 233.6 | 0.7 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 18 , Study no: 30

| Type | Quadrat Frequency | |
|--------|-------------------|-----|
| | '97 | '02 |
| Rabbit | 45 | 12 |
| Deer | 40 | 8 |
| Cattle | 1 | - |

| Pellet Transect | |
|------------------------|------------------------|
| Pellet Groups per Acre | Days Use per Acre (ha) |
| 02 | 02 |
| - | - |
| 400 | 31 (76) |
| - | - |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 30

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|----|------------------|---|---|-------------------|---|---|----------------|------|------|-----|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Artemisia tridentata wyomingensis | | | | | | | | | | | | | | | | | | |
| S | 83 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | 89 | 5 | - | - | - | - | - | 1 | - | - | 6 | - | - | - | 200 | | 6 | |
| | 97 | 16 | - | - | - | - | - | - | - | - | 16 | - | - | - | 320 | | 16 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | 10 | - | - | - | - | - | - | - | - | 10 | - | - | - | 333 | | 10 | |
| | 89 | 13 | 1 | - | - | - | - | 1 | - | - | 13 | 2 | - | - | 500 | | 15 | |
| | 97 | 4 | - | - | 1 | - | - | - | - | - | 5 | - | - | - | 100 | | 5 | |
| | 02 | 11 | 1 | - | - | - | - | - | - | - | 12 | - | - | - | 240 | | 12 | |
| M | 83 | 4 | 5 | 10 | - | - | - | - | - | - | 16 | - | 3 | - | 633 | 21 28 | 19 | |
| | 89 | 11 | 5 | 2 | - | - | - | - | - | - | 18 | - | - | - | 600 | 20 19 | 18 | |
| | 97 | 33 | 1 | - | 1 | - | - | - | - | - | 26 | - | 9 | - | 700 | 19 28 | 35 | |
| | 02 | 32 | 1 | 1 | 3 | - | - | - | - | - | 37 | - | - | - | 740 | 21 30 | 37 | |
| D | 83 | - | - | 3 | - | - | - | - | - | - | 1 | - | 2 | - | 100 | | 3 | |
| | 89 | 4 | - | - | - | - | - | - | - | - | 2 | - | - | 2 | 133 | | 4 | |
| | 97 | 7 | 1 | - | - | - | - | - | - | - | 1 | - | - | 7 | 160 | | 8 | |
| | 02 | 12 | 1 | 1 | - | - | - | - | - | - | 9 | - | - | 5 | 280 | | 14 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 380 | | 19 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 480 | | 24 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 16% | | | 41% | | | 16% | | | +14% | | | | | | | |
| '89 | | 16% | | | 05% | | | 05% | | | -22% | | | | | | | |
| '97 | | 04% | | | 00% | | | 33% | | | +24% | | | | | | | |
| '02 | | 05% | | | 03% | | | 08% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 1066 | Dec: | 9% | | | | |
| | | | | | | | | | | | '89 | 1233 | | 11% | | | | |
| | | | | | | | | | | | '97 | 960 | | 17% | | | | |
| | | | | | | | | | | | '02 | 1260 | | 22% | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Chrysothamnus viscidiflorus stenophyllus | | | | | | | | | | | | | | | | | | |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 89 | 1 | - | - | 1 | - | - | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 56 | - | - | - | - | - | - | - | - | 56 | - | - | - | 1866 | 12 | 17 | 56 |
| | 89 | 10 | 16 | 2 | - | - | - | - | - | - | 28 | - | - | - | 933 | 7 | 7 | 28 |
| | 97 | 12 | - | 1 | 2 | - | - | - | - | - | 15 | - | - | - | 300 | 9 | 13 | 15 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 9 | 13 | 0 |
| D | 83 | 3 | - | - | - | - | - | - | - | - | 1 | - | 2 | - | 100 | | 3 | |
| | 89 | 11 | 13 | - | - | 1 | - | - | - | - | 23 | 1 | 1 | - | 833 | | 25 | |
| | 97 | 3 | - | - | - | - | - | - | - | - | 1 | - | - | 2 | 60 | | 3 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 60 | | 3 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 60 | | 3 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 03% | | | - 8% | | | | | | | |
| '89 | | 55% | | | 04% | | | 02% | | | -79% | | | | | | | |
| '97 | | 00% | | | 05% | | | 11% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 1999 | Dec: | 5% | | | |
| | | | | | | | | | | | | '89 | 1832 | | 45% | | | |
| | | | | | | | | | | | | '97 | 380 | | 16% | | | |
| | | | | | | | | | | | | '02 | 0 | | 0% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|----|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Cowania mexicana stansburiana | | | | | | | | | | | | | | | | | | |
| S | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | 1 | - | - | - | - | - | 1 | - | - | 2 | - | - | - | 66 | | 2 | |
| | '97 | 4 | - | - | - | - | - | - | - | - | 3 | - | 1 | - | 80 | | 4 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | '83 | - | 1 | 1 | - | - | - | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | '89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | '97 | 8 | - | - | - | - | - | - | - | - | 8 | - | - | - | 160 | | 8 | |
| | '02 | 3 | 2 | 1 | - | - | - | - | - | - | 6 | - | - | - | 120 | | 6 | |
| M | '83 | - | 12 | - | - | - | 3 | - | - | - | 13 | - | 2 | - | 500 | 50 41 | 15 | |
| | '89 | 2 | 1 | 4 | - | 1 | - | - | - | - | 8 | - | - | - | 266 | 37 24 | 8 | |
| | '97 | 21 | 2 | 1 | 2 | - | - | - | - | - | 26 | - | - | - | 520 | 51 54 | 26 | |
| | '02 | 12 | 9 | 22 | - | 1 | 3 | - | 3 | - | 50 | - | - | - | 1000 | 50 53 | 50 | |
| D | '83 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | '89 | - | 2 | 2 | 1 | - | 1 | - | - | - | 6 | - | - | - | 200 | | 6 | |
| | '97 | 5 | - | - | - | - | - | - | - | - | 4 | - | - | 1 | 100 | | 5 | |
| | '02 | - | 1 | 2 | - | - | 1 | - | - | - | 4 | - | - | - | 80 | | 4 | |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 100 | | 5 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 140 | | 7 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 78% | | | 22% | | | 11% | | | -11% | | | | | | | |
| '89 | | 25% | | | 44% | | | 00% | | | +32% | | | | | | | |
| '97 | | 05% | | | 03% | | | 03% | | | +35% | | | | | | | |
| '02 | | 22% | | | 48% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 599 | Dec: | 6% | | | |
| | | | | | | | | | | | | '89 | 532 | | 38% | | | |
| | | | | | | | | | | | | '97 | 780 | | 13% | | | |
| | | | | | | | | | | | | '02 | 1200 | | 7% | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|----|--------------------|--------------------------------|----------------|-----|
| | | 1 | 2 | 3 | 4 | | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | |
| S | 83 | 4 | - | - | - | - | - | 4 | 4 |
| | 89 | 5 | - | - | - | - | 2 | 7 | 7 |
| | 97 | - | - | - | - | - | - | 0 | 0 |
| | 02 | - | - | - | - | - | - | 0 | 0 |
| Y | 83 | 15 | - | - | - | - | - | 15 | 15 |
| | 89 | 25 | - | - | - | - | - | 23 | 25 |
| | 97 | 92 | - | - | 1 | - | - | 93 | 93 |
| | 02 | 1 | - | - | - | - | - | 1 | 1 |
| M | 83 | 71 | - | - | - | - | - | 71 | 71 |
| | 89 | 97 | - | - | - | - | 1 | 92 | 98 |
| | 97 | 515 | - | - | 18 | - | - | 533 | 533 |
| | 02 | 20 | 1 | - | - | - | - | 21 | 21 |
| D | 83 | - | - | - | - | - | - | 0 | 0 |
| | 89 | 16 | 2 | - | - | - | 1 | 15 | 19 |
| | 97 | 20 | - | - | - | - | - | 13 | 20 |
| | 02 | 2 | - | - | - | - | 2 | 4 | 4 |
| X | 83 | - | - | - | - | - | - | 0 | 0 |
| | 89 | - | - | - | - | - | - | 0 | 0 |
| | 97 | - | - | - | - | - | - | 440 | 22 |
| | 02 | - | - | - | - | - | - | 7500 | 375 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | |
| '83 | | 00% | | 00% | | 00% | | +39% | |
| '89 | | 01% | | 00% | | 08% | | +63% | |
| '97 | | 00% | | 00% | | 01% | | -96% | |
| '02 | | 04% | | 00% | | 15% | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 2866 | Dec: | 0% |
| | | | | | | '89 | 4732 | | 13% |
| | | | | | | '97 | 12920 | | 3% |
| | | | | | | '02 | 520 | | 15% |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 3 | - | - | 1 | - | - | - | - | - | 4 | - | - | - | 133 | | 4 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 83 | 1 | - | - | 1 | - | - | - | - | - | 2 | - | - | - | 66 | 56 | 42 | 2 |
| | 89 | 2 | - | - | - | - | - | - | 1 | - | 3 | - | - | - | 100 | 79 | 45 | 3 |
| | 97 | 1 | - | - | 1 | - | - | 1 | - | - | 3 | - | - | - | 60 | - | - | 3 |
| | 02 | 2 | - | - | - | - | - | 1 | 1 | - | 4 | - | - | - | 80 | - | - | 4 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +34% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 66 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 100 | | - | | | |
| | | | | | | | | | | | | '97 | 100 | | - | | | |
| | | | | | | | | | | | | '02 | 100 | | - | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Leptodactylon pungens | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 100 | | | 3 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| Y | 83 | 8 | - | - | - | - | - | - | - | - | - | 7 | 1 | 266 | | | 8 | |
| | 89 | 5 | - | - | - | - | - | - | - | - | - | 5 | - | 166 | | | 5 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | 20 | | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| M | 83 | 56 | - | - | - | - | - | - | - | - | - | 56 | - | 1866 | 5 | 5 | 56 | |
| | 89 | 78 | - | - | - | - | - | 4 | - | - | - | 82 | - | 2733 | 5 | 6 | 82 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | - | 2 | - | 40 | 10 | 26 | 2 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | 2 | - | - | - | - | - | - | - | - | - | 2 | - | 66 | | | 2 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 02% | | | +28% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -98% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | -67% | | | | | | | |
| '02 | | 00% | | | 00% | | | 100% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 2132 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 2965 | | 2% | | | |
| | | | | | | | | | | | | '97 | 60 | | 0% | | | |
| | | | | | | | | | | | | '02 | 20 | | 100% | | | |
| Pinus monophylla | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | 20 | | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 20 | | - | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|---|--------------------|--------------------------------|----------------|-------|----|----|----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | | |
| Sclerocactus | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 1 | - | - | - | - | - | - | 20 | 5 | 10 | 1 |
| | 02 | 1 | - | - | - | - | - | - | 20 | 7 | 12 | 1 |
| D | 83 | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | 1 | - | - | - | - | - | - | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | |
| '83 | | 00% | | 00% | | 00% | | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | | |
| '97 | | 00% | | 00% | | 00% | | +50% | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 0 | Dec: | 0% | | | |
| | | | | | | '89 | 0 | | 0% | | | |
| | | | | | | '97 | 20 | | 0% | | | |
| | | | | | | '02 | 40 | | 50% | | | |
| Tetradymia canescens | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | 1 | - | - | - | - | 1 | - | 66 | | | 2 |
| | 97 | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | 0 | | | 0 |
| M | 83 | 12 | - | - | - | - | - | - | 400 | 18 | 19 | 12 |
| | 89 | 2 | 1 | - | - | - | - | - | 100 | 20 | 19 | 3 |
| | 97 | 3 | - | - | - | - | - | - | 60 | 20 | 25 | 3 |
| | 02 | - | - | - | - | - | - | - | 0 | 19 | 30 | 0 |
| D | 83 | 14 | - | - | - | - | - | - | 466 | | | 14 |
| | 89 | 7 | 4 | - | - | - | 1 | 1 | 433 | | | 13 |
| | 97 | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | 1 | - | - | - | - | 1 | - | 40 | | | 2 |
| X | 83 | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | 40 | | | 2 |
| | 02 | - | - | - | - | - | - | - | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | |
| '83 | | 00% | | 00% | | 23% | | -31% | | | | |
| '89 | | 28% | | 06% | | 11% | | -90% | | | | |
| '97 | | 00% | | 00% | | 100% | | -33% | | | | |
| '02 | | 00% | | 00% | | 50% | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 866 | Dec: | 54% | | | |
| | | | | | | '89 | 599 | | 72% | | | |
| | | | | | | '97 | 60 | | 0% | | | |
| | | | | | | '02 | 40 | | 100% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Tetradymia nuttallii | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 9 | 10 | 1 |
| | 97 | 2 | - | - | - | - | - | 1 | - | - | 3 | - | - | - | 60 | 18 | 23 | 3 |
| | 02 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 80 | 24 | 36 | 4 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 20 | - | - | 2 | - | - | - | - | - | 14 | 1 | - | 9 | 480 | | 24 | |
| | 02 | 6 | - | - | 1 | - | - | 3 | - | - | 2 | - | - | 8 | 200 | | 10 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 180 | | 9 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 200 | | 10 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 50% | | | 00% | | | 00% | | | +89% | | | | | | | |
| '97 | | 00% | | | 00% | | | 31% | | | -52% | | | | | | | |
| '02 | | 00% | | | 00% | | | 57% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 66 | | 0% | | | |
| | | | | | | | | | | | | '97 | 580 | | 83% | | | |
| | | | | | | | | | | | | '02 | 280 | | 71% | | | |

Trend Study 18-31-02

Study site name: Carr Fork .

Vegetation type: Annual Grass-Forb .

Compass bearing: frequency baseline 308 degrees magnetic.

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

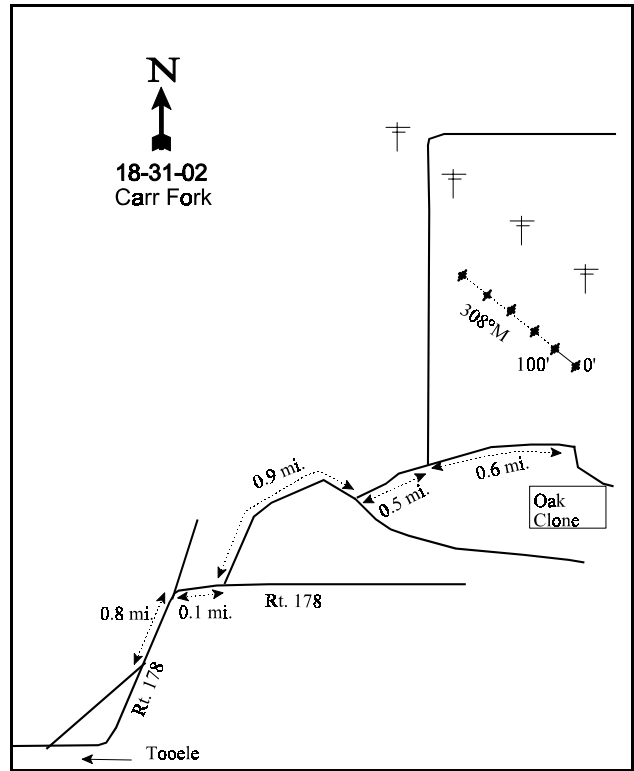
LOCATION DESCRIPTION

Go east on 4th north (Smelter Road) in Tooele for 1.5 miles to Ericson Road. Turn left, continue 0.8 miles to a fork in the road. Take the right fork for 0.1 miles to a locked gate (division lock). Stay on “old” road for 0.9 miles past a gate on the right. Go another 0.4 miles to a gate. Go 0.1 miles through a field of curly gum weed to a left fork. Take the left fork for 0.6 miles to a lone oak clone on the right. The 0-foot stake is on the left side of the road just before the power lines. The study is marked by green, steel fenceposts 12-18 inches in height. Roads were washed out in 2002 requiring walking about ½ mile to the site.



Map name: Bingham Canyon

Township 3S, Range 3W, Section 7



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4491053 N 396565 E

DISCUSSION

Carr Fork - Trend Study No. 18-31

The Carr Fork trend study was established in 1997 by request of the habitat manager in the Central Region. The site lies on property that originally belonged to Kennecott Copper and was then transferred to the Division of Wildlife Resources. The locality is an old tailings area for a copper mine and it was mostly composed of weeds. Because of this problem, the area was disked deeply a couple of times and drill seeded with a mixture of grasses and forbs. The study was set up to monitor the results of this treatment. The site is nearly flat with a 5% slope and an aspect to the west. The elevation is about 5,400 feet. Deer use has been light on the site. The pellet group transect read along the study site baseline showed mostly fall and spring use at 36 deer days use/acre (89 ddu/ha) in 1997, and 24 mostly winter deer days use/acre in 2002 (60 ddu/ha). The nearby drainages provide good cover, provided mainly by Gambel oak.

The soil consists of graded tailings. Effective rooting depth is estimated at 12 inches which is strongly acidic (pH 5.5). The soil has a very compacted layer at about 12 inches. Most all of the old Kennecott Copper sites have mildly acidic pH's, but this site is the most acidic we have tested. This could have been one of the reasons why the seeding was not successful. The amount of soil phosphorus is also relatively high at 51 ppm. Textural analysis shows the soil to be a clay loam. Soil temperature is relatively low for a low elevation west aspect site. It averaged only 58° F at about 13 inches in depth. Exposed bare ground was abundant in 1997, averaging 40% cover. Total protective ground cover was low which left the site subject to erosion. By 2002, protective ground cover was abundant and cover of bare ground had declined to only 6%. Most of the improvement is due to a dramatic increase in cover of bulbous bluegrass (from 6% to 26% cover). The soil is now well protected from most erosion and the erosion condition class was determined as stable in 2002.

The browse component for the site is lacking with no browse species sampled at the site in 1997. There was a small oak clone nearby, but it was not within the sampling grid. During the 2002 reading, a few transplanted bitterbrush plants were encountered. Density was estimated at only 80 plants/acre. They displayed moderate to heavy use but had good vigor. Annual leader growth averaged 3.4 inches. There was also a few white-stemmed rubber rabbitbrush plants on the site but none were encountered within the sampling strips.

The herbaceous species planted did not come in very well on this site. During the 1997 reading, the only seeded species sampled were small burnet and Lewis flax. The remaining species sampled were weeds. Cheatgrass, bulbous bluegrass, ragweed, bindweed, gumweed, and toadflax made up almost 75% of the herbaceous cover. By 2002, the site is still dominated by bulbous bluegrass and weedy forbs. Bulbous bluegrass increased significantly in nested frequency and rose from 6% cover in 1997 to 26% in 2002. It now accounts for 82% of the total grass cover or 40% of the total herbaceous cover. Seeded intermediate wheatgrass was encountered but it provided only 11% of the grass cover in 2002. The forb composition remains poor and totally dominated by weeds. Total forb cover is high averaging 30% in 1997 and 33% in 2002. Weedy forbs including ragweed, spreading dogbane, whitetop, morning glory, curlycup gumweed, sunflower, dalmatian toadflax, and moth mullen, accounted for 77% of the forb cover in 1997, increasing to 97% in 2002. Of these species, morning glory is the most abundant. It occurred in 94% of the quadrats sampled in 2002 and provided 42% of the total forb cover. Three noxious weeds, whitetop, morning glory, and dalmatian toadflax, accounted for half of the forb cover in 1997 increasing to 63% in 2002.

1997 APPARENT TREND ASSESSMENT

The trend for soil appears to be down and in poor condition because of the poor ratio of protective ground cover to bare soil and the high amount of bare soil on the site. The trend for browse is not applicable to this site because there were no browse on the site. The herbaceous understory is poor and completely dominated by weeds. It appears that very few of the seeded species ever became established on the site. This could have been a combination of the strongly acidic pH and the high amounts of phosphorus in the soil. However, what most likely determined the outcome of this treatment was that the species were planted too deep by the rangeland drill when pulled over loose, fluffy surface soil from the double disking treatment.

2002 TREND ASSESSMENT

Trend for soil is up. Cover of bare ground has declined from 40% in 1997 to 6% in 2002. Protective ground cover is abundant and the erosion condition class was determined to be stable. Trend for browse is also improved. A few seeded bitterbrush plants were encountered. These were moderate to heavily hedged but maintained good vigor. Density is low at only 80 plants/acre. Trend for the herbaceous understory is considered slightly down. There have been some improvements in the grass component. Some seeded intermediate wheatgrass was encountered along with a few other perennial species. The grass composition is still poor however, and totally dominated by bulbous bluegrass which increased significantly in nested frequency. Cover of bulbous bluegrass rose from 6% in 1997 to 26% in 2002. It now provides 82% of the grass cover. Bulbous bluegrass is a poor value perennial which is similar to cheatgrass. It dries out early in the season and provides intense competition. The forb composition remains poor and dominated by weeds. Weedy forbs including ragweed, spreading dogbane, whitetop, morning glory, curlycup gumweed, sunflower, dalmatian toadflax, and moth mullen, continue to dominate the forb composition. They accounted for 77% of the forb cover in 1997, increasing to 97% in 2002. Three noxious weeds, whitetop, morning glory, and dalmatian toadflax, accounted for half of the forb cover in 1997 increasing to 63% in 2002. White top declined significantly in nested frequency while morning glory and dalmatian toadflax increased significantly. This poor weedy understory will not improve without some sort of costly intervention or retreatment.

TREND ASSESSMENT

soil - up (5)

browse - up slightly, but still poor (4)

herbaceous understory - down slightly and dominated by weeds (2)

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 31

| T y p e | Species | Nested Frequency | | Quadrat Frequency | | Average Cover % | |
|-----------------------------|-------------------------|---------------------|------|----------------------|-----|--------------------|-------|
| | | '97 | '02 | '97 | '02 | '97 | '02 |
| G | Agropyron intermedium | a- | b79 | - | 33 | - | 3.49 |
| G | Bromus japonicus (a) | - | 9 | - | 3 | - | .01 |
| G | Bromus tectorum (a) | 245 | 254 | 75 | 75 | 3.02 | 1.90 |
| G | Dactylis glomerata | - | 4 | - | 1 | - | .15 |
| G | Poa bulbosa | a178 | b433 | 52 | 99 | 5.99 | 25.93 |
| G | Poa pratensis | - | 3 | - | 1 | - | .15 |
| G | Poa secunda | a- | b14 | - | 7 | - | .05 |
| Total for Annual Grasses | | 245 | 263 | 75 | 78 | 3.02 | 1.91 |
| Total for Perennial Grasses | | 178 | 533 | 52 | 141 | 5.99 | 29.78 |
| Total for Grasses | | 423 | 796 | 127 | 219 | 9.02 | 31.70 |
| F | Alyssum alyssoides (a) | a- | b23 | - | 5 | - | .07 |
| F | Ambrosia psilostachya | a33 | b172 | 15 | 64 | 1.09 | 3.11 |
| F | Apocynum cannabinum | a- | b92 | - | 34 | - | 3.20 |
| F | Asclepias spp. | b50 | a- | 18 | - | 2.62 | - |
| F | Aster spp. | 4 | 3 | 1 | 1 | .15 | .00 |
| F | Astragalus spp. | 2 | - | 2 | - | .01 | - |
| F | Cardaria draba | b63 | a33 | 28 | 14 | .93 | .60 |
| F | Camelina microcarpa (a) | 1 | 2 | 1 | 1 | .00 | .00 |

| Type | Species | Nestled Frequency | | Quadrat Frequency | | Average Cover % | |
|---------------------------|-----------------------------------|-------------------|------------------|-------------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 | '97 | '02 |
| F | <i>Convolvulus arvensis</i> | 287 | 326 | 81 | 94 | 11.16 | 13.76 |
| F | <i>Comandra pallida</i> | 3 | - | 1 | - | .00 | - |
| F | <i>Collinsia parviflora</i> (a) | _a 1 | _b 41 | 1 | 11 | .00 | .13 |
| F | <i>Draba</i> spp. (a) | 4 | 9 | 2 | 2 | .01 | .01 |
| F | <i>Epilobium brachycarpum</i> (a) | _b 93 | _a 75 | 36 | 21 | 1.74 | .15 |
| F | <i>Eriogonum brevicaulis</i> | - | 10 | - | 3 | - | .01 |
| F | <i>Gilia</i> spp. (a) | - | 1 | - | 1 | - | .00 |
| F | <i>Grindelia squarrosa</i> | 104 | 117 | 39 | 51 | 1.48 | 1.07 |
| F | <i>Helianthus annuus</i> (a) | _b 211 | _a 31 | 81 | 14 | 5.36 | .07 |
| F | <i>Lactuca serriola</i> | _b 115 | _a - | 47 | - | 1.89 | - |
| F | <i>Linaria dalmatica</i> | _a 52 | _b 113 | 18 | 41 | 2.96 | 6.12 |
| F | <i>Linum lewisii</i> | _b 26 | _a - | 10 | - | .15 | - |
| F | <i>Onobrychis viciaefolia</i> | - | 2 | - | 1 | - | .00 |
| F | <i>Phlox longifolia</i> | _a - | _b 29 | - | 8 | - | .11 |
| F | <i>Polygonum douglasii</i> (a) | 26 | 21 | 9 | 7 | .17 | .06 |
| F | <i>Sanguisorba minor</i> | 1 | 7 | 1 | 3 | .00 | .18 |
| F | <i>Tragopogon dubius</i> | _a - | _b 16 | - | 7 | - | .16 |
| F | <i>Veronica biloba</i> (a) | _b 15 | _a - | 5 | - | .07 | - |
| F | <i>Verbascum blattaria</i> | _a 20 | _b 84 | 9 | 31 | .50 | 3.70 |
| Total for Annual Forbs | | 351 | 203 | 135 | 62 | 7.37 | 0.50 |
| Total for Perennial Forbs | | 760 | 1004 | 270 | 352 | 22.98 | 32.06 |
| Total for Forbs | | 1111 | 1207 | 405 | 414 | 30.36 | 32.57 |

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

BROWSE TRENDS --

Herd unit 18 , Study no: 31

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|---------------------------|-----------------|-----|-----------------|------|
| | | '97 | '02 | '97 | '02 |
| B | <i>Purshia tridentata</i> | 0 | 4 | - | .18 |
| Total for Browse | | 0 | 4 | 0 | 0.17 |

Key Browse Annual Leader Growth

Herd unit 18 , Study no: 31

| Species | Average leader growth (in) |
|---------------------------|----------------------------|
| | '02 |
| <i>Purshia tridentata</i> | 3.4 |

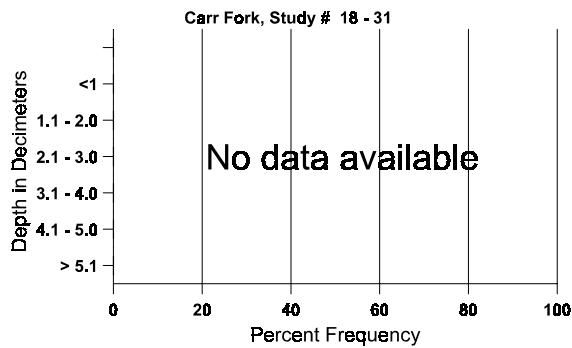
BASIC COVER --
Herd unit 18 , Study no: 31

| Cover Type | Nested Frequency | | Average Cover % | |
|-------------|------------------|-----|-----------------|-------|
| | '97 | '02 | '97 | '02 |
| Vegetation | 450 | 487 | 44.43 | 68.05 |
| Rock | 146 | 91 | .78 | .56 |
| Pavement | 301 | 265 | 1.79 | 2.04 |
| Litter | 478 | 472 | 18.82 | 37.32 |
| Cryptogams | 24 | 147 | .16 | 4.01 |
| Bare Ground | 442 | 218 | 40.18 | 6.32 |

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 31, Carr Fork

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 12.1 | 58.4 (12.7) | 5.5 | 32.0 | 41.4 | 26.6 | 2.2 | 51.0 | 275.2 | 0.4 |

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PELLET GROUP FREQUENCY --
Herd unit 18 , Study no: 31

| Type | Quadrat Frequency | | Pellet Transect | |
|------|-------------------|-----|------------------------|------------------------|
| | '97 | '02 | Pellet Groups per Acre | Days Use per Acre (ha) |
| Deer | 2 | 7 | 313 | 24 (60) |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 31

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Purshia tridentata | | | | | | | | | | | | | | | | | | |
| M | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | 2 | 2 | - | - | - | - | - | - | - | - | - | - | 80 | 15 | 28 | 4 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 50% | | | 50% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '97 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '02 | 80 | | - | | | |

Trend Study 18-32-02

Study site name: East Hickman Canyon.

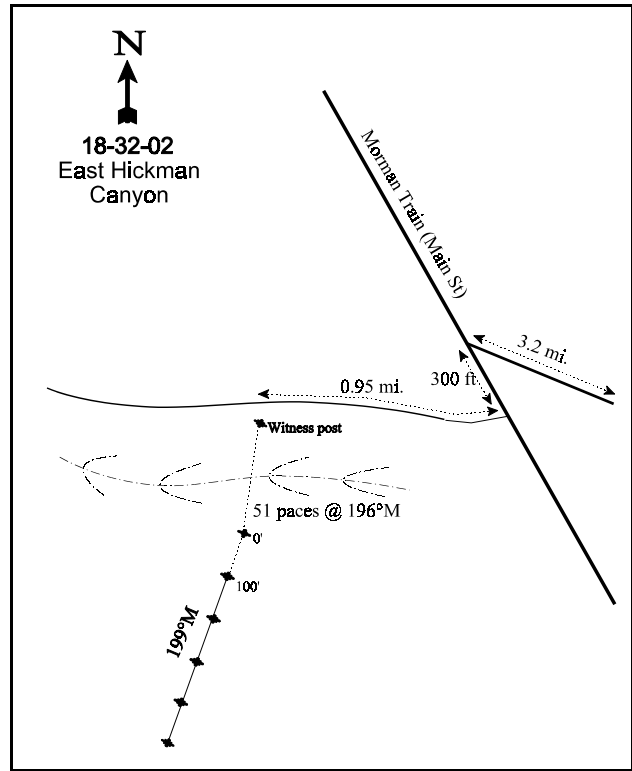
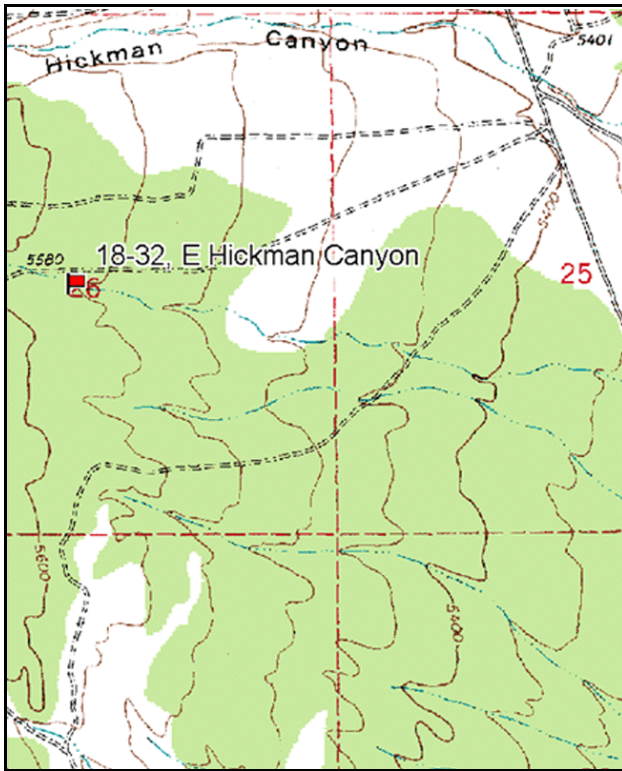
Vegetation type: Chained, seeded P-J.

Compass bearing: frequency baseline 199 degrees magnetic.

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

LOCATION DESCRIPTION

Turn west in Stockton on “silver” street. Follow this road around the lake 3.95 miles to a dead end sign and a dirt road on the right. Turn right (west) on this road and go 3.2 miles to a paved road. Turn left (south) for about 300 feet to another road. Turn right (west) on this road and drive 0.95 miles to a witness post on the left. From the witness post walk 51 paces across the gully at 196 degrees magnetic to the 0-foot stake. The study is marked by green, steel fenceposts 12-18 inches in height. The 0-foot stake is marked by browse tag # 440. In 2002 the site had to be reached by driving up East Hickman Canyon, crossing the creek and driving in from the west.



Map name: South Mountain

Diagrammatic Sketch

Township 4S, Range 6W, Section 26

GPS: NAD 27, UTM 12S 4477583 N 373607 E

DISCUSSION

East Hickman Canyon - Trend Study No. 18-32

The East Hickman Canyon site was established in 1997 to get pretreatment data for a pinyon & juniper chaining project. The site once supported a thick pinyon and juniper woodland with a poor understory. A large chaining and seeding project was completed in 1999. The site has a slope of 3-5% with a slight north aspect and elevation of 5,500 feet. Deer use was very light in 1997, with a pellet group frequency of 13%, while rabbit was much higher at 41%. Since the chaining project, wildlife use still remains low. The chained area is very large, leaving little cover for wildlife. However, this area is most likely only used during severe winters. Pellet group transect data estimated only 2 deer days use/acre (5 ddu/ha) in 2002. Since the treatment, the area is also grazed by cattle which were in the area during the 2002 reading. Data estimated about 5 cow days use/acre (13 cdu/ha).

The soil is a fine clay loam that is limited in depth by a hardpan at a depth of about 13-15 inches. The effective rooting depth is estimated at 15 inches with a soil temperature of 57° F at that depth. There are very few rocks on the surface or within the soil profile. Soil reaction is neutral (pH 7.3). The amount of phosphorus in the soil is low at only 6.5 ppm, where 10 ppm is considered minimal for normal plant growth and development. There was a very high percentage of bare ground exposed on this site in 1997 (35%) with severely pedestalled grasses and dead sagebrush plants throughout the site. Since the chaining and seeding treatment, cover of bare ground has declined and litter cover has increased. Erosion that was apparent in 1997. It now appears stabilized and the erosion condition class was determined as stable in 2002.

Prior to the chaining, the site was dominated by juniper trees. In 1997, canopy cover for juniper averaged 31% with a density of 295 trees/acre (determined by the point-quarter method) and an average diameter of almost 5 inches. The abundant cover and density of juniper suppressed understory species. Mountain big sagebrush density was estimated at only 80 live plants/acre and these were all classified as decadent and dying. There were an estimated 1,220 dead plants/acre on the site. After the treatment, juniper canopy cover declined to about 8% and density dropped to 146 trees/acre (point quarter data). Average diameter of surviving trees was estimated at 3 inches. Just over half of the trees sampled were chained trees that were laying down but still alive. Density of mountain big sagebrush remained stable at 80 plants/acre but vigor improved dramatically and there is now a more balanced age structure. There are also a few scattered stickyleaf low rabbitbrush, cliffrose, and broom snakeweed on the site.

Prior to the chaining, total herbaceous cover was less than 9%, with the total cover for forbs coming to less than 1%. Sandberg and mutton bluegrass made up 80% of the herbaceous cover, indicating just how poor the site was for producing forage. After treatment, total herbaceous cover increased to 28% with the majority coming from seeded grasses, primarily crested wheatgrass. Other seeded grasses, intermediate wheatgrass, smooth brome, and Russian wildrye, occur in limited numbers. Total forb cover increased from 1% in 1997 to 6% in 2002. The forb composition is diverse but dominated by annuals, especially bur buttercup which provided 71% of the total forb cover in 2002. Seeded alfalfa has established and is the most abundant perennial forb on the site.

1997 APPARENT TREND ASSESSMENT

Soil condition is poor and it will remain so due to lack of herbaceous species and the high proportion of bare soil on the site. Litter cover is relatively low, but cryptogamic cover is high which helps to protect the bare soil. The trend for browse is obviously in a state of decline with the majority of the sagebrush population dead and the remainder dying. The mountain big sagebrush population for this site has been lost. The juniper provides excellent thermal and escape cover, but very little browse is available to wintering deer other than the juniper as an emergency food source. The herbaceous understory is also poor and depleted with most species in very low numbers and producing little forage. Any treatment should make sure that there is good establishment of a variety of competitive perennial grasses. Cheatgrass is found throughout the site in low numbers and the potential is there for it to take over the site without proper treatment and seeding of the site.

2002 TREND ASSESSMENT

Trend for soil is up. There is still a moderate amount of bare ground but litter cover has increased and vegetation cover has changed from mostly tree canopy cover to herbaceous cover. Total herbaceous cover has increased from 9% to 28%. Cryptogamic cover has declined dramatically, but herbaceous plants are much more effective at protecting against soil erosion. Trend for browse is up but density of key species is limited. Mountain big sagebrush has maintained a density of only 80 plants/acre. However, use has declined, vigor has improved dramatically, and the number of decadent plants has declined. Another positive factor for the browse trend is the removal of the once dominate juniper overstory. Juniper trees have been reduced from 295 plants/acre in 1997 to 146 plants/acre in 2002 (point quarter data). Canopy cover has been reduced from 31% to 8%. A further treatment of surviving trees should be considered to postpone a return to juniper dominance on this site. Trend for the herbaceous understory is up. Seeded grasses and forbs have established well and herbaceous cover has increased 3 fold. Crested wheatgrass is the most prominent species, providing 69% of the grass cover. The forb composition is diverse but dominated by annuals which is typical for the first few years after a treatment. Bur buttercup is by far the most abundant forb. Seeded alfalfa has established well and should persist if not heavily grazed.

TREND ASSESSMENT

soil - up (5)

browse - up but limited (5)

herbaceous understory - up (5)

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 32

| Type | Species | Nested Frequency | | Quadrat Frequency | | Average Cover % | |
|-----------------------------|--------------------------------|------------------|------|-------------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 | '97 | '02 |
| G | <i>Agropyron cristatum</i> | a- | b231 | - | 72 | - | 15.33 |
| G | <i>Agropyron intermedium</i> | a- | b31 | - | 13 | - | 1.02 |
| G | <i>Agropyron spicatum</i> | 50 | 37 | 22 | 15 | .43 | 1.60 |
| G | <i>Aristida purpurea</i> | - | 2 | - | 1 | - | .00 |
| G | <i>Bromus inermis</i> | - | 4 | - | 2 | - | .03 |
| G | <i>Bromus japonicus</i> (a) | a- | b12 | - | 6 | - | .03 |
| G | <i>Bromus tectorum</i> (a) | a15 | b90 | 6 | 35 | .19 | .79 |
| G | <i>Elymus junceus</i> | - | - | - | - | - | .00 |
| G | <i>Poa bulbosa</i> | - | - | - | - | - | .00 |
| G | <i>Poa fendleriana</i> | b48 | a- | 14 | - | 1.43 | - |
| G | <i>Poa secunda</i> | b277 | a140 | 74 | 48 | 5.67 | 2.36 |
| G | <i>Sitanion hystrix</i> | 17 | 25 | 9 | 13 | .16 | .98 |
| Total for Annual Grasses | | 15 | 102 | 6 | 41 | 0.19 | 0.81 |
| Total for Perennial Grasses | | 392 | 470 | 119 | 164 | 7.72 | 21.36 |
| Total for Grasses | | 407 | 572 | 125 | 205 | 7.92 | 22.18 |
| F | <i>Alyssum alyssoides</i> (a) | a1 | b84 | 1 | 31 | .00 | .66 |
| F | <i>Allium</i> spp. | 4 | 5 | 2 | 3 | .01 | .04 |
| F | <i>Antennaria rosea</i> | 2 | 9 | 1 | 5 | .00 | .05 |
| F | <i>Arabis</i> spp. | 1 | - | 1 | - | .00 | - |
| F | <i>Astragalus convallarius</i> | 16 | 10 | 10 | 5 | .28 | .07 |

| Type | Species | Nested Frequency | | Quadrat Frequency | | Average Cover % | |
|---------------------------|-----------------------------|------------------|------------------|-------------------|-----|-----------------|------|
| | | '97 | '02 | '97 | '02 | '97 | '02 |
| F | Astragalus spp. | - | 1 | - | 1 | - | .00 |
| F | Camelina microcarpa (a) | - | 1 | - | 1 | - | .00 |
| F | Collinsia parviflora (a) | 33 | 21 | 10 | 7 | .15 | .03 |
| F | Crepis acuminata | 1 | 1 | 1 | 1 | .03 | .00 |
| F | Cryptantha spp. | - | 3 | - | 2 | - | .03 |
| F | Draba spp. (a) | 3 | - | 1 | - | .00 | - |
| F | Epilobium brachycarpum (a) | _a - | _b 14 | - | 8 | - | .18 |
| F | Gilia spp. (a) | - | 3 | - | 1 | - | .00 |
| F | Heterotheca villosa | - | 1 | - | 1 | - | .00 |
| F | Holosteum umbellatum (a) | 1 | - | 1 | - | .03 | - |
| F | Lathyrus brachycalyx | _a 5 | _b 16 | 2 | 6 | .01 | .13 |
| F | Lactuca serriola | 2 | 1 | 1 | 1 | .00 | .00 |
| F | Medicago sativa | _a - | _b 33 | - | 17 | - | .23 |
| F | Microsteris gracilis (a) | - | 12 | - | 4 | - | .02 |
| F | Phlox hoodii | _b 18 | _a 3 | 7 | 3 | .28 | .06 |
| F | Phlox longifolia | _a 2 | _b 8 | 1 | 4 | .00 | .02 |
| F | Polygonum douglasii (a) | - | 2 | - | 1 | - | .00 |
| F | Ranunculus testiculatus (a) | _a 50 | _b 231 | 21 | 65 | .13 | 4.04 |
| F | Sisymbrium altissimum (a) | - | 2 | - | 1 | - | .03 |
| F | Sphaeralcea coccinea | - | 7 | - | 2 | - | .01 |
| F | Tragopogon dubius | - | - | - | - | - | .00 |
| Total for Annual Forbs | | 88 | 370 | 34 | 119 | 0.32 | 4.99 |
| Total for Perennial Forbs | | 51 | 98 | 26 | 51 | 0.63 | 0.69 |
| Total for Forbs | | 139 | 468 | 60 | 170 | 0.95 | 5.68 |

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

BROWSE TRENDS --

Herd unit 18 , Study no: 32

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|-------------------------------|-----------------|-----|-----------------|------|
| | | '97 | '02 | '97 | '02 |
| B | Artemisia tridentata vaseyana | 3 | 4 | .18 | .03 |
| B | Gutierrezia sarothrae | 1 | 5 | - | .00 |
| B | Juniperus osteosperma | 24 | 14 | 16.54 | 5.28 |
| Total for Browse | | 28 | 23 | 16.73 | 5.32 |

CANOPY COVER -- LINE INTERCEPT

Herd unit 18 , Study no: 32

| Species | Percent Cover | |
|-------------------------------|---------------|------|
| | '97 | '02 |
| Artemisia tridentata vaseyana | - | .25 |
| Gutierrezia sarothrae | - | .05 |
| Juniperus osteosperma | 31 | 7.67 |

Key Browse Annual Leader Growth

Herd unit 18 , Study no: 32

| Species | Average leader growth (in) |
|-------------------------------|----------------------------|
| | '02 |
| Artemisia tridentata vaseyana | 3.2 |

Point-Quarter Tree Data

Herd unit 18 , Study no: 32

| Species | Trees per Acre | | Average diameter (in) | |
|-----------------------|----------------|-----|-----------------------|-----|
| | '97 | '02 | '97 | '02 |
| Juniperus osteosperma | 295 | 146 | 5.0 | 3.2 |

BASIC COVER --

Herd unit 18 , Study no: 32

| Cover Type | Nested Frequency | | Average Cover % | |
|-------------|------------------|-----|-----------------|-------|
| | '97 | '02 | '97 | '02 |
| Vegetation | 356 | 406 | 26.19 | 32.68 |
| Rock | 57 | 35 | 1.12 | .17 |
| Pavement | 211 | 208 | 4.89 | 4.38 |
| Litter | 458 | 476 | 30.51 | 47.92 |
| Cryptogams | 324 | 11 | 13.01 | .09 |
| Bare Ground | 353 | 323 | 34.45 | 28.27 |

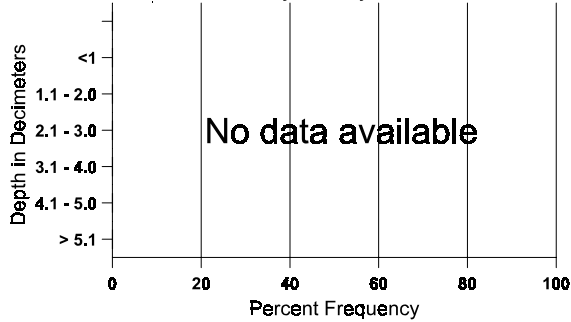
SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 32, East Hickman Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 15.1 | 56.6 (15.3) | 7.3 | 36.7 | 34.7 | 28.6 | 2.0 | 6.5 | 134.2 | 0.4 |

Stoniness Index

East Hickman Canyon, Study # 18 - 32



PELLET GROUP FREQUENCY --

Herd unit 18 , Study no: 32

| Type | Quadrat Frequency | | Pellet Transect | | | |
|--------|-------------------|-----|------------------------|-----|------------------------|--------|
| | '97 | '02 | Pellet Groups per Acre | | Days Use per Acre (ha) | |
| | | | '97 | '02 | '97 | '02 |
| Rabbit | 41 | 31 | - | - | - | - |
| Deer | 13 | 4 | 26 | 26 | 2 (5) | 2 (5) |
| Cattle | - | - | - | 61 | - | 5 (13) |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 32

| A G R E | Y | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|-----|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|----|------|-----------------|-----------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Artemisia tridentata vaseyana | | | | | | | | | | | | | | | | | | |
| Y | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| M | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '02 | 1 | - | - | - | - | - | 1 | - | - | 2 | - | - | - | 40 | 18 | 23 | 2 |
| D | '97 | 1 | - | 3 | - | - | - | - | - | - | - | - | - | 4 | 80 | | | 4 |
| | '02 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | 20 | | | 1 |
| X | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1220 | | | 61 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '97 | | 00% | | | 75% | | | 100% | | | + 0% | | | | | | | |
| '02 | | 00% | | | 00% | | | 25% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '97 | 80 | Dec: | 100% | | | |
| | | | | | | | | | | | | '02 | 80 | | 25% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|--------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | | | | | | | | | | | |
| M | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 10 | 22 | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '97 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |
| <i>Cowania mexicana stansburiana</i> | | | | | | | | | | | | | | | | | | |
| M | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 9 | 12 | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '97 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | | |
| M | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | - | - | 1 |
| | 02 | 3 | - | - | - | - | - | 2 | - | - | 5 | - | - | - | 100 | 8 | 15 | 5 |
| D | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +83% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '97 | 20 | Dec: | 0% | | | |
| | | | | | | | | | | | | '02 | 120 | | 17% | | | |
| <i>Juniperus osteosperma</i> | | | | | | | | | | | | | | | | | | |
| S | 97 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | | | 3 |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| Y | 97 | 2 | - | - | 1 | - | - | - | - | - | 3 | - | - | - | 60 | | | 3 |
| | 02 | 4 | - | - | 1 | - | - | - | - | - | 5 | - | - | - | 100 | | | 5 |
| M | 97 | 14 | - | - | - | - | - | 10 | - | - | 24 | - | - | - | 480 | - | - | 24 |
| | 02 | 8 | - | - | - | - | - | - | - | - | 4 | - | 4 | - | 160 | 52 | 35 | 8 |
| D | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | - | 40 | | | 2 |
| X | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 240 | | | 12 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | -44% | | | | | | | |
| '02 | | 00% | | | 00% | | | 40% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '97 | 540 | Dec: | 0% | | | |
| | | | | | | | | | | | | '02 | 300 | | 13% | | | |

Trend Study 18-34-02

Study site name: Three O’Clock .

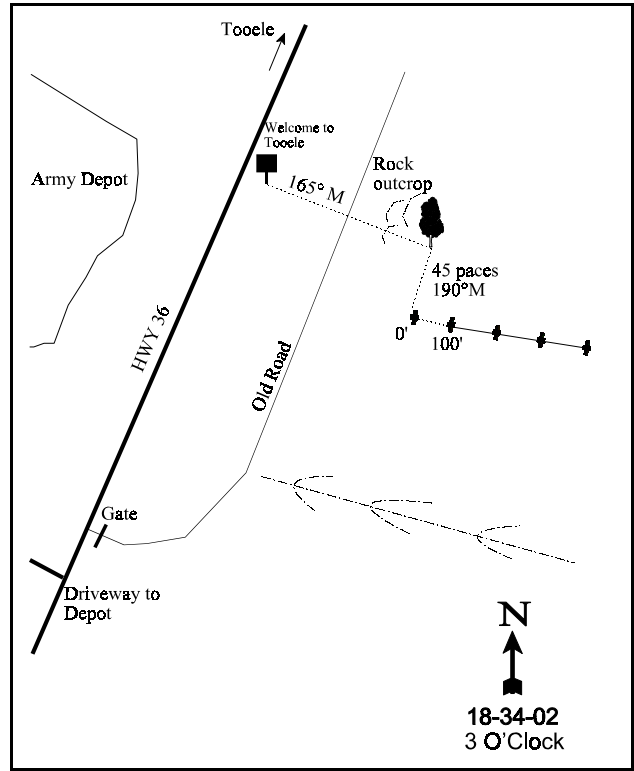
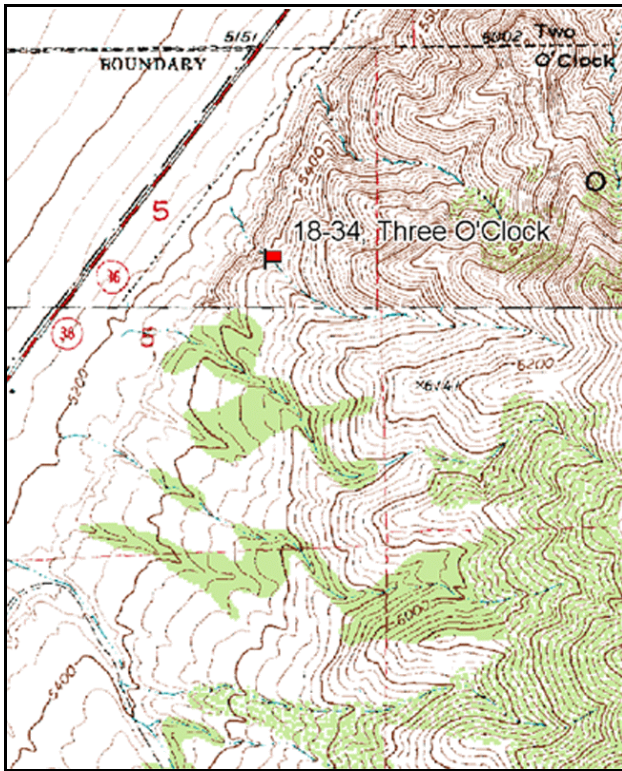
Vegetation type: Mountain Big Sagebrush .

Compass bearing: frequency belt ~120 degrees magnetic.

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

LOCATION DESCRIPTION

Park at the “Welcome to Tooele” sign south of Tooele. It is across from the army depot. From the sign walk at 165 degrees magnetic to a rock out crop with a lone juniper. From the lone juniper, go 45 paces at 190 degrees magnetic to a rock cairn or the 0-foot stake.



Map name: Tooele

Diagrammatic Sketch

Township 3S, Range 4W, Section 33

GPS: NAD 27, UTM 12S 4483993 N 388442 E

DISCUSSION

Three O'Clock - Trend Study No. 18-34

This is a new trend study established to monitor deer and elk winter range east of highway 36 between Tooele and Stockton. It samples a mountain big sagebrush bench on the Bonneville lake terrace. The site has a west aspect and a 10% slope at an elevation of about 5,400 feet. The whole area appears to have burned sometime in the late 1980's but now supports a healthy stand of mountain big sagebrush. The vicinity is used heavily by deer and elk primarily in the winter and early spring. Pellet group transect data from 2002 estimated 30 deer and 43 elk days use/acre (74 ddu/ha and 106 edu/ha). Some of the deer pellet groups may be from antelope which also use the area. Cattle also graze the site with use estimated at 13 days use/acre (32 cdu/ha).

Soil at the site is shallow and very rocky on the surface and especially within the profile. Effective rooting depth was estimated at only 9 inches. Soil depth is obviously deeper but deeper soil penetrometer readings were not possible due to the rocky nature of the soil profile. Texture is a sandy clay loam with a slightly acidic reaction (pH 6.4). There is little exposed bare ground on the site primarily due to the abundance of bulbous bluegrass. Protective ground cover is abundant and erosion minimal. The erosion condition class was determined as stable in 2002.

The site supports a vigorous stand of mostly mature mountain big sagebrush, estimated at 6,480 plants/acre in 2002. Mountain big sagebrush on this site is rather low growing averaging only 15 inches in height. They display moderate to heavy use, good vigor and low decadence. Annual leader growth was estimated at 1.4 inches. The only other common shrub found on the site was broom snakeweed which had a density of 3,320 plants/acre. There are a few very heavily hedged bitterbrush and serviceberry scattered around the site but none occurred within the sample.

The herbaceous understory is diverse and produces a high amount of cover. However, 92% of the grass cover or 83% of the total herbaceous cover comes from the low value perennial, bulbous bluegrass. It has a very high cover value of 36%. Bulbous bluegrass provides little forage and dries out completely by early summer. The only other common grasses include purple threeawn and cheatgrass. Forbs are diverse with 22 species sampled in 2002. The most common species sampled include silky milkvetch, redroot eriogonum, and sunflower.

2002 APPARENT TREND ASSESSMENT

Soil on the site is well protected and erosion is minimal. The soil erosion condition class was determined as stable in 2002. The site supports a healthy and vigorous stand of mountain big sagebrush. Utilization is moderate to heavy but vigor is good and there are few decadent plants. The population is mostly mature but should remain at a stable density in the absence of disturbance. The herbaceous understory is abundant and diverse but composition is poor with bulbous bluegrass accounting for 92% of the total grass cover or 83% of the total herbaceous cover. This poor value perennial is low growing, provides little forage, and dries out completely in early summer.

HERBACEOUS TRENDS --
Herd unit 18 , Study no: 34

| T y p e | Species | Nested Frequency | Quadrat Frequency | Average Cover % |
|-----------------------------|----------------------------|---------------------|----------------------|--------------------|
| | | '02 | '02 | '02 |
| G | Agropyron spicatum | 4 | 1 | .01 |
| G | Aristida purpurea | 94 | 45 | 1.69 |
| G | Bromus tectorum (a) | 227 | 78 | .95 |
| G | Poa bulbosa | 470 | 99 | 35.82 |
| G | Poa secunda | 29 | 13 | .14 |
| G | Sitanion hystrix | 3 | 2 | .18 |
| G | Sporobolus cryptandrus | 5 | 4 | .07 |
| G | Vulpia octoflora (a) | 1 | 1 | .00 |
| Total for Annual Grasses | | 228 | 79 | 0.96 |
| Total for Perennial Grasses | | 605 | 164 | 37.91 |
| Total for Grasses | | 833 | 243 | 38.87 |
| F | Alyssum alyssoides (a) | 15 | 5 | .02 |
| F | Antennaria rosea | 2 | 1 | .03 |
| F | Astragalus cibarius | 53 | 27 | 1.23 |
| F | Asclepias spp. | 1 | 1 | .15 |
| F | Astragalus utahensis | 5 | 3 | .09 |
| F | Castilleja linariaefolia | 7 | 5 | .41 |
| F | Calochortus nuttallii | 17 | 13 | .06 |
| F | Cirsium spp. | 22 | 10 | .50 |
| F | Crepis acuminata | 21 | 10 | .18 |
| F | Epilobium brachycarpum (a) | 3 | 1 | .00 |
| F | Erodium cicutarium (a) | 25 | 11 | .13 |
| F | Eriogonum racemosum | 40 | 22 | .21 |
| F | Gilia spp. (a) | 1 | 1 | .00 |
| F | Helianthus annuus (a) | 137 | 63 | .33 |
| F | Heterotheca villosa | 7 | 4 | .31 |
| F | Holosteum umbellatum (a) | 1 | 1 | .00 |
| F | Petradoria pumila | 2 | 1 | .00 |
| F | Phlox hoodii | 3 | 1 | .03 |
| F | Phlox longifolia | 24 | 11 | .08 |
| F | Polygonum douglasii (a) | 10 | 5 | .02 |
| F | Tragopogon dubius | 21 | 14 | .12 |
| F | Zigadenus paniculatus | 22 | 12 | .39 |
| Total for Annual Forbs | | 192 | 87 | 0.53 |
| Total for Perennial Forbs | | 247 | 135 | 3.81 |
| Total for Forbs | | 439 | 222 | 4.34 |

BROWSE TRENDS --

Herd unit 18 , Study no: 34

| Type | Species | Strip Frequency | Average Cover % |
|------------------|------------------------------------|-----------------|-----------------|
| | | '02 | '02 |
| B | Artemisia tridentata vaseyana | 84 | 14.41 |
| B | Chrysothamnus nauseosus albicaulis | 3 | .06 |
| B | Gutierrezia sarothrae | 66 | .86 |
| B | Opuntia spp. | 3 | .00 |
| B | Tetradymia canescens | 5 | .03 |
| Total for Browse | | 161 | 15.37 |

Key Browse Annual Leader Growth

Herd unit 18 , Study no: 34

| Species | Average leader growth (in) |
|-------------------------------|----------------------------|
| | '02 |
| Artemisia tridentata vaseyana | 1.4 |

BASIC COVER --

Herd unit 18 , Study no: 34

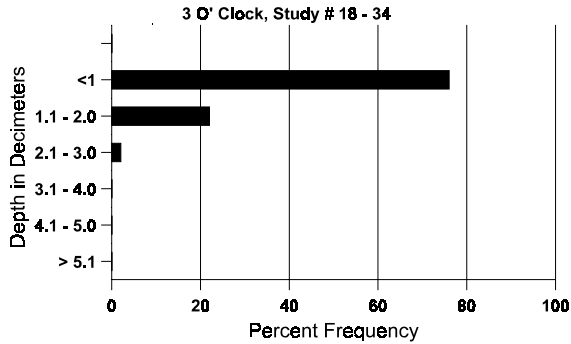
| Cover Type | Nested Frequency | Average Cover % |
|-------------|------------------|-----------------|
| | '02 | '02 |
| Vegetation | 484 | 61.09 |
| Rock | 316 | 13.46 |
| Pavement | 389 | 9.80 |
| Litter | 452 | 24.87 |
| Cryptogams | 127 | 3.27 |
| Bare Ground | 240 | 6.83 |

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 34, Three O'Clock

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %0M | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 8.9 | N/A | 6.4 | 46.9 | 24.4 | 28.7 | 2.7 | 20.7 | 518.4 | 0.8 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 18 , Study no: 34

| Type | Quadrat Frequency | Pellet Transect | |
|--------|-------------------|------------------------|------------------------|
| | | Pellet Groups per Acre | Days Use per Acre (ha) |
| | '02 | 02 | 02 |
| Elk | 27 | 557 | 43 (116) |
| Deer | 24 | 392 | 30 (74) |
| Cattle | 2 | 157 | 13 (32) |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 34

| A G R E | Y | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | |
|------------------------------------------------|----|----------------------------|-----|-----|----------------------|---|---|-----------------------|---|---|-------------|----------------|------|------|-----------------|--------------------------|-------|-----|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | | | | | | | |
| S | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| Y | 02 | 3 | 1 | - | - | - | - | - | - | - | 4 | - | - | - | 80 | | 4 | |
| M | 02 | 51 | 121 | 125 | - | - | - | - | - | - | 297 | - | - | - | 5940 | 15 | 24 | 297 |
| D | 02 | 15 | 6 | 2 | - | - | - | - | - | - | 15 | - | 3 | 5 | 460 | | 23 | |
| X | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 520 | | 26 | |
| % Plants Showing '02 | | <u>Moderate Use</u> 40% | | | <u>Heavy Use</u> 39% | | | <u>Poor Vigor</u> 02% | | | | <u>%Change</u> | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 6480 | Dec: | 7% | | | |
| <i>Chrysothamnus nauseosus albicaulis</i> | | | | | | | | | | | | | | | | | | |
| M | 02 | 1 | 1 | 1 | - | - | - | - | - | - | 3 | - | - | - | 60 | 10 | 9 | 3 |
| % Plants Showing '02 | | <u>Moderate Use</u> 33% | | | <u>Heavy Use</u> 33% | | | <u>Poor Vigor</u> 00% | | | | <u>%Change</u> | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 60 | Dec: | - | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|-------------------------|---|---|--------------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | | |
| S | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| Y | 02 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | | 5 | |
| M | 02 | 146 | - | - | - | - | - | - | - | - | 146 | - | - | - | 2920 | 6 | 7 | 146 |
| D | 02 | 15 | - | - | - | - | - | - | - | - | 10 | - | - | 5 | 300 | | 15 | |
| X | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 320 | | 16 | |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 03% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 3320 | Dec: | 9% | | | |
| <i>Opuntia spp.</i> | | | | | | | | | | | | | | | | | | |
| Y | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | 5 | 12 | 2 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 60 | Dec: | - | | | |
| <i>Purshia tridentata</i> | | | | | | | | | | | | | | | | | | |
| S | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 22 | 57 | 0 |
| X | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 0 | Dec: | - | | | |
| <i>Tetradymia canescens</i> | | | | | | | | | | | | | | | | | | |
| M | 02 | 4 | 1 | - | - | - | - | - | - | - | 5 | - | - | - | 100 | 15 | 22 | 5 |
| X | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 60 | | 3 | |
| % Plants Showing '02 | | <u>Moderate Use</u> 20% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 100 | Dec: | - | | | |

Trend Study 18-35-02

Study site name: Settlement Canyon Reservoir.

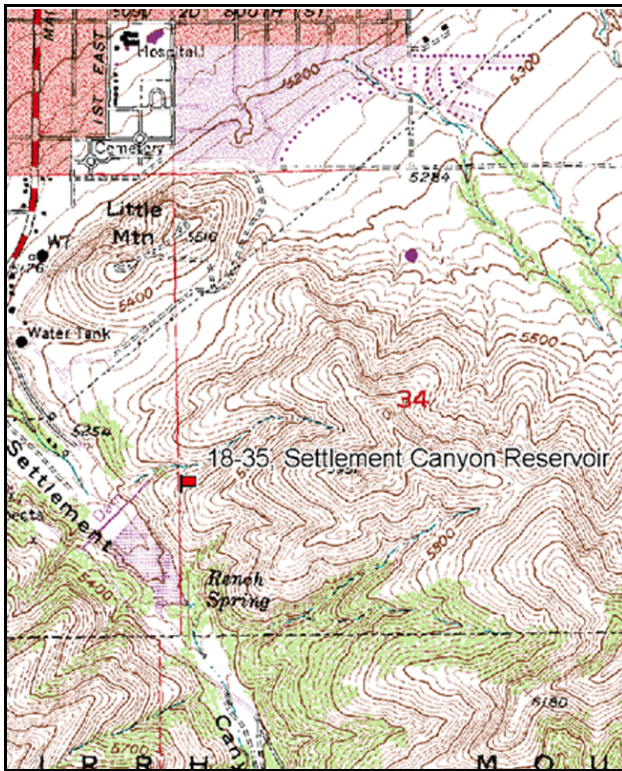
Vegetation type: Mountain Big Sagebrush.

Compass bearing: frequency belt 79 degrees magnetic.

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

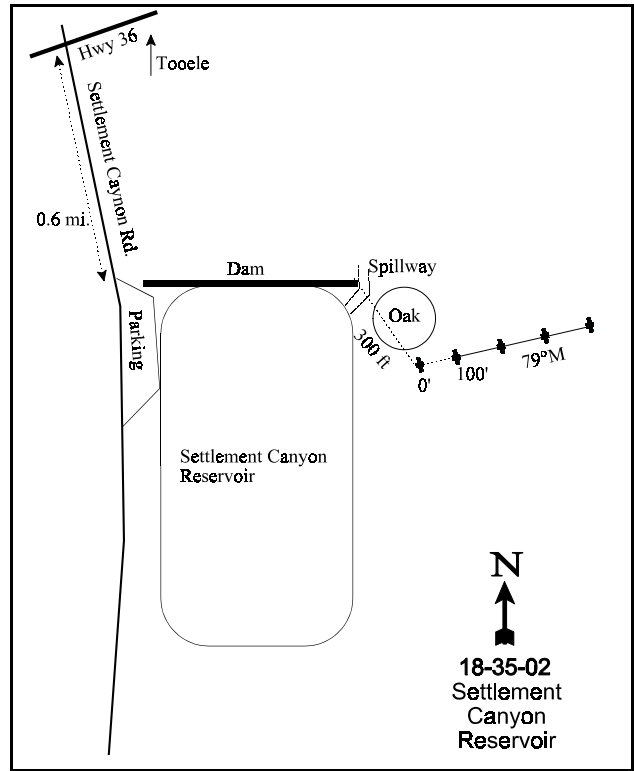
LOCATION DESCRIPTION

From the intersection of Hwy 36 and Settlement Canyon Road in Tooele, drive 0.6 miles to the parking lot at Settlement Canyon Reservoir. Walk across the dam and spillway. From the spillway, walk southeast up the ridge (there is a well worn trail) for 300 foot through an oak patch. Get above the oak and walk along the contour a short distance to the 0-foot stake marked by browse tag #246. There is a rock cairn next to the 0-foot stake.



Map Name: Tooele

Township 3S, Range 4W, Section 33



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4485178 N 390545 E

DISCUSSION

Settlement Canyon Reservoir - Trend Study No. 18-35

This is a new trend study established in 2002 to replace trend study 18-9, Left Fork Settlement Canyon. The new study, Settlement Canyon Reservoir, is more representative of critical winter range in the area and is more heavily used by deer and elk. It samples a mountain big sagebrush slope located east of the Settlement Canyon Reservoir dam. Slope at the site is 20 to 25% with a west aspect and an elevation of 5,400 feet. Deer use the area heavily and pellet group transect data estimated 90 deer days use/acre in 2002 (223 ddu/ha). Most of the deer pellet groups appear to be from winter use but a few were recent indicating that some deer were still in the area at the time of study site establishment (6/11/02).

Soil at the site is shallow and rocky. Rocks are common on the surface and within the profile. Effective rooting depth is estimated at only about 6 inches with a relatively cool average temperature of about 56° F at 8 inches in depth. This is obviously an underestimate of actual rooting depth but deeper soil penetrometer measurements were inhibited by the rocky soil profile. Soil is a clay loam with a neutral reaction (pH 6.6). Protective ground cover is abundant and there is little exposed bare soil. The erosion condition class was determined as stable in 2002.

The site supports a stand of mountain big sagebrush which had an estimated density of 3,240 plants/acre in 2002. Utilization was moderate to heavy and vigor poor on 13% of the plants sampled. In addition, 38% of the sagebrush sampled were classified as decadent. Most mature plants were vigorous with annual leader growth averaging 2 inches in 2002. Young recruitment is marginal with only 3% of the population consisting of young plants. No seedling sagebrush were found. The only other shrubs found on the site consist of broom snakeweed, creeping barberry, and pricklypear cactus.

The herbaceous understory is abundant, producing nearly 40% total cover. However, species composition is poor. Bulbous bluegrass, a poor value perennial, dominates the composition by providing 64% of the grass cover or 48% of the total herbaceous cover. Bluebunch wheatgrass is secondary in abundance and accounts for 28% of the grass cover. Japanese brome and cheatgrass, two winter annuals, are also fairly abundant but due to drought conditions, produced little cover in 2002. Other perennial grasses, purple threeawn, Kentucky bluegrass, and Sandberg bluegrass, occur infrequently. The forb composition is diverse with 27 species sampled in 2002. Composition is also less than optimal with the most abundant forb consisting of the noxious weed, dalmatian toadflax. It produced 24% of the total forb cover in 2002. Other common forbs include hooker balsamroot, rock goldenrod, and mulesear.

2002 APPARENT TREND ASSESSMENT

The soil is well protected and erosion is minimal. The erosion condition class was determined to be stable. The key browse species, mountain big sagebrush, appears to be showing the effects of drought. An estimated 38% of the population was classified as decadent with one-third of those classified as dying, 420 plants/acre (>50% crown death). No seedlings were encountered in 2002, while young plants accounted for only 3% of the population. This suggests a slight decline in the sagebrush population in the future unless there is a return to normal precipitation patterns and better recruitment of young plants. The herbaceous understory is abundant and diverse, but composition is less than optimal. The low value perennial, bulbous bluegrass, provides 64% of the grass cover or 48% of the total herbaceous cover. The most abundant forb is the noxious weed, dalmatian toadflax.

HERBACEOUS TRENDS --
Herd unit 18 , Study no: 35

| T y p e | Species | Nested Frequency | Quadrat Frequency | Average Cover % |
|-----------------------------|------------------------------------|---------------------|----------------------|--------------------|
| | | '02 | '02 | '02 |
| G | <i>Agropyron spicatum</i> | 280 | 88 | 8.05 |
| G | <i>Aristida purpurea</i> | 25 | 9 | .39 |
| G | <i>Bromus japonicus</i> (a) | 102 | 48 | .29 |
| G | <i>Bromus tectorum</i> (a) | 139 | 50 | 1.50 |
| G | <i>Poa bulbosa</i> | 389 | 96 | 18.62 |
| G | <i>Poa pratensis</i> | 1 | 1 | .03 |
| G | <i>Poa secunda</i> | 17 | 7 | .14 |
| Total for Annual Grasses | | 241 | 98 | 1.79 |
| Total for Perennial Grasses | | 712 | 201 | 27.25 |
| Total for Grasses | | 953 | 299 | 29.04 |
| F | <i>Agoseris glauca</i> | 9 | 5 | .07 |
| F | <i>Alyssum alyssoides</i> (a) | 27 | 11 | .08 |
| F | <i>Allium</i> spp. | 10 | 3 | .01 |
| F | <i>Ambrosia psilostachya</i> | 2 | 1 | .00 |
| F | <i>Artemisia ludoviciana</i> | 4 | 1 | .15 |
| F | <i>Astragalus cibaricus</i> | 24 | 10 | .29 |
| F | <i>Aster</i> spp. | 8 | 4 | .19 |
| F | <i>Astragalus utahensis</i> | 11 | 5 | .07 |
| F | <i>Balsamorhiza hookeri</i> | 44 | 20 | 1.40 |
| F | <i>Calochortus nuttallii</i> | 17 | 9 | .09 |
| F | <i>Cirsium</i> spp. | 10 | 6 | .45 |
| F | <i>Collomia linearis</i> (a) | 1 | 1 | .00 |
| F | <i>Comandra pallida</i> | 21 | 10 | .29 |
| F | <i>Crepis acuminata</i> | 35 | 17 | .17 |
| F | <i>Cymopterus</i> spp. | 18 | 9 | .14 |
| F | <i>Eriogonum racemosum</i> | 24 | 13 | .22 |
| F | <i>Heterotheca villosa</i> | 39 | 16 | .89 |
| F | <i>Holosteum umbellatum</i> (a) | 3 | 2 | .01 |
| F | <i>Linaria dalmatica</i> | 122 | 59 | 2.45 |
| F | <i>Petradoria pumila</i> | 42 | 18 | 1.54 |
| F | <i>Phlox longifolia</i> | 45 | 25 | .22 |
| F | <i>Polygonum douglasii</i> (a) | 2 | 2 | .01 |
| F | <i>Ranunculus testiculatus</i> (a) | 9 | 3 | .01 |
| F | <i>Tragopogon dubius</i> | 8 | 5 | .15 |
| F | <i>Viola</i> spp. | 1 | 1 | .00 |
| F | <i>Wyethia amplexicaulis</i> | 23 | 13 | 1.01 |
| F | <i>Zigadenus paniculatus</i> | 6 | 4 | .13 |

| T y p e | Species | Nested Frequency | Quadrat Frequency | Average Cover % |
|------------------|---------------------------|---------------------|----------------------|--------------------|
| | | '02 | '02 | '02 |
| | Total for Annual Forbs | 42 | 19 | 0.11 |
| | Total for Perennial Forbs | 523 | 254 | 10.02 |
| | Total for Forbs | 565 | 273 | 10.14 |

BROWSE TRENDS --

Herd unit 18 , Study no: 35

| T y p e | Species | Strip Frequency | Average Cover % |
|------------------|-------------------------------|--------------------|--------------------|
| | | '02 | '02 |
| B | Artemisia tridentata vaseyana | 77 | 12.28 |
| B | Gutierrezia sarothrae | 41 | 1.46 |
| B | Mahonia repens | 2 | .03 |
| B | Opuntia spp. | 22 | .33 |
| | Total for Browse | 142 | 14.11 |

CANOPY COVER -- LINE INTERCEPT

Herd unit 18 , Study no: 35

| Species | Percent Cover |
|-------------------------------|------------------|
| | '02 |
| Artemisia tridentata vaseyana | 12.17 |
| Gutierrezia sarothrae | .83 |
| Opuntia spp. | .17 |

Key Browse Annual Leader Growth

Herd unit 18 , Study no: 35

| Species | Average leader growth (in) |
|-------------------------------|-------------------------------|
| | '02 |
| Artemisia tridentata vaseyana | 2.1 |

BASIC COVER --

Herd unit 18 , Study no: 35

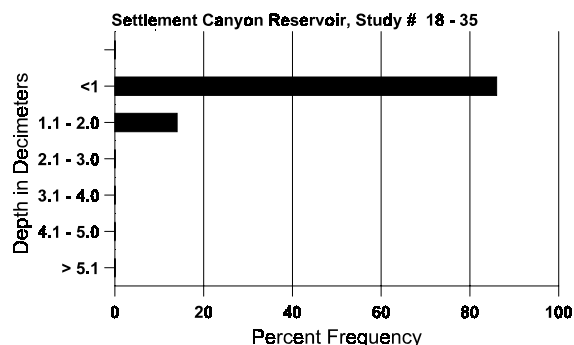
| Cover Type | Nested Frequency | Average Cover % |
|-------------|---------------------|--------------------|
| | '02 | '02 |
| Vegetation | 467 | 47.58 |
| Rock | 367 | 24.67 |
| Pavement | 249 | 6.13 |
| Litter | 451 | 30.61 |
| Cryptogams | 129 | 3.65 |
| Bare Ground | 194 | 4.59 |

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 35, Settlement Canyon Reservoir

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %0M | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 5.5 | 55.6 (8.1) | 6.6 | 36.9 | 32.4 | 30.7 | 3.2 | 21.7 | 259.2 | 1.0 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 18 , Study no: 35

| Type | Quadrat Frequency | Pellet Transect | |
|------|-------------------|------------------------|------------------------|
| | | Pellet Groups per Acre | Days Use per Acre (ha) |
| | '02 | 02 | 02 |
| Deer | 51 | 1175 | 90 (223) |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 35

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total |
|------------------------------------------------|--------|----------------------------|----|----|----------------------|---|---|-----------------------|---|----|----------------|-----|------|------|-----------------|--------------------------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | |
| Artemisia tridentata vaseyana | | | | | | | | | | | | | | | | | |
| Y | 02 | 3 | 2 | - | - | - | - | - | - | - | 5 | - | - | - | 100 | | 5 |
| M | 02 | 21 | 31 | 44 | - | - | - | - | - | 94 | 2 | - | - | 1920 | 14 | 29 | 96 |
| D | 02 | 13 | 18 | 29 | - | - | - | 1 | - | 40 | - | - | 21 | 1220 | | 61 | |
| X | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 540 | | 27 | |
| % Plants Showing '02 | | <u>Moderate Use</u> 31% | | | <u>Heavy Use</u> 45% | | | <u>Poor Vigor</u> 13% | | | <u>%Change</u> | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 3240 | Dec: | 38% | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|-------------------------|---|---|--------------------------|---|---|----------------|---|---|-----|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | | |
| S | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| Y | 02 | 6 | - | - | - | - | - | - | - | - | 6 | - | - | - | 120 | | 6 | |
| M | 02 | 74 | - | - | - | - | - | - | - | - | 74 | - | - | - | 1480 | 7 | 9 | 74 |
| D | 02 | 13 | - | - | - | - | - | - | - | - | 1 | - | - | 12 | 260 | | 13 | |
| X | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 160 | | 8 | |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 13% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | '02 | 1860 | Dec: | 14% | |
| <i>Mahonia repens</i> | | | | | | | | | | | | | | | | | | |
| M | 02 | 22 | - | - | - | - | - | - | - | - | 22 | - | - | - | 440 | 1 | 4 | 22 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | '02 | 440 | Dec: | - | |
| <i>Opuntia spp.</i> | | | | | | | | | | | | | | | | | | |
| Y | 02 | 10 | - | - | - | - | - | - | - | - | 10 | - | - | - | 200 | | 10 | |
| M | 02 | 25 | - | - | - | - | - | - | - | - | 25 | - | - | - | 500 | 5 | 10 | 25 |
| D | 02 | 5 | - | - | - | - | - | - | - | - | 2 | - | - | 3 | 100 | | 5 | |
| X | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | 2 | |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 08% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | '02 | 800 | Dec: | 13% | |

SUSPENDED TREND STUDIES

Trend Study 18-4-97

Study site name: Silverado Canyon .

Vegetation type: Pinyon-Juniper .

Compass bearing: frequency baseline 287 degrees magnetic. (Line 2 @ 268°M, line 3 @ 318°M, line 4 @ 345°M).

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

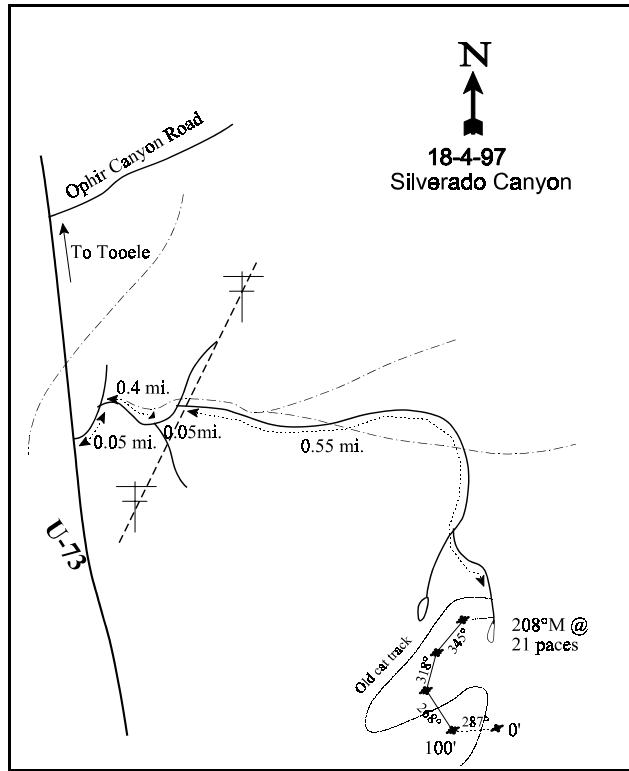
LOCATION DESCRIPTION

From the junction of Highway U-73 and the Ophir Canyon road, proceed south on U-73 until the first dirt road to the left is reached before Silverado Canyon. Turn left and travel 0.05 miles to a fork. Take the right fork and travel 0.40 miles to another fork. Take the left fork and travel 0.05 miles to another fork. Take the right fork and travel 0.55 miles until there is a rock pile (a rock monument) on the left side of the road. From here, walk 21 paces at 208 degrees magnetic to the 400-foot stake of the baseline, a green painted steel fencepost, 15 inches in height. The 0-foot stake is marked with a red browse tag, number 3932.



Map Name: Ophir

Township 5S, Range 4W, Section 34



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4466663 N 390520 E

DISCUSSION

Silverado Canyon - Trend Study No. 18-4

***SUSPENDED - This site was suspended in 2002. Text and tables from the 1997 report have been retained and are found below.

The Silverado Canyon study is located in the juniper-pinyon type between Ophir and Silverado Canyons. The area is thought to be critical deer winter range. However, pellet-group frequency data in 1997 showed wildlife use to be relatively low. The understory is severely depleted of forage with herbaceous cover totaling only to a little over 2%. The study area has an elevation of 5,680 feet with a slope of 2% to 5% and a west-southwest aspect. In the past, deer, cattle, and sheep all used the area, now there is little deer sign and no indications of livestock use.

Soil condition is poor. Aerial cover of juniper and pinyon provides most of what protection there is to the soils from high intensity summer storms. Together they provide 77% of the total vegetative cover. Herbaceous cover, which is most protective of the soils, only contributes to 13% of the vegetative cover. Litter is very sparse, thin and easily moved by surface runoff. Soil textural analysis indicates that it is a clay loam with a neutral pH (7.3). Effective rooting depth (see methods) is over 14 inches with a soil temperature of 52°F at just over 12 inches in depth. The amount of phosphorus in the soil could be a limiting factor to plant development at 9.6 ppm where 10 ppm is thought to be a minimal value where it could limit growth and development of plants. Soil is a heavy clay loam derived from shale and shale in the form of small rocks and pavement from extensive areas of erosion pavement. Through all sampling periods, rock and pavement together have contributed to more than 50% of the soil surface cover.

Browse forage is limited to an understory of black sagebrush and the available portions of juniper and pinyon trees. On this site, the two sagebrush species (Wyoming big sagebrush and black sagebrush) are very similar in appearance and are the products of a high propensity to hybridize on this site and are difficult to distinguish. The majority have physical characteristics of black sagebrush. The average size of sagebrush plants (even mature individuals) is relatively small, averaging under 10 inches in height. Shrub density is moderate. However, little available forage is produced. Other shrubs occur only rarely. There are a few heavily hedged green ephedra, along with a few scattered prickly pear cactus found throughout the understory. Utah juniper and single-leaf pinyon appear to be both increasing on the site.

A herbaceous understory is almost nonexistent as it only contributes to a little over 2% total vegetative cover. A few clumps of Sandberg bluegrass and bottlebrush squirreltail provide virtually the only available grass forage. Cheatgrass brome is present but scattered. It can't even do very well on the site. A few seeded grasses were found in 1997 due to a recent bulldozer track through the area that was apparently seeded. There are many mining claims in the immediate area. Forbs are limited to a few low-growing species of poor forage value. Annual forbs are present but not abundant. The only place where significant amounts of herbaceous growth occurs is along some of the nearby drainage channels. These are usually crowded with cheatgrass and a variety of annual weeds.

1983 APPARENT TREND ASSESSMENT

This site is in poor condition and is not improving. Soil trend appears to be declining. Erosion is excessive and little soil fertility remains. Vegetative trend also appears down. The key browse species are decreasing at the same time overstory trees are becoming more dominant. Understory herbs are almost nonexistent. This site will not recover without some form of rehabilitation effort.

1989 TREND ASSESSMENT

This site continues to be in poor condition. The trend for soil is slightly improved but still poor with percent bare soil down to less than 10% from the high of 21% in 1983. Trend for the key browse (black sagebrush) is slightly down with percent decadence increasing to 66%. Twenty-five percent of the population still displays poor vigor, but that is an improvement from 99% in 1983. The herbaceous understory is slightly down and still in very poor condition as it is only contributing to about 2% cover.

TREND ASSESSMENT

soil - up slightly but still poor (4)

browse - down slightly (2)

herbaceous understory - down slightly and very poor (2)

1997 TREND ASSESSMENT

The site continues to be in poor condition. The trend for soil is stable (but still very poor) with about 10% bare soil, but very little protective herbaceous cover. The trend for black sagebrush is up slightly because percent decadence has gone from 66% down to 18% and only 3% are classified as having poor vigor. The decrease in density is more reflective of the much larger sample size utilized at this time. The much larger sample gives significantly better population estimates for browse populations that are discontinuous and/or clumped in their respective distributions. Another positive characteristic is that now the majority of the population is now classified as mature (77%) not decadent (18%). In fact the density of mature black sagebrush has remained stable at about 1,400 plants/acre since 1989. There has been little change in the herbaceous understory. It is still very poorly represented with 78% of the herbaceous cover furnished by annuals.

TREND ASSESSMENT

soil - stable (3)

browse - up slightly (4)

herbaceous understory - stable, but very poor (3)

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 4

| T y p e | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % '97 |
|-----------------------------|------------------------|------------------|------------------|-----------------|-------------------|-----|-----|---------------------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | |
| G | Agropyron cristatum | - | - | 6 | - | - | 2 | .01 |
| G | Agropyron smithii | - | - | 6 | - | - | 2 | .01 |
| G | Agropyron spicatum | a- | a- | b ¹⁹ | - | - | 8 | .09 |
| G | Bromus tectorum (a) | - | - | 23 | - | - | 10 | .05 |
| G | Dactylis glomerata | - | - | 2 | - | - | 1 | .03 |
| G | Poa secunda | a ¹⁰⁴ | b ¹²⁷ | a ⁸³ | 47 | 55 | 35 | .38 |
| G | Secale spp. | - | - | 4 | - | - | 2 | .01 |
| G | Sitanion hystrix | b ³³ | a- | a ⁸ | 16 | - | 3 | .01 |
| Total for Annual Grasses | | 0 | 0 | 23 | 0 | 0 | 10 | 0.05 |
| Total for Perennial Grasses | | 137 | 127 | 128 | 63 | 55 | 53 | 0.54 |
| Total for Grasses | | 137 | 127 | 151 | 63 | 55 | 63 | 0.59 |
| F | Astragalus mollissimus | 1 | 1 | 3 | 1 | 1 | 1 | .00 |
| F | Calochortus nuttallii | 3 | - | - | 1 | - | - | - |

| T y p e | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|---------------------------|------------------------------------|------------------|-----|-----|-------------------|-----|-----|--------------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | '97 |
| F | <i>Chaenactis douglasii</i> | 2 | - | 3 | 1 | - | 2 | .01 |
| F | <i>Chorispora tenella</i> (a) | - | - | 13 | - | - | 5 | .54 |
| F | <i>Cryptantha</i> spp. | 2 | 2 | 3 | 1 | 1 | 1 | .00 |
| F | <i>Descurainia pinnata</i> (a) | - | - | 6 | - | - | 3 | .04 |
| F | <i>Draba</i> spp. (a) | - | - | 5 | - | - | 2 | .01 |
| F | <i>Lappula occidentalis</i> (a) | - | - | 4 | - | - | 2 | .01 |
| F | <i>Physaria australis</i> | 1 | 3 | - | 1 | 2 | - | - |
| F | <i>Ranunculus testiculatus</i> (a) | - | - | 233 | - | - | 76 | 1.04 |
| F | <i>Sisymbrium altissimum</i> (a) | - | - | 20 | - | - | 10 | .35 |
| F | <i>Tragopogon dubius</i> | 1 | - | - | 1 | - | - | - |
| Total for Annual Forbs | | 0 | 0 | 281 | 0 | 0 | 98 | 2.00 |
| Total for Perennial Forbs | | 10 | 6 | 9 | 6 | 4 | 4 | 0.01 |
| Total for Forbs | | 10 | 6 | 290 | 6 | 4 | 102 | 2.02 |

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

BROWSE TRENDS --

Herd unit 18 , Study no: 4

| T y p e | Species | Strip Frequency | Average Cover % |
|------------------|------------------------------|--------------------|--------------------|
| | | '97 | '97 |
| B | <i>Artemisia nova</i> | 43 | 2.01 |
| B | <i>Juniperus osteosperma</i> | 0 | 7.90 |
| B | <i>Opuntia</i> spp. | 10 | - |
| B | <i>Pinus monophylla</i> | 8 | 7.34 |
| Total for Browse | | 61 | 17.28 |

CANOPY COVER --

Herd unit 18 , Study no: 4

| Species | Percent Cover '97 |
|------------------------------|-------------------------|
| <i>Juniperus osteosperma</i> | 1.6 |
| <i>Pinus monophylla</i> | 4.2 |

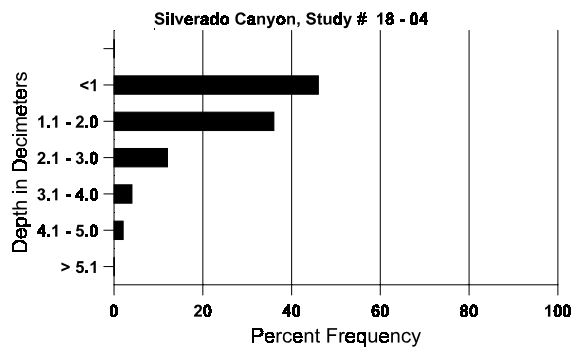
BASIC COVER --
Herd unit 18 , Study no: 4

| Cover Type | Nested Frequency '97 | Average Cover % | | |
|-------------|-------------------------|-----------------|-------|-------|
| | | '83 | '89 | '97 |
| Vegetation | 286 | 0 | 6.25 | 19.41 |
| Rock | 301 | 12.50 | 26.75 | 19.98 |
| Pavement | 352 | 41.75 | 33.00 | 30.77 |
| Litter | 362 | 25.25 | 23.25 | 21.00 |
| Cryptogams | 122 | 0 | 1.00 | 1.93 |
| Bare Ground | 264 | 20.50 | 9.75 | 9.62 |

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 4, Silverado Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 7.9 | 52.0 (12.3) | 7.3 | 29.6 | 33.8 | 36.6 | 3.9 | 9.6 | 121.6 | .5 |

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PELLET GROUP FREQUENCY --
Herd unit 18 , Study no: 4

| Type | Quadrat Frequency '97 |
|--------|--------------------------|
| Rabbit | 27 |
| Deer | 13 |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 4

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|----|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Artemisia nova | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 97 | 3 | 2 | - | - | - | - | - | - | - | 5 | - | - | - | 100 | | 5 | |
| M | 83 | - | - | 62 | - | - | - | - | - | - | - | - | 62 | - | 2066 | 11 17 | 62 | |
| | 89 | 23 | 19 | - | - | - | - | - | - | - | 41 | 1 | - | - | 1400 | 8 12 | 42 | |
| | 97 | 60 | 6 | - | 5 | 2 | - | - | - | - | 73 | - | - | - | 1460 | 9 18 | 73 | |
| D | 83 | - | - | 44 | - | - | - | - | - | - | - | - | 44 | - | 1466 | | 44 | |
| | 89 | 70 | 8 | - | - | - | - | 5 | - | - | 50 | 2 | 1 | 30 | 2766 | | 83 | |
| | 97 | 10 | 2 | - | 3 | 2 | - | - | - | - | 14 | - | - | 3 | 340 | | 17 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 300 | | 15 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 99% | | | 99% | | | +15% | | | | | | | |
| '89 | | 21% | | | 00% | | | 25% | | | -55% | | | | | | | |
| '97 | | 15% | | | 00% | | | 03% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 3565 | Dec: | 41% | | | |
| | | | | | | | | | | | | '89 | 4199 | | 66% | | | |
| | | | | | | | | | | | | '97 | 1900 | | 18% | | | |
| Ephedra viridis | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | 1 | - | - | 1 | - | - | - | 33 | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 33 | | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|---|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| S | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | 89 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 100 | | 3 | |
| | 97 | 1 | - | - | 1 | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| M | 83 | 1 | - | - | 1 | - | - | - | - | - | 2 | - | - | - | 66 | 67 101 | 2 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 98 122 | 1 | |
| | 97 | 4 | - | - | 1 | - | - | 1 | - | - | 6 | - | - | - | 120 | - - | 6 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | 1 | - | - | - | - | - | - | - | 1 | - | 33 | | 1 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | 1 | - | - | 1 | 40 | | 2 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 100 | | 5 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +20% | | | | | | | |
| '89 | | 00% | | | 00% | | | 20% | | | +17% | | | | | | | |
| '97 | | 00% | | | 00% | | | 10% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 132 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 166 | | 20% | | | |
| | | | | | | | | | | | | '97 | 200 | | 20% | | | |
| Pinus monophylla | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | - | 33 | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 166 | | 5 | |
| | 89 | 6 | - | - | 1 | - | - | - | - | - | 7 | - | - | - | 233 | | 7 | |
| | 97 | 3 | - | - | 1 | - | - | - | - | - | 4 | - | - | - | 80 | | 4 | |
| M | 83 | - | - | - | 2 | - | - | 1 | - | - | 3 | - | - | - | 100 | 67 126 | 3 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 106 110 | 1 | |
| | 97 | 1 | - | - | - | - | - | 3 | - | - | 4 | - | - | - | 80 | - - | 4 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -40% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 266 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 266 | | - | | | |
| | | | | | | | | | | | | '97 | 160 | | - | | | |

Trend Study 18-7-97

Study site name: Calumet Mine.

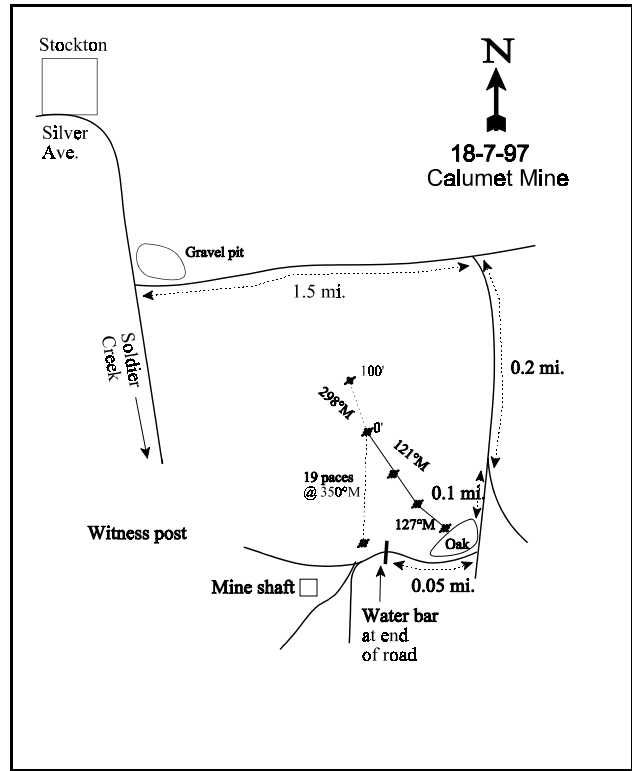
Vegetation type: Mixed Oak-Sage.

Compass bearing: frequency baseline 298 degrees magnetic. (Line 2 @ 121°M, line 3-4 @ 127°M).

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

LOCATION DESCRIPTION

Take Silver Avenue east from the main highway in Stockton to the Soldier Creek Road. Go south to the athletic field outside of town. Continue 0.25 miles to a dirt road to the left (east) just south of a gravel pit. Go 1.5 miles, always staying on the main road, to an intersection. Turn right and go 0.20 miles to a fork. Stay to the right for 0.1 miles to another fork. Go right and continue approximately 0.05 miles to a water bar which effectively ends the road. Continue up the road another 100 yards to a short witness post on the right side of the road. From here walk 350°M for 19 paces into the oak brush to the 0-foot mark of the baseline.



Map Name: Stockton

Diagrammatic Sketch

Township 4S, Range 4W, Section 30

GPS: NAD 27, UTM 12S 4478291 N 387292 E

DISCUSSION

Calumet Mine - Trend Study No. 18-7

***SUSPENDED - This site was suspended in 2002 and needs to be moved to a better location. Text and tables from the 1997 report have been retained and are found below.

The Calumet Mine study is located on what was considered important deer winter range at one time east of Stockton, near the Calumet Mine. The site has an elevation of 5,800 feet on a north slope (10%). The study begins near the top of a small "finger-like" ridge covered with mixed Gambel oakbrush and mountain big sagebrush that extends a short distance downslope. Deer use of the area appeared moderate in 1983. In 1989 deer use was thought to be light. The pellet group frequency in 1997 indicated that deer use was also light with a 8% quadrat frequency.

Soil has some rock on the surface (about 7% cover), but otherwise it is moderately fine textured. Effective rooting depth is more than 11 inches with a soil temperature of 51°F at almost 14 inches. This is the first site (after sites 18-3, 18-4, 18-5, and 18-6) that has more than 10 ppm of phosphorus in the soil. Therefore, on this site it would not be considered a limiting factor to plant growth and development. Soil textural analysis indicates a sandy loam soil with a soil reaction that is neutral (pH of 6.8). Litter cover and soil organic matter content vary greatly between the oak clones and big sagebrush openings. Under the oak, litter cover is high. Big sagebrush openings have much less protective ground cover and show evidence of moderate erosion.

Low growing Gambel oak comprises the bulk of mid and overstory vegetation, as it now contributes to 51% of the browse cover or 30% of the total vegetative cover. Oak initially had an estimated density of 20,932 stems/acre, but currently with the extended transect, this estimate is down to about 13,060 stems/acre. Age structure data is characteristic of a healthy and expanding population. Oakbrush utilization has generally been light through all sampling periods and sprouts appear to be steadily invading into sagebrush openings.

Mountain big sagebrush is the second highest producer of browse cover. In 1983, it appeared to be a declining population with only moderate to good vigor and 38% showing moderate use. Percent decadence was at 24% with no seedlings encountered and young only made up 10% of the population. Percent decadence did increase to a high of 45% by 1989, but the percentage of the population that were classified with moderate use decreased to 25%. By 1997, percent decadence further declined to 18% with those classified as having moderate use also declining to 15%. The increase in its population is because the sampling design was greatly increased and now picks up a much better sample of the population. Other browse species are less common. The most important is stickyleaf low rabbitbrush, a shrub which appeared to be slowly expanding in 1983. Now the population is at 2,080 plants/acre. Isolated and heavily hedged individuals of antelope bitterbrush occur in the immediate vicinity but were not encountered on any study plots.

In 1983, perennial grasses were described as occurring frequently, but nowhere do they form dense cover. This could also apply currently. The three species of the bluegrass (mutton, Kentucky and Sandberg bluegrass) are still the most common perennial species, followed by bluebunch wheatgrass, Indian ricegrass, and bottlebrush squirreltail. All of these show evidence of light utilization. Cheatgrass is most frequently encountered within sagebrush openings where it forms a sparse cover that furnishes 7% of the total grass cover.

Forb composition is diverse but somewhat depleted and unproductive. For an oakbrush type, comparatively there is less cover and lower densities for the forbs. Annual, biennial, and perennial increasers are common. Species such as bastard toadflax, foothill deathcamas, longleaf phlox, and rock goldenrod are among the most frequently observed forbs within the area. More palatable forbs include redroot eriogonum and narrowleaf lomatium.

1983 APPARENT TREND ASSESSMENT

Based upon apparent trend indicators, soil trend appears to be declining slightly. The dispersion of ground cover is highly variable and evidence exists for moderate erosion, especially within sagebrush openings. Vegetatively, trend is toward a thickening oak stand, which gradually is crowding out mountain big sagebrush. Understory plants will likely remain a minor forage component.

1989 TREND ASSESSMENT

Soil trend was determined as stable, with little changes in ground cover. Percent bare soil has declined from 15% to 12%. The trend for browse is down slightly. Mountain big sagebrush showed a large increase in percent decadence (24% to 45%) and a 31% decrease in its density. Stickyleaf low rabbitbrush also showed signs of decline with an increase in percent decadence (0% to 33%) and a lower population estimate. Herbaceous understory trend is slightly upward with increases for both grasses and forbs.

TREND ASSESSMENT

soil - stable (3)

browse - down slightly (2)

herbaceous understory - up slightly (4)

1997 TREND ASSESSMENT

Trend for soils would be considered slightly improved with further decreases in percent bare soil (12% to 7%). Protective cover provided by litter and herbaceous vegetation is good. The trend for browse, primarily sagebrush and stickyleaf low rabbitbrush, is up and improving with decreases in percent decadence for both species. The percentage of sagebrush with moderate use has also decreased. The density estimates for both species also increased, but this is more reflective of the much larger sample size giving better population estimates for shrub species. The herbaceous understory trend is slightly improved, with most of the improvement with the grasses.

TREND ASSESSMENT

soil - slightly up (4)

browse - up (5)

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 7

| T y p e | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|------------------|----------------------|------------------|------------------|------------------|-------------------|-----|-----|--------------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | |
| G | Agropyron spicatum | a ¹³ | a ² | b ¹¹⁸ | 5 | 1 | 38 | 6.00 |
| G | Bromus tectorum (a) | - | - | 92 | - | - | 34 | 1.23 |
| G | Oryzopsis hymenoides | 6 | 5 | 3 | 2 | 2 | 1 | .04 |
| G | Poa bulbosa | a ⁻ | a ⁻ | b ²⁶ | - | - | 8 | 1.54 |
| G | Poa fendleriana | a ¹⁴ | b ⁴⁵ | 50 | 7 | 20 | 21 | .91 |
| G | Poa pratensis | a ¹⁵¹ | b ²⁰³ | 134 | 48 | 60 | 41 | 6.51 |
| G | Poa secunda | b ¹⁰⁵ | a ⁷² | a ⁵³ | 44 | 27 | 22 | .70 |
| G | Secale spp. | - | - | 3 | - | - | 1 | .00 |
| G | Sitanion hystrix | a ² | b ²³ | ab ¹⁹ | 1 | 10 | 10 | .45 |

| Type | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|------|-----------------------------|------------------|------|------|-------------------|-----|-----|-----------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | '97 |
| | Total for Annual Grasses | 0 | 0 | 92 | 0 | 0 | 34 | 1.23 |
| | Total for Perennial Grasses | 291 | 350 | 406 | 107 | 120 | 142 | 16.18 |
| | Total for Grasses | 291 | 350 | 498 | 107 | 120 | 176 | 17.41 |
| F | Agoseris glauca | a1 | a2 | b13 | 1 | 1 | 10 | .05 |
| F | Alyssum alyssoides (a) | - | - | 58 | - | - | 26 | .25 |
| F | Allium spp. | - | - | 5 | - | - | 2 | .06 |
| F | Ambrosia psilostachya | - | - | 3 | - | - | 1 | .03 |
| F | Antennaria rosea | - | 8 | 2 | - | 4 | 2 | .03 |
| F | Arabis spp. | a1 | ab6 | b15 | 1 | 2 | 7 | .03 |
| F | Astragalus tenellus | a- | a- | b12 | - | - | 6 | .38 |
| F | Astragalus spp. | A- | a2 | b18 | - | 1 | 9 | .73 |
| F | Astragalus utahensis | - | - | 9 | - | - | 3 | .07 |
| F | Balsamorhiza hookeri | - | - | 1 | - | - | 1 | .03 |
| F | Calochortus nuttallii | - | - | 7 | - | - | 3 | .07 |
| F | Castilleja spp. | - | - | 24 | - | - | 12 | .19 |
| F | Chaenactis douglasii | - | 3 | - | - | 3 | - | - |
| F | Cirsium spp. | - | - | 15 | - | - | 8 | .53 |
| F | Collomia linearis (a) | - | - | 19 | - | - | 8 | .04 |
| F | Comandra pallida | 115 | 111 | 63 | 50 | 53 | 29 | .83 |
| F | Collinsia parviflora (a) | - | - | 63 | - | - | 25 | .20 |
| F | Crepis acuminata | - | 17 | 26 | - | 11 | 14 | .21 |
| F | Delphinium nuttallianum | - | 4 | - | - | 3 | - | - |
| F | Draba spp. (a) | - | - | 3 | - | - | 1 | .00 |
| F | Epilobium brachycarpum (a) | - | - | 9 | - | - | 5 | .02 |
| F | Erodium cicutarium (a) | - | - | 2 | - | - | 1 | .00 |
| F | Erigeron pumilus | - | - | 2 | - | - | 1 | .00 |
| F | Eriogonum racemosum | 15 | 15 | 22 | 7 | 7 | 8 | .06 |
| F | Galium aparine (a) | - | - | 35 | - | - | 14 | .17 |
| F | Grindelia squarrosa | - | - | 3 | - | - | 1 | .03 |
| F | Hydrophyllum spp. | a- | a2 | b15 | - | 1 | 7 | .21 |
| F | Lathyrus pauciflorus | b15 | b22 | a- | 7 | 9 | - | - |
| F | Lactuca serriola | - | - | 2 | - | - | 1 | .00 |
| F | Lithospermum ruderale | - | - | 3 | - | - | 1 | .18 |
| F | Lomatium triternatum | a- | c28 | b6 | - | 18 | 4 | .02 |
| F | Microsteris gracilis (a) | - | - | 23 | - | - | 7 | .03 |
| F | Orobanche fasciculata | - | - | 2 | - | - | 1 | .00 |
| F | Petradoria pumila | a3 | ab25 | b43 | 1 | 11 | 16 | 1.16 |
| F | Phacelia spp. | - | 1 | - | - | 1 | - | - |
| F | Phlox longifolia | a2 | b22 | ab13 | 1 | 11 | 5 | .05 |

| T y p e | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|---------------------------|-----------------------------|------------------|------------------|-----------------|-------------------|-----|-----|--------------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | '97 |
| F | Polygonum douglasii (a) | - | - | 16 | - | - | 5 | .02 |
| F | Ranunculus testiculatus (a) | - | - | 43 | - | - | 17 | .11 |
| F | Tragopogon dubius | _a 1 | _{ab} 10 | _b 12 | 1 | 5 | 6 | .08 |
| F | Veronica biloba (a) | - | - | 6 | - | - | 2 | .01 |
| F | Zigadenus paniculatus | - | 7 | 3 | - | 3 | 1 | .00 |
| Total for Annual Forbs | | 0 | 0 | 277 | 0 | 0 | 111 | 0.87 |
| Total for Perennial Forbs | | 153 | 285 | 339 | 69 | 144 | 159 | 5.08 |
| Total for Forbs | | 153 | 285 | 616 | 69 | 144 | 270 | 5.96 |

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

BROWSE TRENDS --

Herd unit 18 , Study no: 7

| T y p e | Species | Strip Frequency | Average Cover % |
|------------------|----------------------------------------------|--------------------|--------------------|
| | | '97 | '97 |
| B | Ambrosia spp. | 0 | .38 |
| B | Artemisia tridentata vaseyana | 65 | 10.65 |
| B | Chrysothamnus nauseosus albicaulis | 5 | .15 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 47 | 2.07 |
| B | Gutierrezia sarothrae | 5 | .21 |
| B | Juniperus osteosperma | 2 | 1.70 |
| B | Opuntia spp. | 8 | .18 |
| B | Pinus monophylla | 0 | 1.00 |
| B | Quercus gambelii | 45 | 17.18 |
| B | Tetradymia canescens | 2 | .15 |
| Total for Browse | | 179 | 33.71 |

BASIC COVER --

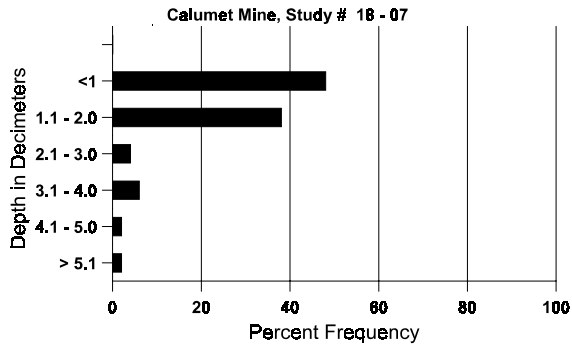
Herd unit 18 , Study no: 7

| Cover Type | Nested Frequency | Average Cover % | | |
|-------------|---------------------|-----------------|-------|-------|
| | | '83 | '89 | '97 |
| Vegetation | 366 | 2.50 | 2.75 | 51.97 |
| Rock | 105 | 6.00 | 9.25 | 3.84 |
| Pavement | 130 | .50 | 1.00 | 3.07 |
| Litter | 394 | 75.00 | 74.75 | 63.52 |
| Cryptogams | 58 | 1.00 | 0 | .85 |
| Bare Ground | 139 | 15.00 | 12.25 | 6.90 |

SOIL ANALYSIS DATA --
 Herd Unit 18, Study no: 7, Calumet Mine

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 11.4 | 51.2 (13.7) | 6.8 | 60.4 | 22.1 | 17.6 | 2.5 | 15.0 | 201.6 | .5 |

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 18 , Study no: 7

| Type | Quadrat Frequency '97 |
|--------|-----------------------|
| Rabbit | 8 |
| Deer | 8 |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 7

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| Y | 83 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 200 | | 3 | |
| | 89 | 1 | 1 | - | - | - | - | - | - | - | 2 | - | - | - | 133 | | 2 | |
| | 97 | 11 | - | - | - | - | - | - | - | - | 11 | - | - | - | 220 | | 11 | |
| M | 83 | 15 | 4 | - | - | - | - | - | - | - | 17 | 2 | - | - | 1266 | 21 28 | 19 | |
| | 89 | 7 | 1 | - | 1 | - | - | - | - | - | 8 | - | 1 | - | 600 | 19 24 | 9 | |
| | 97 | 77 | 16 | 5 | 11 | - | - | - | - | - | 109 | - | - | - | 2180 | 48 55 | 109 | |
| D | 83 | - | 7 | - | - | - | - | - | - | - | 2 | 4 | 1 | - | 466 | | 7 | |
| | 89 | 6 | 3 | - | - | - | - | - | - | - | 8 | - | 1 | - | 600 | | 9 | |
| | 97 | 17 | 6 | 1 | 2 | - | - | - | - | - | 16 | - | - | 10 | 520 | | 26 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 560 | | 28 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 38% | | | 00% | | | 03% | | | -31% | | | | | | | |
| '89 | | 25% | | | 00% | | | 10% | | | +54% | | | | | | | |
| '97 | | 15% | | | 04% | | | 07% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 1932 | Dec: | 24% | | | |
| | | | | | | | | | | | | '89 | 1333 | | 45% | | | |
| | | | | | | | | | | | | '97 | 2920 | | 18% | | | |
| <i>Chrysothamnus nauseosus albicaulis</i> | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 6 | - | - | - | - | - | - | - | - | 6 | - | - | - | 120 | | 6 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - - | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - - | 0 | |
| | 97 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | 20 22 | 1 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | 1 | - | - | - | - | - | - | - | - | 2 | 40 | | 2 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 22% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 0 | | 0% | | | |
| | | | | | | | | | | | | '97 | 180 | | 22% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|--------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | | | | | | | | | | | |
| S | 83 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 133 | | | 2 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | 2 | - | - | - | - | - | 2 | - | - | - | 40 | | | 2 |
| Y | 83 | 8 | - | - | - | - | - | - | - | - | 8 | - | - | - | 533 | | | 8 |
| | 89 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 333 | | | 5 |
| | 97 | 1 | - | - | 2 | - | - | - | - | - | 3 | - | - | - | 60 | | | 3 |
| M | 83 | 18 | - | - | - | - | - | - | - | - | 18 | - | - | - | 1200 | 14 | 12 | 18 |
| | 89 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 200 | 13 | 12 | 3 |
| | 97 | 78 | - | - | 12 | - | - | 11 | - | - | 101 | - | - | - | 2020 | 13 | 16 | 101 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | 4 | - | - | - | - | - | - | - | - | 3 | - | - | 1 | 266 | | | 4 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | -54% | | | | | | | |
| '89 | | 00% | | | 00% | | | 08% | | | +62% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 1733 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 799 | | 33% | | | |
| | | | | | | | | | | | | '97 | 2080 | | 0% | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | | | 5 |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 17 | - | - | - | - | - | - | - | - | 17 | - | - | - | 340 | 6 | 6 | 17 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 440 | | - | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|---|--------------------|--------------------------------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 |
| | 97 | - | - | - | - | - | - | 1 | - | - | 1 | - | - | - | 20 | - | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | '97 | 40 | | - | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 |
| | 97 | 8 | - | - | - | - | - | - | - | - | 8 | - | - | - | 160 | 6 | 8 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | '97 | 160 | | - | | | |
| Pinus monophylla | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | '97 | 0 | | - | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-------|------|----|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Quercus gambelii | | | | | | | | | | | | | | | | | | |
| S | 83 | 8 | - | - | - | - | - | - | - | - | 8 | - | - | - | 533 | | | 8 |
| | 89 | 100 | - | - | - | - | - | 3 | - | - | 94 | 9 | - | - | 6866 | | | 103 |
| | 97 | 3 | - | - | - | - | - | 6 | - | - | 9 | - | - | - | 180 | | | 9 |
| Y | 83 | 63 | - | - | - | - | - | - | - | - | 63 | - | - | - | 4200 | | | 63 |
| | 89 | 223 | 2 | - | - | - | - | - | - | - | 183 | 40 | 1 | 1 | 15000 | | | 225 |
| | 97 | 197 | - | - | 38 | - | - | 41 | - | - | 276 | - | - | - | 5520 | | | 276 |
| M | 83 | 206 | 41 | - | - | - | - | - | - | - | 228 | 19 | - | - | 16466 | 37 | 22 | 247 |
| | 89 | 120 | - | 2 | - | - | - | - | - | - | 108 | 14 | - | - | 8133 | 39 | 28 | 122 |
| | 97 | 356 | - | - | 9 | - | - | - | - | - | 365 | - | - | - | 7300 | 49 | 33 | 365 |
| D | 83 | - | 4 | - | - | - | - | - | - | - | 1 | 2 | 1 | - | 266 | | | 4 |
| | 89 | 17 | - | 1 | - | - | - | - | - | - | 6 | 11 | - | 1 | 1200 | | | 18 |
| | 97 | 9 | - | - | 3 | - | - | - | - | - | 10 | - | - | 2 | 240 | | | 12 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1640 | | | 82 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 14% | | | 00% | | | .31% | | | +14% | | | | | | | |
| '89 | | .54% | | | .82% | | | .82% | | | -46% | | | | | | | |
| '97 | | 00% | | | 00% | | | .30% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 20932 | Dec: | 1% | | | | |
| | | | | | | | | | | | '89 | 24333 | | 5% | | | | |
| | | | | | | | | | | | '97 | 13060 | | 2% | | | | |
| Tetradymia canescens | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | 19 | 32 | 2 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 0 | Dec: | - | | | | |
| | | | | | | | | | | | '89 | 0 | | - | | | | |
| | | | | | | | | | | | '97 | 60 | | - | | | | |

Trend Study 18-9-97

Study site name: Left Fork Settlement Canyon.

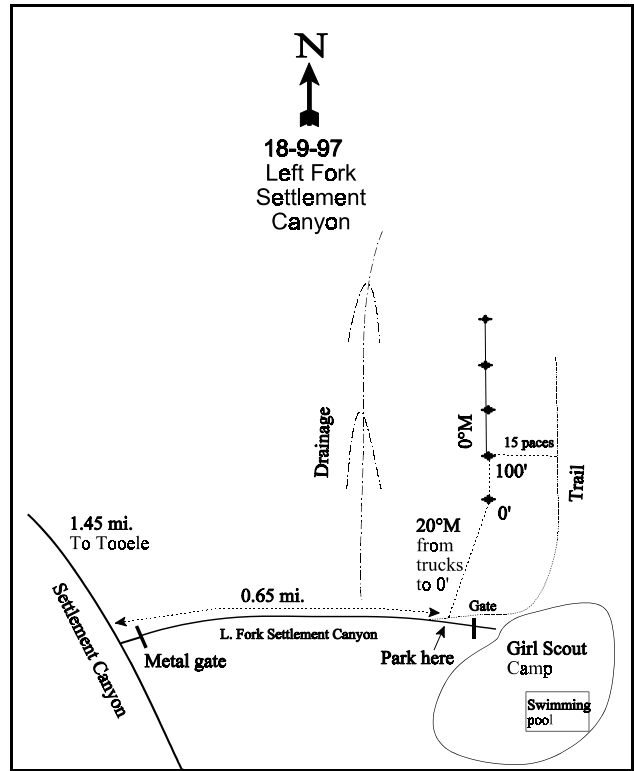
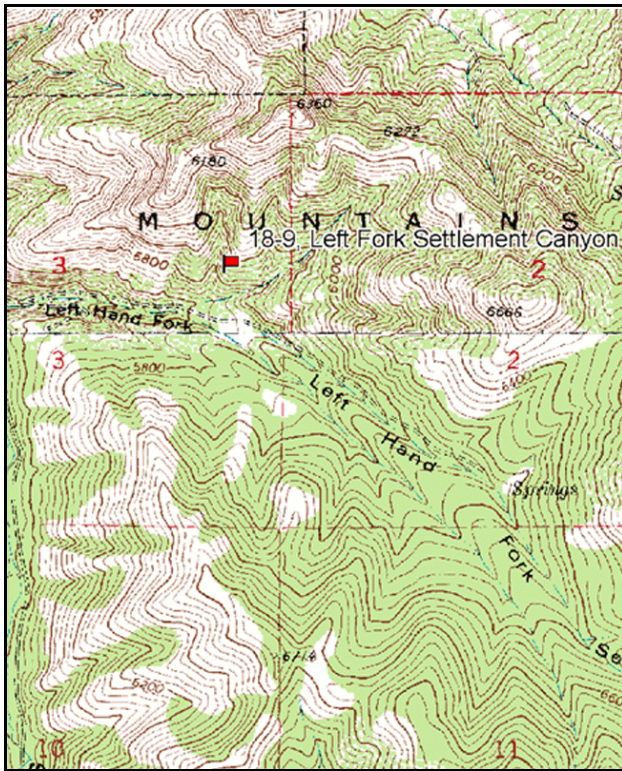
Vegetation type: Gambel Oakbrush.

Compass bearing: frequency baseline 0 degrees magnetic.

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

LOCATION DESCRIPTION

From Tooele, proceed southeast on the Settlement Canyon road to the lefthand fork, a distance of approximately 1.45 miles. Turn east (left) on the lefthand fork road and travel 0.65 miles. Turn north on an indistinct dirt road, directly across from the Girl Scout Camp and travel 0.05 miles to the base of a moderately steep dugway. From here, the 0-foot mark is found at an azimuth of 20°M. There is a trail that goes up the dugway. Follow this trail up and the 0-foot stake is 15 paces to the left of the trail and is marked with a red browse tag, number 3930.



Map Name: Tooele

Diagrammatic Sketch

Township 4S, Range 4W, Section 3

GPS: NAD 27, UTM 12S 4484039 N 391867 E

DISCUSSION

Left Fork Settlement Canyon - Trend Study No. 18-9

***SUSPENDED - This site was suspended in 2002 and replaced with a new study, 18-35 Settlement Canyon Reservoir. Text and tables from the 1997 report have been retained and are found below.

The Left Fork of Settlement Canyon study is on deer winter range. Located immediately north of the Girl Scout Camp, the area receives considerable summer recreational and horse use. In previous years heavy sheep use occurred. However, in 1983 the local conservation officer said that sheep use had been curtailed. At the time of study establishment, cattle were observed in the immediate area. The study is located within low growing Gambel oakbrush on a moderately steep slope (25%) with a south facing aspect. The site has an elevation of 5,500 feet.

Soil is moderately shallow and characterized by many small to medium sized grey-colored angular surface limestone rock that contributes to almost a 20% of the ground cover. Effective rooting depth was a little over 10 inches. Soil textural analysis indicates a clay loam with a mildly alkaline pH (7.5). Soil temperature at about 12 inches was 54°F. Erosion is normal for this kind of site, especially in the more open areas. Ground cover is irregular with patches of oak separated by open interspaces dominated by mountain big sagebrush and broom snakeweed. Percent bare soil has decreased down to only about 2% by 1997.

Browse composition consists primarily of Gambel oak, broom snakeweed, mountain big sagebrush, and prickly pear cactus which are in order of abundance. Gambel oak is the "key species" as it makes up 76% of the browse cover. The population showed moderate to heavy use in 1983 and 1989 and good vigor with an age structure dominated by young plants. It is now mostly classified as mature (65%) plants. Broom snakeweed is also abundant and found increasing in 1989. By 1997, it appeared to be on the decline, but this was mostly reflective of the much larger sample size giving a more conservative yet more accurate population estimate. It is currently the most common shrub in oak openings, with oak showing signs of slow encroachment. Mountain big sagebrush is currently showing a moderate to light hedged form and a decreasing density. The population was initially low, and now it is even more so. It contributes to less than 1% of the browse cover. This is understandable with competition from the oakbrush and the fairly abundant weedy grass understory of cheatgrass and bulbous bluegrass.

Herbaceous understory is dominated by grasses, especially cheatgrass brome, bulbous bluegrass, and bluebunch wheatgrass. Together they provide 84% of the total grass cover. Other perennial grasses occur infrequently. The abundance of annual grass and bulbous bluegrass, which is annual-like in growth habit, is an indication of the intense grazing pressure applied to this site in the past.

Forb composition consists chiefly of poor value increasers. These include bastard toadflax, Utah milkvetch, goldenrod, thistle, and yellow salsify. More palatable forbs are much less common. Grazing use of forbs is light overall but varies somewhat with species.

1983 APPARENT TREND ASSESSMENT

Soil trend appears stable. Current erosion is light to moderate but could decrease if grazing, especially from sheep, were to be reduced. A thickening oak stand will likely result in better overall ground cover which, in the long term, could result in better soil protection. Vegetation trend also appears stable. Although oak appears to be expanding, moderately heavy use will tend to keep it at below average height. A dense growth of head-high or higher oak is not expected. Broom snakeweed appears to be increasing but not rapidly. If oak continues to spread, snakeweed will become less of a competitive factor. Mountain big sagebrush is currently an important browse but will become less so in the years ahead. No rapid change in herbaceous composition or density should be expected, unless livestock use is eliminated completely.

1989 TREND ASSESSMENT

Soil trend is stable with percent bare soil down slightly. The trend for browse is stable with the majority of the browse cover being contributed by oakbrush. Mountain big sagebrush is declining and becoming an insignificant part of the community. Oakbrush is increasing in its dominance of the area. The grasses and forbs show upward trends with increased numbers and species. This increase is especially evident for the forbs.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - up (5)

1997 TREND ASSESSMENT

Soil trend is considered stable with percent bare soil decreasing to 2%. However, this decline comes partly from an increase in rock cover (11% to 18%). The browse trend is also considered stable. The key species is oakbrush which contributes 76% of the browse cover, while mountain big sagebrush accounts for less than 1% of the browse cover. Density of oakbrush has declined 51% since 1989, but this more conservative population estimate is a more accurate estimate and more reflective of the larger sample size and not necessarily a loss in numbers. The population of oak is lightly utilized, and in good vigor. Mountain big sagebrush occur in low numbers and will become a less meaningful part of the browse composition due to the dense understory of very competitive grasses (cheatgrass and bulbous bluegrass) which make it very difficult for sagebrush to become established from seed. The herbaceous understory trend is up with increases for bluebunch wheatgrass and many forbs. The major problem is that the majority of the herbaceous species are weedy increasers.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - up, but mostly composed of weedy species (5)

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 9

| T y p e | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|------------------|----------------------|------------------|-----------------|------------------|-------------------|-----|-----|--------------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | |
| G | Agropyron spicatum | 84 | 63 | 91 | 36 | 26 | 30 | 3.62 |
| G | Aristida purpurea | _a - | _a 2 | _b 36 | - | 2 | 20 | 1.08 |
| G | Bromus tectorum (a) | - | - | 189 | - | - | 71 | 1.79 |
| G | Festuca spp. | - | - | 6 | - | - | 2 | .03 |
| G | Oryzopsis hymenoides | _b 13 | _b 20 | _a 2 | 6 | 7 | 2 | .18 |
| G | Poa bulbosa | _a - | _b 17 | _c 165 | - | 7 | 54 | 6.28 |
| G | Poa pratensis | _a 4 | _b 27 | _{ab} 21 | 2 | 11 | 7 | .42 |
| G | Poa secunda | _a 14 | _b 34 | _{ab} 27 | 7 | 16 | 10 | .64 |
| G | Sitanion hystrix | 1 | - | - | 1 | - | - | - |

| Type | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|------|------------------------------------|------------------|-----------------|-----------------|-------------------|-----|-----|-----------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | '97 |
| | Total for Annual Grasses | 0 | 0 | 189 | 0 | 0 | 71 | 1.79 |
| | Total for Perennial Grasses | 116 | 163 | 348 | 52 | 69 | 125 | 12.27 |
| | Total for Grasses | 116 | 163 | 537 | 52 | 69 | 196 | 14.07 |
| F | <i>Agoseris glauca</i> | - | 3 | 2 | - | 2 | 1 | .00 |
| F | <i>Alyssum alyssoides</i> (a) | - | - | 29 | - | - | 14 | .12 |
| F | <i>Artemisia ludoviciana</i> | 6 | 5 | 8 | 3 | 2 | 4 | .42 |
| F | <i>Asclepias asperula</i> | 3 | 4 | 12 | 1 | 3 | 5 | .62 |
| F | <i>Aster chilensis</i> | _a 6 | _b 59 | _b 35 | 2 | 22 | 13 | 1.44 |
| F | <i>Astragalus</i> spp. | _a - | _a - | _b 7 | - | - | 4 | .09 |
| F | <i>Balsamorhiza hookeri</i> | _a - | _a - | _b 11 | - | - | 4 | .39 |
| F | <i>Carduus nutans</i> (a) | - | - | 12 | - | - | 6 | .05 |
| F | <i>Calochortus nuttallii</i> | - | 4 | 3 | - | 3 | 1 | .00 |
| F | <i>Cirsium</i> spp. | 19 | 12 | 14 | 9 | 6 | 7 | .36 |
| F | <i>Comandra pallida</i> | _b 55 | _b 37 | _a 8 | 26 | 21 | 5 | .08 |
| F | <i>Collinsia parviflora</i> (a) | - | - | 1 | - | - | 1 | .00 |
| F | <i>Crepis acuminata</i> | _a 3 | _b 15 | _a 2 | 2 | 8 | 1 | .15 |
| F | Cruciferae | - | 3 | - | - | 1 | - | - |
| F | <i>Cymopterus</i> spp. | - | 3 | 3 | - | 1 | 1 | .00 |
| F | <i>Draba</i> spp. (a) | - | - | 64 | - | - | 19 | .71 |
| F | <i>Epilobium brachycarpum</i> (a) | - | - | 71 | - | - | 30 | .32 |
| F | <i>Erodium cicutarium</i> (a) | - | - | 97 | - | - | 36 | .74 |
| F | <i>Erigeron divergens</i> | _a - | _a - | _b 19 | - | - | 9 | .32 |
| F | <i>Galium aparine</i> (a) | - | - | 104 | - | - | 36 | 2.44 |
| F | <i>Gayophytum ramosissimum</i> (a) | - | 45 | 89 | - | 24 | 31 | 1.22 |
| F | <i>Grindelia squarrosa</i> | - | - | 1 | - | - | 1 | .03 |
| F | <i>Hackelia patens</i> | - | 4 | 3 | - | 3 | 1 | .03 |
| F | <i>Hedysarum boreale</i> | 3 | 6 | - | 1 | 3 | - | - |
| F | <i>Heterotheca villosa</i> | _a - | _a - | _b 38 | - | - | 19 | .78 |
| F | <i>Holosteum umbellatum</i> (a) | - | - | 39 | - | - | 16 | .10 |
| F | <i>Ipomopsis aggregata</i> | 3 | 2 | - | 2 | 1 | - | - |
| F | <i>Lappula occidentalis</i> (a) | - | - | 11 | - | - | 7 | .06 |
| F | <i>Lactuca serriola</i> | - | 18 | 14 | - | 11 | 8 | .04 |
| F | <i>Lithospermum ruderale</i> | - | 6 | - | - | 3 | - | - |
| F | <i>Lygodesmia grandiflora</i> | 6 | - | 8 | 2 | - | 4 | .02 |
| F | <i>Microsteris gracilis</i> (a) | - | - | 2 | - | - | 1 | .00 |
| F | <i>Oenothera caespitosa</i> | 3 | 3 | - | 2 | 2 | - | - |

| Type | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|---------------------------|-----------------------------|------------------|-----|-----|-------------------|-----|-----|-----------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | '97 |
| F | Phlox longifolia | a- | c46 | b21 | - | 19 | 9 | .09 |
| F | Polygonum douglasii (a) | - | - | 28 | - | - | 10 | .05 |
| F | Ranunculus testiculatus (a) | - | - | 23 | - | - | 8 | .09 |
| F | Senecio spp. | - | 2 | - | - | 1 | - | - |
| F | Silene spp. | - | - | 5 | - | - | 3 | .01 |
| F | Solidago sparsiflora | c75 | b43 | a- | 26 | 17 | - | - |
| F | Tragopogon dubius | 31 | 17 | 34 | 14 | 10 | 18 | .27 |
| F | Trifolium spp. | a- | b15 | b21 | - | 8 | 8 | 1.22 |
| F | Unknown forb-perennial | - | 1 | - | - | 1 | - | - |
| F | Veronica biloba (a) | - | - | 39 | - | - | 15 | .10 |
| F | Viola spp. | - | 2 | - | - | 1 | - | - |
| F | Zigadenus paniculatus | a2 | b40 | a2 | 2 | 20 | 2 | .01 |
| Total for Annual Forbs | | 0 | 45 | 609 | 0 | 24 | 230 | 6.04 |
| Total for Perennial Forbs | | 215 | 350 | 271 | 92 | 169 | 128 | 6.43 |
| Total for Forbs | | 215 | 395 | 880 | 92 | 193 | 358 | 12.47 |

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

BROWSE TRENDS --

Herd unit 18 , Study no: 9

| Type | Species | Strip Frequency | Average Cover % |
|------------------|-------------------------------|-----------------|-----------------|
| | | '97 | '97 |
| B | Artemisia tridentata vaseyana | 3 | .18 |
| B | Gutierrezia sarothrae | 73 | 5.92 |
| B | Opuntia spp. | 19 | .22 |
| B | Quercus gambelii | 60 | 19.75 |
| Total for Browse | | 155 | 26.07 |

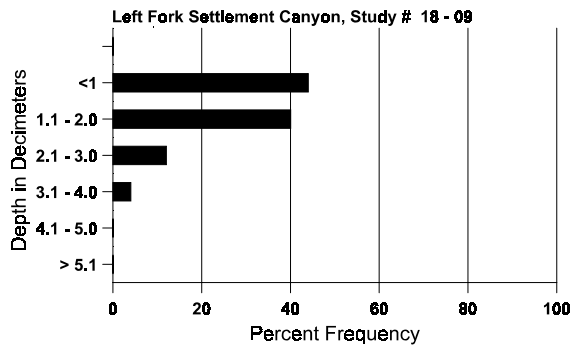
BASIC COVER --
Herd unit 18 , Study no: 9

| Cover Type | Nested Frequency '97 | Average Cover % | | |
|-------------|-------------------------|-----------------|-------|-------|
| | | '83 | '89 | '97 |
| Vegetation | 366 | 0 | 6.75 | 49.60 |
| Rock | 282 | 7.75 | 11.25 | 18.67 |
| Pavement | 140 | 0 | 3.25 | 2.38 |
| Litter | 386 | 74.50 | 63.50 | 51.46 |
| Cryptogams | 105 | 0 | 0 | 2.96 |
| Bare Ground | 110 | 17.75 | 15.25 | 1.93 |

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 9, Left Fork Settlement Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 10.2 | 54.0 (12.4) | 7.5 | 44.0 | 24.1 | 31.9 | 2.6 | 18.5 | 102.4 | .4 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 18 , Study no: 9

| Type | Quadrat Frequency '97 |
|--------|--------------------------|
| Rabbit | 4 |
| Elk | 2 |
| Deer | 12 |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 9

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|---|--------------------|--------------------------------|----------------|-------|----|------|-----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | |
| Y | 83 | 3 | - | - | - | - | - | - | 3 | | 3 | |
| | 89 | 1 | - | - | - | - | - | - | 1 | | 1 | |
| | 97 | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | - | 2 | - | - | - | - | - | 2 | 20 | 20 | 2 |
| | 89 | 2 | 1 | - | - | - | - | - | 3 | 15 | 17 | 3 |
| | 97 | 3 | 1 | - | - | - | - | - | 4 | 15 | 26 | 4 |
| D | 83 | - | 1 | - | - | - | - | - | - | - | 1 | 1 |
| | 89 | - | - | - | - | - | - | - | - | - | 0 | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | 0 | 0 |
| X | 83 | - | - | - | - | - | - | - | - | - | 0 | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | 0 | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | 20 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | |
| '83 | | 50% | | 00% | | 17% | | -33% | | | | |
| '89 | | 25% | | 00% | | 00% | | -70% | | | | |
| '97 | | 25% | | 00% | | 00% | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 399 | Dec: | 17% | | | |
| | | | | | | '89 | 266 | | 0% | | | |
| | | | | | | '97 | 80 | | 0% | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 21 | - | - | - | - | - | - | 21 | | 1400 | 21 |
| | 97 | 23 | - | - | - | - | - | - | 23 | | 460 | 23 |
| Y | 83 | 42 | - | - | - | - | - | - | 42 | | 2800 | 42 |
| | 89 | 42 | - | - | - | - | - | - | 42 | | 2800 | 42 |
| | 97 | 34 | - | - | - | - | - | - | 34 | | 700 | 35 |
| M | 83 | 93 | - | - | - | - | - | - | 93 | 10 | 7 | 93 |
| | 89 | 53 | - | - | - | - | - | - | 53 | 11 | 6 | 53 |
| | 97 | 649 | - | - | 1 | - | - | - | 650 | 9 | 11 | 650 |
| D | 83 | - | - | - | - | - | - | - | - | - | 0 | 0 |
| | 89 | 26 | - | - | - | - | - | - | 26 | | 1733 | 26 |
| | 97 | 2 | - | - | - | - | - | - | - | | 40 | 2 |
| X | 83 | - | - | - | - | - | - | - | - | - | 0 | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | 0 | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | 20 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | |
| '83 | | 00% | | 00% | | 00% | | -10% | | | | |
| '89 | | 00% | | 00% | | 00% | | +41% | | | | |
| '97 | | 00% | | 00% | | .29% | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 9000 | Dec: | 0% | | | |
| | | | | | | '89 | 8066 | | 21% | | | |
| | | | | | | '97 | 13740 | | 0% | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | |
|------------------------------------------------|----------------------------|---------------------|-----|------------------|----|--------------------|--------------------------------|----------------|-----|
| | | 1 | 2 | 3 | 4 | | | | |
| Opuntia spp. | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | 0 | |
| | 89 | 1 | - | - | - | - | - | 66 | |
| | 97 | - | - | - | - | - | - | 0 | |
| M | 83 | 1 | - | - | - | - | - | 66 | |
| | 89 | 1 | - | - | - | - | - | 66 | |
| | 97 | 25 | - | - | - | - | - | 500 | |
| D | 83 | - | - | - | - | - | - | 0 | |
| | 89 | - | - | - | - | - | - | 0 | |
| | 97 | 6 | - | - | - | - | - | 120 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | |
| '83 | | 00% | | 00% | | 00% | | +50% | |
| '89 | | 00% | | 00% | | 00% | | +79% | |
| '97 | | 00% | | 00% | | 16% | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 66 | Dec: | 0% |
| | | | | | | '89 | 132 | | 0% |
| | | | | | | '97 | 620 | | 19% |
| Quercus gambelii | | | | | | | | | |
| S | 83 | 8 | - | - | - | - | - | 533 | |
| | 89 | 224 | 1 | - | - | - | - | 15000 | |
| | 97 | 102 | - | - | - | - | - | 2040 | |
| Y | 83 | 93 | 49 | - | - | - | - | 9466 | |
| | 89 | 194 | 161 | 4 | - | - | - | 23933 | |
| | 97 | 124 | - | - | 31 | - | 49 | 4160 | |
| M | 83 | - | 80 | 30 | - | - | - | 7333 | |
| | 89 | 1 | 1 | 2 | - | - | - | 266 | |
| | 97 | 370 | 4 | - | 53 | - | - | 8540 | |
| D | 83 | - | - | - | - | - | - | 0 | |
| | 89 | 5 | 25 | 8 | - | - | - | 2533 | |
| | 97 | 18 | - | - | 1 | - | - | 380 | |
| X | 83 | - | - | - | - | - | - | 0 | |
| | 89 | - | - | - | - | - | - | 0 | |
| | 97 | - | - | - | - | - | - | 2140 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | |
| '83 | | 51% | | 12% | | 00% | | +37% | |
| '89 | | 47% | | 03% | | 33% | | -51% | |
| '97 | | .61% | | .61% | | 00% | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 16799 | Dec: | 0% |
| | | | | | | '89 | 26732 | | 9% |
| | | | | | | '97 | 13080 | | 3% |

Trend Study 18-10-97

Study site name: Bates Canyon.

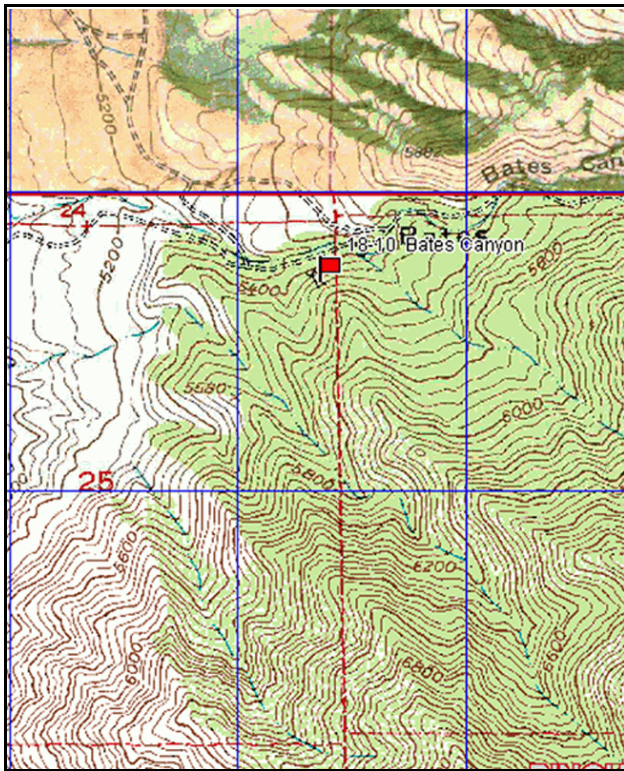
Vegetation type: Big Sagebrush.

Compass bearing: frequency baseline 328 degrees magnetic.

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

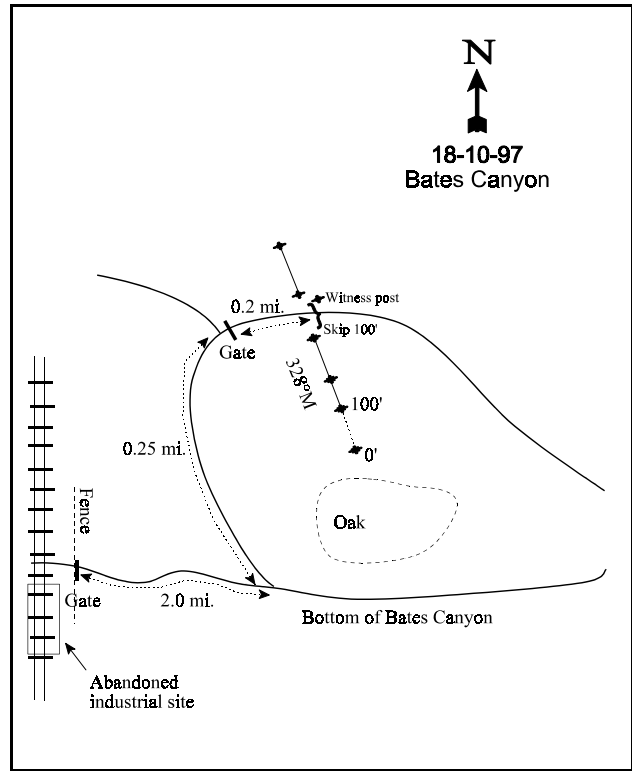
LOCATION DESCRIPTION

From Highway U-36 just north of Erda, turn east on the road marked by the “Bates Canyon” sign. Proceed east on this road for 1.40 miles to a fence near an abandoned industrial plant. Proceed east through the gate for approximately 2.0 miles up Bates Canyon to a fork. Turn left (north) and travel approximately 0.50 miles to where there is a green steel fencepost 15 inches in height, on the right (south) side of the road. This is nearly to the point where the road turns downhill into Bates Canyon again. From this point, the 0-foot mark of the frequency baseline is 29 paces away at an azimuth of 213 degrees magnetic. The 0-foot mark is marked by a green steel fencepost with a red browse tag, number 3916 attached.



Map Name: Bingham Canyon

Township 2S, Range 4W, Section 25



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4497537 N 395250 E

DISCUSSION

Bates Canyon - Trend Study No. 18-10

***SUSPENDED - This site was suspended in 2002. Text and tables from the 1997 report have been retained and are found below.

The Bates Canyon study is located within a nearly pure mountain big sagebrush community on a 10-15% west facing bench at the mouth of Bates Canyon. The area is deer winter range and potentially elk winter range. In the past it was grazed by sheep but the site is now permitted for cattle use with 250 AUM's split between the spring and fall. Elevation of the site is 5,200 feet. It was noted in 1983 that the sagebrush population was apparently a stand that had become established after a fire for there were numerous burned sagebrush stems.

Soil is brown in color and alluvially deposited. Soil textural analysis indicates it to be a clay loam with a slightly acidic pH (6.4). Effective soil depth is almost 15 inches with a soil temperature of 53°F at 17 inches. Rock cover, which makes up about 12% cover, is mostly (86%) pavement. Most of the soil surface not directly under a sagebrush crown is erosion pavement or bare soil. Herbaceous cover was initially very sparse in 1983, but with the combination of pavement, gentle slope, and comparatively low precipitation, there is a relatively low rate of erosion.

Browse composition consists mostly of low growing (e.g. about 15 inches) mountain big sagebrush with an occasional interspersed broom snakeweed. Species identification of the sagebrush ecotype is difficult. In growth habit, it resembles Wyoming big sagebrush. Although, morphological characteristics and ultraviolet light testing suggest it to be mountain big sagebrush. Shrub density is moderate and individuals tend to be evenly spaced. Shrub interspaces initially (1983) were nearly barren of vegetation. Utilization was mostly moderate, yet vigor was good and numerous young and decadent plants were indicative of a dynamic but essentially stable and self-sustaining population. In 1989, the sagebrush population remained at a stable density yet increased in percent decadence from 15% to 57%. Poor vigor was also noted on 24% of the plants sampled. In 1997, density of sagebrush increased to 14,280 plants/acre. The sample size was greatly increased which gives a much better estimate of sagebrush density. This is evident with the relatively low density estimates given in 1983 and 1989 of 3,899 and 3,032 plants/acre respectively. Currently, percent decadency has decreased to only 12% and those with poor vigor are down to 9% from a high of 24% in 1989. The health of the sagebrush community appears to be improving.

Both grasses and forbs were relatively rare in 1983 and were discounted as forage sources or as an important soil protection. By far the most commonly occurring species were the annual grasses. Perennial grasses were limited to Sandberg bluegrass and bulbous bluegrass. Except for an abundance of bur buttercup and isolated individuals of foothill deathcamas, mountain dandelion, and sego lily, forbs are nearly missing from the site in 1983. Sum of nested frequency has increased substantially since then for grasses and forbs. However, composition is poor. Bulbous bluegrass currently makes up 88% of the grass cover and weedy annual and perennial forbs dominate the forb component. The forbs are still a minor component of the herbaceous understory, but the number of species occurring on the site have increase significantly, from 3 to 11 to 23 in 1997.

1983 APPARENT TREND ASSESSMENT

Soil trend appears to be stable to slightly declining. Although most of the ground surface is barren, only moderate soil loss appears to be occurring. The gentle slope and pavement cover allows only slight erosion. Vegetatively, the area appears quite stable. The big sagebrush population is obviously self sustaining and the barren interspaces virtually rule out the possibility of fire.

1989 TREND ASSESSMENT

The trend for soils was assessed as improving because of a significant decrease in percent bare soil (21% to 3%), a large increase in cryptogamic cover (6% to 24%), and an increase in herbaceous cover. The 1989 report declared that the mountain big sagebrush was stable to possibly increasing. The data supports the opposite view where its density decreased by 22%, percent decadence increased from 15% to 57%, with 42% of the decadent plants being classified as having poor vigor or dying. Those individuals with poor vigor increased from 10% to 24%. This all points to a sagebrush community that is experiencing a downward trend due to combination of factors including extended drought, intraspecific competition, and moderate use. This will cause some thinning of the population. The trend for the herbaceous understory is up, with increases in species diversity and abundance. But, much of the herbaceous species are classified as weedy increaser species.

TREND ASSESSMENT

soil - up (5)

browse - down (1)

herbaceous understory - up, but is dominated by weedy species (5)

1997 TREND ASSESSMENT

The trend for soils appears to be stable with percent bare soil stable at 3% and slight increases in herbaceous species abundance. The trend for sagebrush is improved with a decline in percent decadence. However, 74% of the decadent plants were classified as dying in 1997. Young plants are abundant (5,100 plants/acre) and appear adequate to replace the individuals that may be lost in the future. The percentage of plants classified as having moderate to heavy use increased to over 60%. The density for the sagebrush is still probably too high for the site at 14,280 plants/acre. Depending on the extent of the drought periods, this population could experience further losses. Nevertheless, this will not be able to be determined until the next sampling date in 2002. The trend for the herbaceous understory is slightly up with increases for perennial grass and forb species. The number of grass species have not changed much through the years, but for the forbs it has changed dramatically (3 in 1983, 11 in 1989, and 23 in 1997). However, the grasses still make up almost 80% of the herbaceous cover, making forbs still a minor component of the herbaceous understory. One species, bulbous bluegrass, contributes 70% of the total herbaceous cover. One can follow the dramatic increase it has experienced since 1983 by the inspection of its sum of nested frequency values; 12 in 1983, 251 in 1989, and 309 in 1997. The herbaceous understory has improved, but it still is dominated by “weedy” increaser species.

TREND ASSESSMENT

soil - stable (3)

browse - slightly up (4)

herbaceous understory - up slightly, but is dominated by weedy species (4)

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 10

| T y p e | Species | Nested Frequency | | | Quadrat Frequency | | | Average |
|------------------|----------------------|------------------|------------------|------------------|-------------------|-----|-----|---------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | Cover % |
| G | Bromus japonicus (a) | - | - | 16 | - | - | 7 | .03 |
| G | Bromus tectorum (a) | - | - | 77 | - | - | 30 | .20 |
| G | Poa bulbosa | _a 12 | _b 251 | _c 309 | 6 | 82 | 87 | 14.98 |
| G | Poa fendleriana | _a - | _b 19 | _a 4 | - | 8 | 1 | .38 |
| G | Poa secunda | _b 84 | _a 23 | _b 57 | 30 | 9 | 22 | 1.41 |

| Type | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|------|-----------------------------|------------------|------------------|-----------------|-------------------|-----|-----|-----------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | '97 |
| | Total for Annual Grasses | 0 | 0 | 93 | 0 | 0 | 37 | 0.24 |
| | Total for Perennial Grasses | 96 | 293 | 370 | 36 | 99 | 110 | 16.78 |
| | Total for Grasses | 96 | 293 | 463 | 36 | 99 | 147 | 17.02 |
| F | Agoseris glauca | _{ab} 6 | _a - | _b 14 | 3 | - | 7 | .04 |
| F | Ambrosia psilostachya | _a - | _a - | _b 23 | - | - | 9 | .32 |
| F | Arabis spp. | - | 3 | 3 | - | 1 | 1 | .00 |
| F | Asclepias asperula | - | 1 | - | - | 1 | - | - |
| F | Astragalus utahensis | - | - | 6 | - | - | 3 | .21 |
| F | Castilleja chromosa | _a - | _b 25 | _b 35 | - | 12 | 18 | .27 |
| F | Caulanthus crassicaulis | _a - | _a - | _b 10 | - | - | 5 | .07 |
| F | Calochortus nuttallii | _a 2 | _{ab} 11 | _b 18 | 1 | 6 | 10 | .05 |
| F | Collomia linearis (a) | - | - | 32 | - | - | 13 | .09 |
| F | Collinsia parviflora (a) | - | - | 5 | - | - | 2 | .01 |
| F | Descurainia spp. (a) | - | - | 4 | - | - | 1 | .00 |
| F | Draba spp. (a) | - | - | 75 | - | - | 27 | .16 |
| F | Epilobium brachycarpum (a) | - | - | 199 | - | - | 79 | .49 |
| F | Galium aparine (a) | - | - | 1 | - | - | 1 | .00 |
| F | Grindelia squarrosa | _a - | _b 5 | _c 86 | - | 4 | 32 | 1.82 |
| F | Helianthus annuus (a) | - | 66 | - | - | 31 | - | - |
| F | Heterotheca villosa | - | - | - | - | - | - | .00 |
| F | Holosteum umbellatum (a) | - | - | 30 | - | - | 11 | .10 |
| F | Lactuca serriola | _a - | _b 22 | _a - | - | 10 | - | - |
| F | Lesquerella spp. | - | 5 | - | - | 2 | - | - |
| F | Lomatium triternatum | _a - | _b 13 | _a 2 | - | 5 | 1 | .00 |
| F | Microsteris gracilis (a) | - | - | 1 | - | - | 1 | .00 |
| F | Phlox hoodii | - | - | 2 | - | - | 1 | .03 |
| F | Polygonum douglasii (a) | - | - | 25 | - | - | 9 | .04 |
| F | Tragopogon dubius | _a - | _a - | _b 98 | - | - | 46 | .41 |
| F | Unknown forb-perennial | _a - | _b 76 | _a - | - | 36 | - | - |
| F | Viola spp. | - | 1 | 1 | - | 1 | 1 | .00 |
| F | Wyethia amplexicaulis | - | - | 3 | - | - | 1 | .03 |
| F | Zigadenus paniculatus | _a 21 | _b 88 | _a 46 | 11 | 43 | 23 | .20 |
| | Total for Annual Forbs | 0 | 66 | 372 | 0 | 31 | 144 | 0.92 |
| | Total for Perennial Forbs | 29 | 250 | 347 | 15 | 121 | 158 | 3.49 |
| | Total for Forbs | 29 | 316 | 719 | 15 | 152 | 302 | 4.41 |

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

BROWSE TRENDS --
Herd unit 18 , Study no: 10

| Type | Species | Strip Frequency | Average Cover % |
|------------------|-------------------------------|-----------------|-----------------|
| | | '97 | '97 |
| B | Artemisia tridentata vaseyana | 97 | 19.03 |
| B | Gutierrezia sarothrae | 44 | .99 |
| B | Quercus gambelii | 2 | - |
| Total for Browse | | 143 | 20.03 |

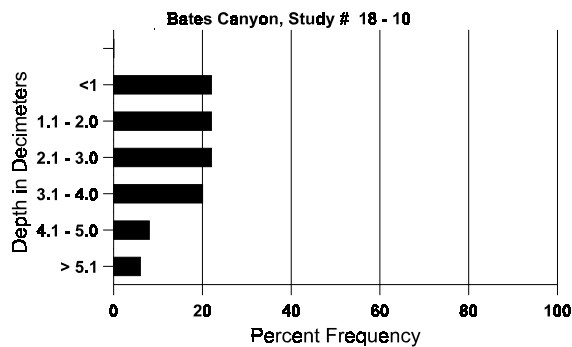
BASIC COVER --
Herd unit 18 , Study no: 10

| Cover Type | Nested Frequency | Average Cover % | | |
|-------------|------------------|-----------------|-------|-------|
| | | '97 | '83 | '89 |
| Vegetation | 368 | .50 | 6.50 | 42.57 |
| Rock | 153 | 1.25 | 1.00 | 1.74 |
| Pavement | 268 | 25.50 | 26.50 | 10.59 |
| Litter | 394 | 46.00 | 39.50 | 36.64 |
| Cryptogams | 265 | 6.00 | 23.75 | 16.48 |
| Bare Ground | 180 | 20.75 | 2.75 | 3.25 |

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 10, Bates Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 14.6 | 53.0 (17.0) | 6.4 | 29.6 | 31.8 | 38.6 | 2.5 | 17.0 | 268.8 | .3 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 18 , Study no: 10

| Type | Quadrat Frequency '97 |
|--------|-----------------------|
| Rabbit | 1 |
| Deer | 13 |
| Cattle | 1 |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 10

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total |
|------------------------------------------------|--------|----------------------------|-----|-----|------------------|---|-----|-------------------|---|---|-------------|----------------|-------|------|-----------------|--------------------------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 188 | - | - | - | - | - | 131 | - | - | - | - | - | 319 | - | - | 319 |
| | 97 | 42 | - | - | 1 | - | - | - | - | - | - | - | - | 43 | - | - | 43 |
| Y | 83 | 22 | 2 | - | - | - | - | - | - | - | - | - | - | 24 | - | - | 24 |
| | 89 | 2 | - | - | - | - | - | - | - | - | - | - | - | 2 | - | - | 2 |
| | 97 | 53 | - | 100 | 1 | - | 100 | - | - | - | - | - | - | 254 | - | - | 255 |
| M | 83 | 22 | 48 | 6 | - | - | - | - | - | - | - | - | - | 73 | - | 3 | 76 |
| | 89 | 25 | 10 | 2 | - | - | - | - | - | - | - | - | - | 35 | 2 | - | 37 |
| | 97 | 164 | 179 | 27 | - | - | - | - | - | - | - | - | - | 270 | 100 | - | 371 |
| D | 83 | 1 | 8 | 8 | - | - | - | - | - | - | - | - | - | 8 | - | 9 | 17 |
| | 89 | 39 | 13 | - | - | - | - | - | - | - | - | - | - | 29 | 1 | 14 | 52 |
| | 97 | 27 | 59 | 2 | - | - | - | - | - | - | - | - | - | 23 | - | 65 | 88 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1560 | 78 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | | <u>%Change</u> | | | | | |
| '83 | | 50% | | | 12% | | | 10% | | | | -22% | | | | | |
| '89 | | 25% | | | 02% | | | 24% | | | | +79% | | | | | |
| '97 | | 33% | | | 32% | | | 09% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 3899 | Dec: | 15% | | |
| | | | | | | | | | | | | '89 | 3032 | | 57% | | |
| | | | | | | | | | | | | '97 | 14280 | | 12% | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|------|------|-----|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | | |
| S | 83 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 100 | | 3 | |
| | 89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | 97 | 50 | - | - | - | - | - | - | - | - | 50 | - | - | - | 1000 | | 50 | |
| Y | 83 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 166 | | 5 | |
| | 89 | 21 | - | - | - | - | - | - | - | - | 21 | - | - | - | 700 | | 21 | |
| | 97 | 67 | - | - | - | - | - | - | - | - | 67 | - | - | - | 1340 | | 67 | |
| M | 83 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 100 | 12 14 | 3 | |
| | 89 | 15 | - | - | - | - | - | - | - | - | 15 | - | - | - | 500 | 8 8 | 15 | |
| | 97 | 130 | - | - | - | - | - | - | - | - | 130 | - | - | - | 2600 | 7 7 | 130 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 8 | 2 | - | - | - | - | - | - | - | 5 | - | - | 5 | 333 | | 10 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +83% | | | | | | | |
| '89 | | 04% | | | 00% | | | 11% | | | +61% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 266 | Dec: | 0% | | | | |
| | | | | | | | | | | | '89 | 1533 | | 22% | | | | |
| | | | | | | | | | | | '97 | 3940 | | 0% | | | | |
| <i>Quercus gambelii</i> | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - - | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - - | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 20 21 | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 0 | Dec: | - | | | | |
| | | | | | | | | | | | '89 | 0 | | - | | | | |
| | | | | | | | | | | | '97 | 40 | | - | | | | |

Trend Study 18-14-97

Study site name: Little Valley.

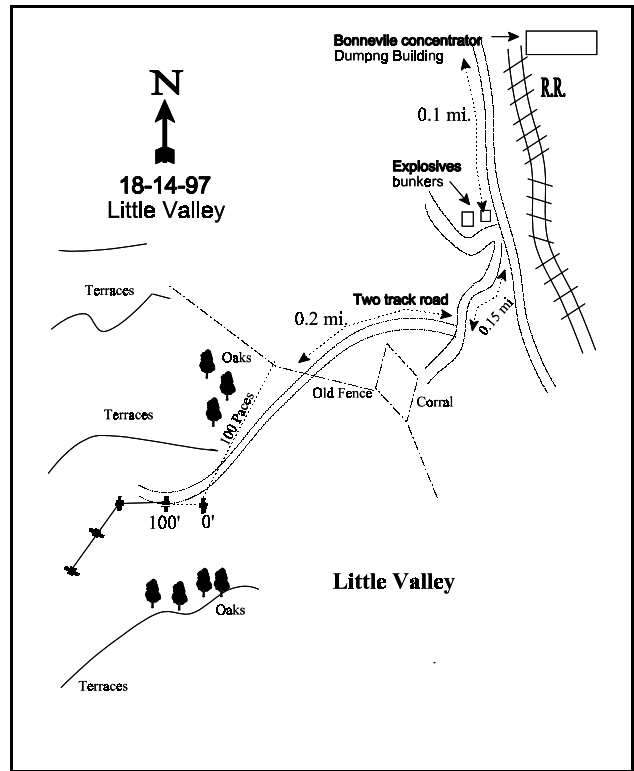
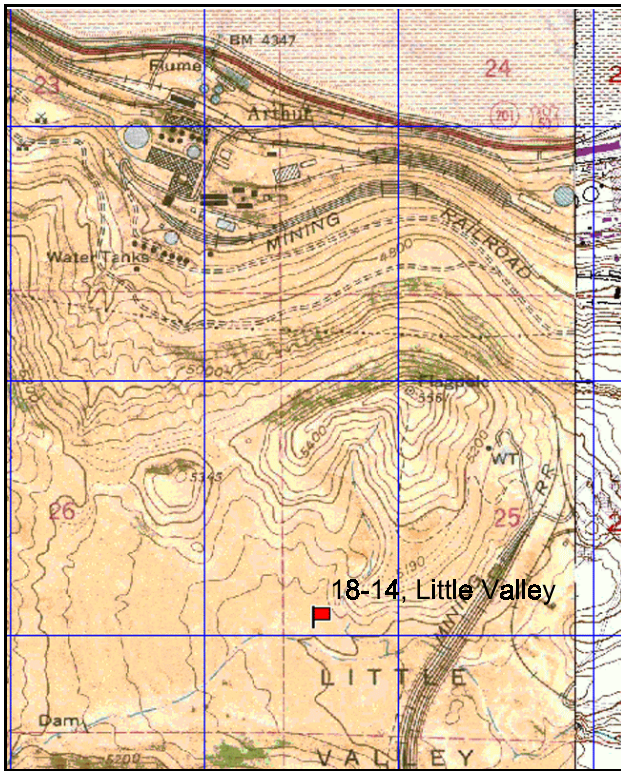
Vegetation type: Perennial Grass.

Compass bearing: frequency baseline 285 degrees magnetic (Lines 3-4 @ 240°M).

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

LOCATION DESCRIPTION

From the Bonneville concentrator, proceed south for 0.1 miles along the railroad tracks to a three-way fork. Take the middle fork past some explosives bunkers for 0.15 miles to an old corral. Just before the corral is a two track road. Take this road for 0.2 miles to a bend in the old fence line. Bear southwesterly for approximately 100 paces from the bend in the fence. The study is located in the flat, between terraces. The study markers are half high fenceposts.



Map Name: Farnsworth Peak

Diagrammatic Sketch

Township 1S, Range 3W, Section 25

GPS: NAD 27, UTM 12S 4506012 N 403957 E

DISCUSSION

Little Valley - Trend Study No. 18-14

***SUSPENDED - This site was suspended in 2002. Text and tables from the 1997 report have been retained and are found below.

This is a new study site established on Kennecott property in Little Valley. It samples a grassland type in an area that has been rehabilitated by terracing and limited seeding treatment. The slope is negligible but it has a slight south aspect and an elevation of about 5,000 feet. Plant composition is mostly weedy in habit. As described in the 1990 report, it had been previously grazed by cattle and more recently by sheep in early spring. Deer use occurs year-round. Elk use was mainly in winter and spring. A pellet-group transect read in conjunction with the trend study in 1997 indicated elk use at 48 elk days use/acre and deer use at less than one.

The soil was visibly described as a hard packed clay in the upper 6 to 12 inches. Below the packed layer, the soil was more loam-like and more loosely packed. Rock and pavement cover is less than 1%. Soil textural analysis indicate a clay loam soil with a moderately acidic pH (5.8) which could be limiting to some plant species. Effective rooting depth was almost 12 inches with a soil temperature of 62°F at 14 inches in depth. Because of the good herbaceous cover and litter cover, very little erosion was noticeable on the site.

Since 1978, the site was dominated by annual rye and other weedy species. Western wheatgrass had a higher nested frequency than annual rye which is still true, but currently western wheatgrass has shown a significantly decreased abundance (lower sum of nested frequency number). In 1990 they were about the only grasses present on the site. Curlycup gumweed and ragweed remain very common, but surprisingly, no whitetop was identified in 1990. From the 1997 sampling, some of the more weedy species decreased, but others increased to take their place. Currently, 91% of the grasses cover is contributed by annuals, mostly annual rye and 90% of the forb cover is furnished by annual and perennial weedy species. Therefore, about 90% of the total herbaceous cover (there are no shrubs) is furnished by weedy species. Ragweed by itself provides 42% of the forb cover. There is still no browse available in much of the valley.

1990 APPARENT TREND ASSESSMENT

Soil trend appears stable even with 38% bare soil. The lack of slope, good protective cover from herbaceous cover and litter, and terracing help minimize erosion. The trend for shrubs is not applicable for there are no shrubs on the site. With the prominence of undesirable weeds and lack of diversity, the herbaceous understory vegetative trend appears downward.

1997 TREND ASSESSMENT

Soil trend is up with bare soil declining to 7%, and good herbaceous and litter cover. There is no trend for shrubs as they do not occur on the site. The trend for the herbaceous understory is down because 91% of the grass cover is from weedy annual species and 90% of the forb cover is from weedy annual and perennial species. One of the few good species on the site is western wheatgrass which has declined significantly in nested frequency since the 1990 reading.

TREND ASSESSMENT

soil - up (5)

browse - no shrubs on site (NA)

herbaceous understory - down, and mostly weeds (90% cover) (1)

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 14

| Type | Species | Nested Frequency | | Quadrat Frequency | | Average Cover % |
|-----------------------------|----------------------------|------------------|------------------|-------------------|-----|-----------------|
| | | '90 | '97 | '90 | '97 | |
| G | Agropyron smithii | _b 266 | _a 190 | 81 | 68 | 3.88 |
| G | Bromus japonicus (a) | - | 254 | - | 81 | 6.71 |
| G | Bromus tectorum (a) | - | 21 | - | 11 | .08 |
| G | Poa fendleriana | - | 5 | - | 2 | .03 |
| G | Poa pratensis | _a 1 | _b 40 | 1 | 14 | 1.81 |
| G | Poa secunda | - | 6 | - | 3 | .01 |
| G | Secale cereale (a) | 143 | 110 | 57 | 37 | 8.12 |
| Total for Annual Grasses | | 143 | 385 | 57 | 129 | 14.92 |
| Total for Perennial Grasses | | 267 | 241 | 82 | 87 | 5.75 |
| Total for Grasses | | 410 | 626 | 139 | 216 | 20.67 |
| F | Alyssum alyssoides (a) | - | 2 | - | 1 | .00 |
| F | Ambrosia psilostachya | _a 48 | _b 165 | 21 | 52 | 9.80 |
| F | Aster chilensis | _b 15 | _a - | 10 | - | - |
| F | Cardaria draba | _a - | _b 31 | - | 13 | .14 |
| F | Convolvulus arvensis | _a 9 | _b 45 | 3 | 20 | .40 |
| F | Comandra pallida | 1 | 4 | 1 | 1 | .03 |
| F | Epilobium brachycarpum (a) | - | 148 | - | 61 | 3.50 |
| F | Grindelia squarrosa | _b 213 | _a 129 | 72 | 52 | 2.25 |
| F | Helianthus annuus (a) | _a 12 | _b 69 | 6 | 30 | 3.22 |
| F | Lactuca serriola | _a - | _b 35 | - | 18 | .34 |
| F | Linaria dalmatica | 3 | 6 | 2 | 2 | .15 |
| F | Machaeranthera canescens | _b 22 | _a - | 10 | - | - |
| F | Nicotiana attenuata (a) | 16 | - | 7 | - | - |
| F | Polygonum douglasii (a) | - | 129 | - | 48 | 2.12 |
| F | Rumex crispus | _a - | _b 41 | - | 19 | .52 |
| F | Tragopogon dubius | _a 7 | _b 41 | 4 | 19 | .70 |
| Total for Annual Forbs | | 28 | 348 | 13 | 140 | 8.85 |
| Total for Perennial Forbs | | 318 | 497 | 123 | 196 | 14.36 |
| Total for Forbs | | 346 | 845 | 136 | 336 | 23.21 |

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

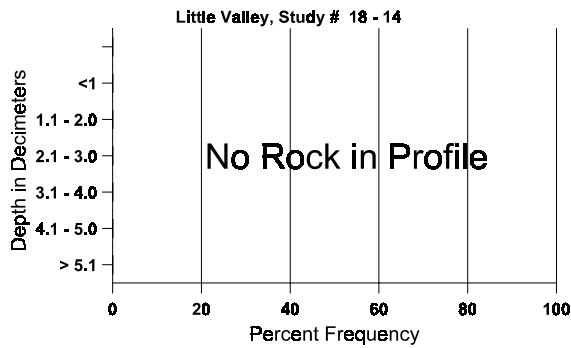
BASIC COVER --
Herd unit 18 , Study no: 14

| Cover Type | Nested Frequency | Average Cover % | |
|-------------|------------------|-----------------|-------|
| | '97 | '90 | '97 |
| Vegetation | 376 | 4.75 | 58.24 |
| Rock | 9 | 0 | .07 |
| Pavement | 21 | .25 | .09 |
| Litter | 390 | 53.00 | 59.97 |
| Cryptogams | 115 | 4.00 | 4.53 |
| Bare Ground | 193 | 38.00 | 6.90 |

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 14, Little Valley

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 11.4 | 61.7 (13.8) | 5.8 | 35.6 | 38.8 | 25.6 | 1.5 | 48.9 | 192.0 | .4 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 18 , Study no: 14

| Type | Quadrat Frequency | Pellet Transect | |
|------|-------------------|------------------------|------------------------|
| | | Pellet Groups per Acre | Days Use per Acre (ha) |
| | '97 | '97 | '97 |
| Elk | 28 | 923 | 71 (175) |
| Deer | 3 | 9 | 1 (2) |

Trend Study 18-19-97

Study site name: Black Rock West .

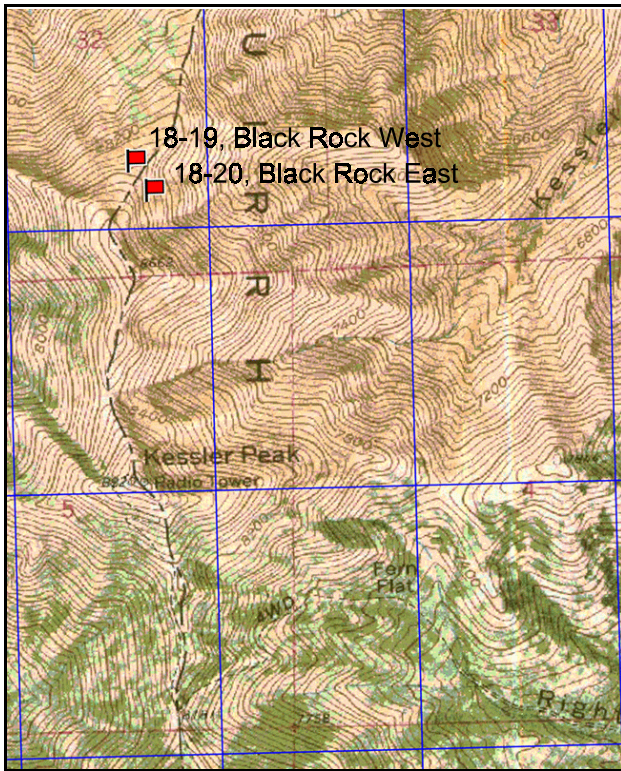
Vegetation type: Perennial Grass .

Compass bearing: frequency baseline 270 degrees magnetic.

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

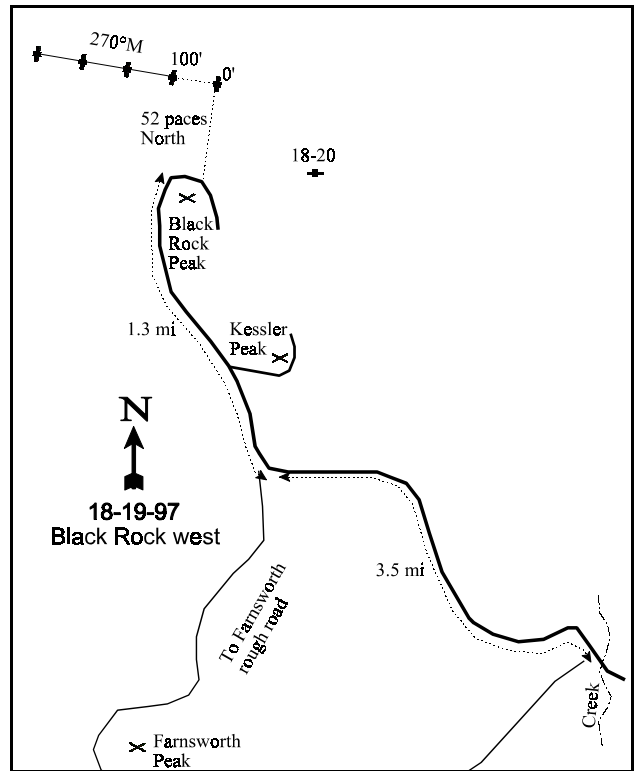
LOCATION DESCRIPTION

Traveling north on Highway #111 turn left (West) (just before the Baccus west gate sign and overpass) on a dirt road which goes up Coon Canyon. Travel west for 0.2 miles to a gate. This gate is controlled by Kennecott and you must get permission to have it opened. From the gate continue up Coon Canyon for 3.9 miles to a fork. Turn right (north) off the main road and travel north west up the right fork of Coon Canyon for 3.5 miles to a saddle and an intersection. Stay right and continue 1.3 miles up a steep road around the west side of Kessler Peak to last switchback west of Black Rock Peak. Park here and walk onto the knoll to the east. From the knoll, walk approximately 52 paces north to the study site. The study stakes are short, green fenceposts.



Map Name: Farnsworth Peak

Township 1S, Range 3W, Section 32



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4504140 N 398300 E

DISCUSSION

Black Rock West - Trend Study No. 18-19

***SUSPENDED - This site was suspended in 2002. The nearby trend study 18-20, Black Rock East, was retained because it contains more forage and is a better site for monitoring elk use. A pellet group transect was read on this site in 2002. Text and tables from the 1997 report have been retained and are found below.

This trend study samples a high elevation elk range at the top of Black Rock Mountain. It supports a sparse mixed mountain brush community with an abundant grass and forb understory. The site is at a relatively high elevation of about 8,500 feet. It has a moderately steep slope (35%) with a west-north-west aspect. These slopes would be typically blown free of snow in the winter. The effect of the prevailing winds helps maintain a low vegetative growth form for most all species. Use on the site appears to be limited to elk. Pellet group transect data from 1997 indicated 84 elk days use/acre (208 edu/ha). There were few deer pellet-groups found on or around the site. In 1997, grasshoppers were prevalent and appeared to be consuming large amounts of the available herbaceous vegetation. Pellet group transect data from 2002 estimated 40 elk days use/acre (98 edu/ha) and 4 deer days use/acre (10 ddu/ha).

The soil is fairly shallow and rocky, but erosion is limited by the high amounts of protective plant and litter cover. Percent bare soil has decreased significantly since 1990, from 11% to 3%. About 40% of the soil surface is covered with a combination of rock and pavement cover. Soil textural analysis classifies it as a loam with an effective rooting depth of about 10 inches. The pH of the soil is slightly acidic (pH of 6.4) with a soil temperature of 50°F at 10 inches. One thing of note which could be limiting to plant development is that phosphorus is relatively low at 8.1 ppm (10 ppm is considered minimal for normal plant growth and development). Vegetative cover is relatively high, with almost 90% coming from herbaceous species. Soil erosion on the site is minimal.

The site supports small amounts of a variety of useful browse species including serviceberry, mountain big sagebrush, curleaf mountain mahogany, and chokecherry. The browse species tend to be moderately hedged but they only contribute to about 23% of the vegetative cover. Low rabbitbrush is common and has the potential to increase. Density was estimated at just over 7,000 plants/acre in 1990, increasing to 8,480 by 1997. The rabbitbrush plants are small and some show use.

Although small, the serviceberry sprouts are vigorous. Conversely, the estimate for serviceberry is down significantly from the original density. Some of the change may be due to the much larger sample which gives a much more accurate estimate of its density. Sagebrush grows on similar, but physiologically drier slopes below the study site.

Initially the native grasses had a relatively high frequency. Now in 1997, three species have decreased significantly (bluebunch wheatgrass, muttongrass, and Sandberg bluegrass), while spike fescue has increased slightly. Overall the trend for perennial grasses is down with the sum of nested frequency down noticeably. As before, there is a large diversity of low-growing native forb species. Nineteen perennial species were identified in 1990. Tall forbs such as Indian paintbrush and hawksbeard, and the shorter mountain dandelion are often grazed by elk and deer. In mid-July and August. There is little evidence of utilization of the grasses on this exposure other than the use by grass hoppers in 1997.

1990 APPARENT TREND ASSESSMENT

The trend for soil appears stable with good protective cover from herbaceous species and litter. Trends appear stable for the limited browse on the site, but would not be considered critical for the site is too high to be considered a winter range for deer. The herbaceous understory is abundant and diverse.

1997 TREND ASSESSMENT

The trend for soil is slightly improved with percent bare soil decreasing to about 3%. Herbaceous cover continues to be high. With the much larger sample size, some of the shrubs have shown changes in density. This has been more reflective of the larger sample rather than any real changes in their respective densities. Browse trend is assessed as being stable. The herbaceous understory (perennial species) is slightly down for both the grasses and forbs. Bluebunch wheatgrass, muttongrass, and Sandberg bluegrass have all significantly decreased in nested frequency since 1990. The only grass that has increased is spike fescue which is more adapted to the higher elevation. However, it has not compensated for the losses to the other three species.

TREND ASSESSMENT

soil - up slightly (4)

browse - stable, but a minor component of the community (3)

herbaceous understory - down slightly (2)

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 19

| Type | Species | Nested Frequency | | Quadrat Frequency | | Average Cover % |
|-----------------------------|--------------------------|------------------|------------------|-------------------|-----|-----------------|
| | | '90 | '97 | '90 | '97 | |
| G | Agropyron spicatum | _b 185 | _a 153 | 72 | 63 | 3.24 |
| G | Bromus carinatus | 3 | - | 1 | - | - |
| G | Leucopoa kingii | 159 | 175 | 62 | 69 | 4.38 |
| G | Poa fendleriana | _b 170 | _a 88 | 65 | 35 | 2.47 |
| G | Poa secunda | _b 246 | _a 190 | 84 | 74 | 3.14 |
| Total for Annual Grasses | | 0 | 0 | 0 | 0 | 0 |
| Total for Perennial Grasses | | 763 | 606 | 284 | 241 | 13.25 |
| Total for Grasses | | 763 | 606 | 284 | 241 | 13.25 |
| F | Achillea millefolium | 83 | 55 | 32 | 27 | 1.47 |
| F | Agoseris glauca | _a 1 | _b 11 | 1 | 6 | .13 |
| F | Antennaria rosea | _b 273 | _a 195 | 93 | 71 | 9.00 |
| F | Arabis spp. | 11 | 15 | 4 | 8 | .04 |
| F | Arenaria fendleri | 284 | 265 | 92 | 91 | 8.05 |
| F | Astragalus convallarius | - | 2 | - | 1 | .03 |
| F | Aster spp. | 9 | 16 | 4 | 7 | .06 |
| F | Castilleja linariaefolia | 28 | 14 | 14 | 7 | .11 |
| F | Calochortus nuttallii | _a 22 | _b 99 | 10 | 51 | .28 |
| F | Chaenactis douglasii | 30 | 49 | 16 | 23 | .33 |
| F | Cirsium spp. | - | 15 | - | 7 | .20 |
| F | Comandra pallida | 19 | 22 | 9 | 11 | .25 |
| F | Collinsia parviflora (a) | - | 46 | - | 17 | .11 |
| F | Crepis acuminata | _b 141 | _a 34 | 61 | 18 | .09 |
| F | Draba spp. (a) | 2 | - | 1 | - | - |
| F | Eriogonum umbellatum | 10 | 11 | 5 | 6 | .22 |
| F | Geum spp. | 7 | - | 4 | - | - |

| Type | Species | Nested Frequency | | Quadrat Frequency | | Average Cover % |
|---------------------------|-------------------------|------------------|-----------------|-------------------|-----|-----------------|
| | | '90 | '97 | '90 | '97 | '97 |
| F | Lathyrus brachycalyx | _b 35 | _a 19 | 12 | 7 | 1.26 |
| F | Lactuca serriola | - | 3 | - | 1 | .00 |
| F | Lupinus argenteus | 17 | 25 | 7 | 14 | 1.12 |
| F | Polygonum douglasii (a) | - | 16 | - | 7 | .08 |
| F | Potentilla spp. | 8 | 10 | 3 | 5 | .12 |
| F | Senecio multilobatus | 1 | 8 | 1 | 5 | .05 |
| F | Unknown forb-perennial | 1 | - | 1 | - | - |
| Total for Annual Forbs | | 2 | 62 | 1 | 24 | 0.19 |
| Total for Perennial Forbs | | 980 | 868 | 369 | 366 | 22.86 |
| Total for Forbs | | 982 | 930 | 370 | 390 | 23.06 |

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

BROWSE TRENDS --

Herd unit 18 , Study no: 19

| Type | Species | Strip Frequency | Average Cover % |
|------------------|-------------------------------------------|-----------------|-----------------|
| | | '97 | '97 |
| B | Amelanchier alnifolia | 39 | 1.19 |
| B | Artemisia tridentata vaseyana | 3 | .00 |
| B | Cercocarpus ledifolius | 0 | .78 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 96 | 8.87 |
| B | Prunus virginiana | 2 | .15 |
| B | Quercus gambelii | 1 | - |
| B | Symphoricarpos oreophilus | 1 | - |
| Total for Browse | | 142 | 11.00 |

BASIC COVER --

Herd unit 18 , Study no: 19

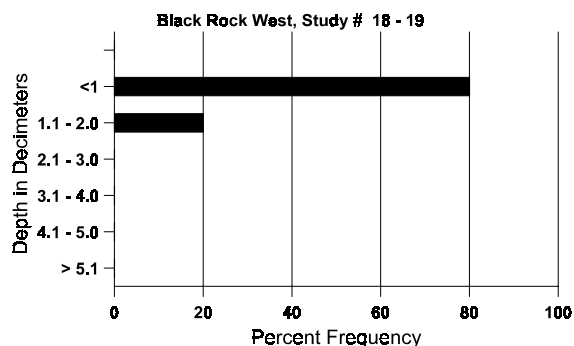
| Cover Type | Nested Frequency | Average Cover % | |
|-------------|------------------|-----------------|-------|
| | '97 | '90 | '97 |
| Vegetation | 354 | 27.75 | 48.52 |
| Rock | 286 | 22.75 | 14.85 |
| Pavement | 335 | 17.50 | 27.34 |
| Litter | 386 | 19.75 | 17.86 |
| Cryptogams | 29 | 1.25 | .16 |
| Bare Ground | 159 | 11.00 | 2.83 |

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 19, Black Rock West

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 9.1 | 50.0 (9.5) | 6.4 | 36.0 | 41.1 | 22.9 | 6.1 | 8.1 | 316.8 | .8 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 18 , Study no: 19

| Type | Quadrat Frequency | Pellet Transect | |
|--------|-------------------|------------------------|------------------------|
| | | Pellet Groups per Acre | Days Use per Acre (ha) |
| | '97 | '97 | '97 |
| Rabbit | 1 | - | - |
| Elk | 60 | 1096 | 84 (208) |
| Deer | 4 | - | - |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 19

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | | | | | | | |
|------------------------------------------------|----------------------------|---------------------|----|------------------|---|-------------------|--------------------------|----------------|-----|---|---|----|------|---|----|
| | | 1 | 2 | 3 | 4 | | | | | | | | | | |
| Amelanchier alnifolia | | | | | | | | | | | | | | | |
| S | 90 | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 1 | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 |
| Y | 90 | 44 | 35 | 8 | - | - | - | - | 86 | 1 | - | - | 2900 | | 87 |
| | 97 | 6 | 6 | - | - | - | - | - | 12 | - | - | - | 240 | | 12 |
| M | 90 | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - |
| | 97 | 1 | 46 | 17 | 2 | 1 | - | - | 66 | - | 1 | - | 1340 | 6 | 8 |
| D | 90 | 3 | 33 | 10 | 4 | - | - | - | 47 | 2 | - | 1 | 1666 | | 50 |
| | 97 | 9 | 4 | 2 | - | - | 2 | - | 1 | 1 | - | 15 | 340 | | 17 |
| X | 90 | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | 300 | | 15 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | | | |
| '90 | | 50% | | 13% | | .72% | | -58% | | | | | | | |
| '97 | | 59% | | 22% | | 17% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '90 | 4566 | Dec: | 36% | | | | | | |
| | | | | | | '97 | 1920 | | 18% | | | | | | |

| A Y G R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|--------------------------------------------------|----------------------------|---------------------|----|---|------------------|---|---|-------------------|---|-------------|----------------|-----|------|--------------------|--------------------------------|-----|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | | | | | | |
| S | 90 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 | |
| M | 90 | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 97 | 2 | 1 | - | - | - | - | - | - | - | - | 3 | 60 | 8 | 9 | 3 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '90 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '97 | | 33% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '90 | 0 | Dec: | - | | |
| | | | | | | | | | | | | '97 | 60 | | - | | |
| <i>Cercocarpus ledifolius</i> | | | | | | | | | | | | | | | | | |
| M | 90 | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | 0 | 28 | 101 | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '90 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '90 | 0 | Dec: | - | | |
| | | | | | | | | | | | | '97 | 0 | | - | | |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | | | | | | | | | | |
| S | 90 | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | - | 2 | 40 | | 2 | | |
| Y | 90 | 50 | 5 | - | 1 | - | - | - | - | - | - | 56 | 1866 | | 56 | | |
| | 97 | 43 | - | - | - | - | - | - | - | - | - | 43 | 860 | | 43 | | |
| M | 90 | 119 | 18 | - | 2 | - | - | - | - | - | - | 139 | 4633 | 7 | 10 | 139 | |
| | 97 | 370 | 2 | - | - | - | - | - | - | - | - | 372 | 7440 | 7 | 12 | 372 | |
| D | 90 | 6 | 10 | 1 | - | - | - | - | - | - | - | 16 | 566 | | 17 | | |
| | 97 | 9 | - | - | - | - | - | - | - | - | - | 7 | 180 | | 9 | | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '90 | | 16% | | | .47% | | | .47% | | | +17% | | | | | | |
| '97 | | .47% | | | 00% | | | .47% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '90 | 7065 | Dec: | 8% | | |
| | | | | | | | | | | | | '97 | 8480 | | 2% | | |
| <i>Prunus virginiana</i> | | | | | | | | | | | | | | | | | |
| Y | 90 | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | - | 2 | - | - | - | - | - | - | - | - | 2 | 40 | | 2 | | |
| M | 90 | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 97 | - | 9 | - | - | - | - | - | - | - | - | 9 | 180 | 24 | 14 | 9 | |
| X | 90 | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '90 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '97 | | 100% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '90 | 0 | Dec: | - | | |
| | | | | | | | | | | | | '97 | 220 | | - | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|---|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Quercus gambelii | | | | | | | | | | | | | | | | | | |
| M | 90 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 97 | 5 | - | - | - | - | - | - | - | - | - | - | - | 100 | 13 | 15 | 5 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '90 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '90 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '97 | 100 | | - | | | |
| Symphoricarpos oreophilus | | | | | | | | | | | | | | | | | | |
| M | 90 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | - | - | - | 20 | 15 | 49 | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '90 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '90 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |

Trend Study 18-21-97

Study site name: Black Rock Canyon .

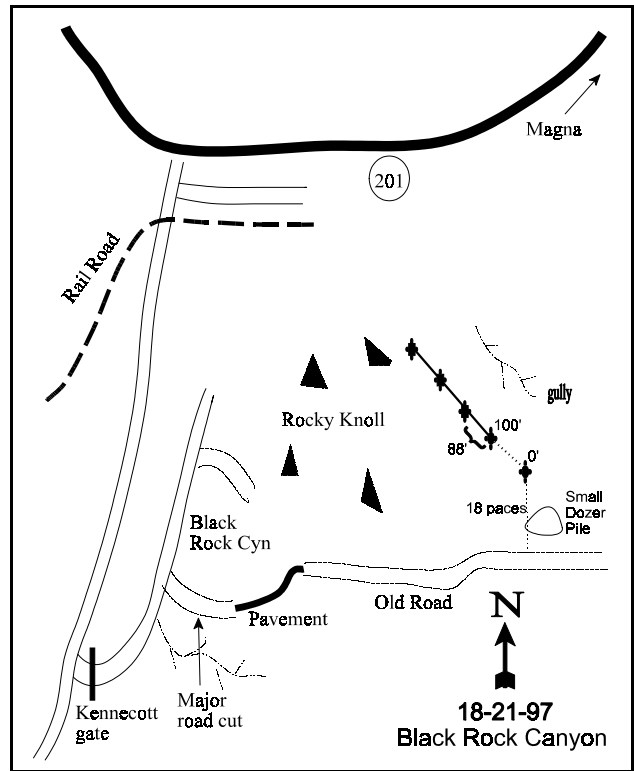
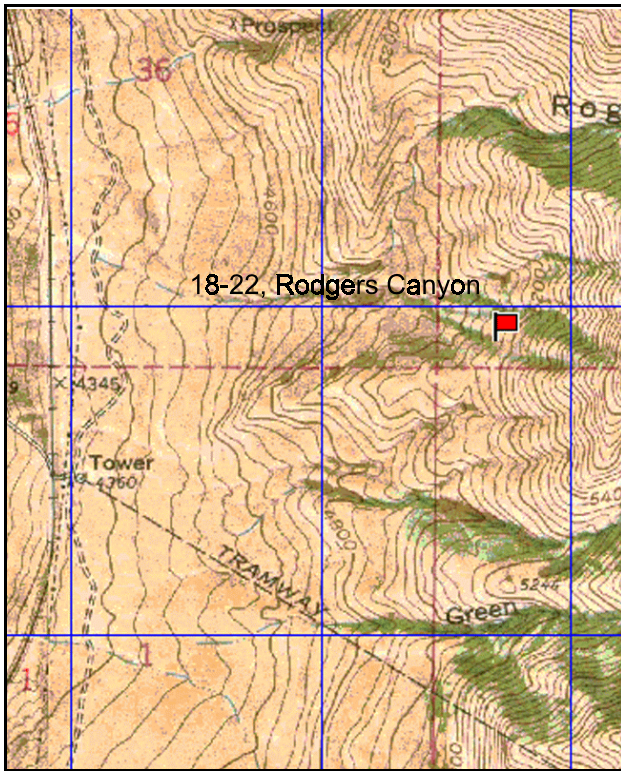
Vegetation type: Seeded .

Compass bearing: frequency baseline 304 degrees magnetic.

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

LOCATION DESCRIPTION

From the Kennecott road on the northwest side of the Oquirrh Mountains, drive south between the mountain and the railroad tracks to an intersection with a gated road just past Black Rock Canyon. Drive back up this road to the mouth of the canyon. Walk up into the canyon along an old road cut on the south side of the canyon. Follow the old road approximately 0.5 miles into the valley. The study site is on the north side of the road, in a seeded flat. The study is marked by 2½ foot tall fencepost stakes.



Map Name: Farnsworth Peak

Diagrammatic Sketch

Township 1S, Range 3W, Section 20

GPS: NAD 27, UTM 12S 4507414 N 397329 E

DISCUSSION

Black Rock Canyon - Trend Study No. 18-21

***SUSPENDED - This site was suspended in 2002. Text and tables from the 1997 report have been retained and are found below.

The Black Rock Canyon study is located in the lower portion of Black Rock Canyon. The site is on a 10% slope with a northwest aspect. The elevation of the site is about 4,800 feet. This was one of the first areas to be seeded in the 1970's, then in 1987 it was bulldozed, disked, and seeded with intermediate wheatgrass, Kentucky bluegrass, and sweetclover. Browse are scarce and currently contribute to only 4% of the total vegetative cover. The site is obviously not a deer winter range. The site is used heavily by elk. A pellet group transect read in 1997 indicated 125 elk use days/acre. There were no signs of deer. In addition, a large bachelor group of 27 mature bull elk were seen near the site during the 1997 reading (8/26).

The soils in the canyon are a gravelly-loam. Textural analysis shows it to be a loam with a neutral to slightly acidic pH (6.6). Effective rooting depth (see methods) is relatively shallow at only 7 inches. Soil temperature is quite high at 70°F at about 10 inches in depth. This high a temperature and relatively shallow effective rooting depth would be a limiting factor for perennial species establishment, especially with a winter annual like cheatgrass dominating the site and drying out the surface moisture so early in the spring.

The herbaceous species dominate this site as they contribute over 96% of the total vegetative cover. Shrubs are uncommon and consist of small numbers of rubber rabbitbrush and broom snakeweed. Species composition is similar between years. Alkali muhly, *Muhlenbergia asperifolia*, is the most common perennial native species. It currently contributes 29% of the grass cover. This species usually thrives in areas that are disturbed. Now as the disturbance (treatment) is becoming more distant in time, it is becoming less dominant. This is illustrated best with the inspection of the sum of nested frequency values which have decreased significantly from 167 down to 72. Cheatgrass is currently the most common grass with a cover value of nearly 8%. It accounts for over half (56%) of the grass cover. Annual grasses and forbs were not included in the 1990 reading so no comparisons can be made between years. Intermediate wheatgrass has significantly increased since 1990, yet it is still a minor component of this community as it only makes up 4% of the grass cover. Through time the intermediate wheatgrass should increase. As on the other low elevation sites in this area, undesirable forbs such as ragweed, curlycup gumweed, and dalmatian toadflax are common. In fact, together these forbs contribute to 92% of the forb cover. There is a low density of broom snakeweed and rubber rabbitbrush on the site. However, they only make up 4% of the total plant cover. Undesirable species have not be eliminated, but the seeding effort provides increased desirable forage production.

1990 APPARENT TREND ASSESSMENT

The trend for soil appears stable with good protective cover from herbaceous species even though most of it is from weedy species. The trend for browse appears stable, but at very insignificantly low numbers. Only broom snakeweed was sampled in 1990. The trend for the herbaceous understory should improve in time.

1997 TREND ASSESSMENT

Soil trend is stable with percent bare soil low at 4%. Furthermore, 96% of the vegetative cover is derived from herbaceous species which are more protective from soil losses during high intensity summer storms. The browse component on the site is insignificant, as it only contributes 4% of the total vegetative cover. Trend for browse is stable for white-stemmed rabbitbrush and broom snakeweed, but of no real importance because of its relatively low numbers. The trend for the herbaceous understory is more complicated, because the perennial portion of the grasses shows a decline. Intermediate wheatgrass has increased significantly, but it still only provides 4% of the grass cover. Whereas, alkali muhly has significantly decreased since the treatment. This would be expected because it is most often found on disturbed sites where it can become established and stay at relatively high numbers with continued disturbance. Cheatgrass is still the dominant grass which provides 56% of the grass cover. For the forbs, the overall trend for the perennial forbs is that

they have increased. However, three weedy increaser species, western ragweed, curlycup gumweed, and dalmatian toadflax contribute 92% of the total forb cover. Trend for the herbaceous understory is down because of the composition.

TREND ASSESSMENT

soil - stable (3)

browse - stable, but very low numbers (3)

herbaceous understory - down and poor composition (1)

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 21

| T y p e | Species | Nested Frequency | | Quadrat Frequency | | Average Cover % |
|-----------------------------|----------------------------|---------------------|------|----------------------|-----|-----------------------|
| | | '90 | '97 | '90 | '97 | '97 |
| G | Agropyron intermedium | a3 | b28 | 1 | 11 | .53 |
| G | Aristida purpurea | 6 | 13 | 3 | 8 | .94 |
| G | Bromus tectorum (a) | - | 321 | - | 94 | 7.83 |
| G | Leucopoa kingii | - | 3 | - | 1 | .03 |
| G | Muhlenbergia asperifolia | b167 | a72 | 55 | 26 | 4.03 |
| G | Poa pratensis | 16 | 25 | 6 | 9 | .55 |
| G | Sporobolus cryptandrus | a10 | b- | 6 | - | - |
| Total for Annual Grasses | | 0 | 321 | 0 | 94 | 7.83 |
| Total for Perennial Grasses | | 202 | 141 | 71 | 55 | 6.10 |
| Total for Grasses | | 202 | 462 | 71 | 149 | 13.94 |
| F | Ambrosia psilostachya | b217 | a147 | 81 | 59 | 6.53 |
| F | Aster spp. | 1 | - | 1 | - | - |
| F | Cardaria draba | a- | b34 | - | 14 | .55 |
| F | Carduus nutans (a) | b11 | a- | 6 | - | - |
| F | Comandra pallida | a2 | b22 | 1 | 8 | .14 |
| F | Cruciferae | 1 | - | 1 | - | - |
| F | Epilobium brachycarpum (a) | - | 39 | - | 20 | .33 |
| F | Grindelia squarrosa | b94 | a59 | 43 | 30 | 1.63 |
| F | Helianthus annuus (a) | a14 | b2 | 6 | 1 | .03 |
| F | Lactuca serriola | 23 | 9 | 12 | 5 | .22 |
| F | Linaria dalmatica | a6 | b221 | 4 | 82 | 10.39 |
| F | Melilotus alba | b22 | a- | 11 | - | - |
| F | Medicago sativa | 4 | 1 | 2 | 1 | .15 |
| F | Nicotiana attenuata (a) | 1 | - | 1 | - | .00 |
| F | Salsola pestifer (a) | 3 | - | 1 | - | - |
| F | Taraxacum officinale | - | 3 | - | 1 | .00 |
| F | Tragopogon dubius | b44 | a3 | 23 | 1 | .01 |
| F | Unknown forb-perennial | - | 2 | - | 1 | .15 |

| Type | Species | Nested Frequency | | Quadrat Frequency | | Average Cover % |
|---------------------------|---------|------------------|-----|-------------------|-----|-----------------|
| | | '90 | '97 | '90 | '97 | '97 |
| Total for Annual Forbs | | 29 | 41 | 14 | 21 | 0.37 |
| Total for Perennial Forbs | | 414 | 501 | 179 | 202 | 19.79 |
| Total for Forbs | | 443 | 542 | 193 | 223 | 20.16 |

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

BROWSE TRENDS --

Herd unit 18 , Study no: 21

| Type | Species | Strip Frequency | Average Cover % |
|------------------|-------------------------------------------|-----------------|-----------------|
| | | '97 | '97 |
| B | <i>Chrysothamnus nauseosus albicaulis</i> | 5 | 1.06 |
| B | <i>Gutierrezia sarothrae</i> | 1 | .18 |
| Total for Browse | | 6 | 1.24 |

BASIC COVER --

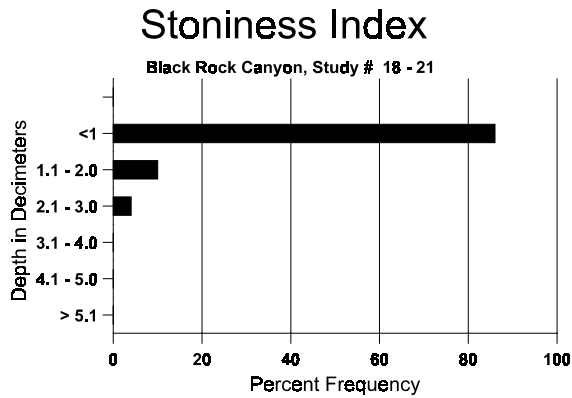
Herd unit 18 , Study no: 21

| Cover Type | Nested Frequency | Average Cover % | |
|-------------|------------------|-----------------|-------|
| | '97 | '90 | '97 |
| Vegetation | 282 | 5.00 | 32.95 |
| Rock | 152 | 10.00 | 5.53 |
| Pavement | 112 | 2.50 | 2.31 |
| Litter | 318 | 77.25 | 47.41 |
| Cryptogams | 22 | 0 | .24 |
| Bare Ground | 83 | 5.25 | 3.94 |

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 21, Black Rock Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %0M | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 7.1 | 69.8 (9.4) | 6.6 | 49.3 | 31.2 | 19.6 | 4.3 | 53.7 | 208.0 | .8 |



PELLET GROUP FREQUENCY --
Herd unit 18 , Study no: 21

| Type | Quadrat Frequency '97 |
|--------|-----------------------|
| Rabbit | 2 |
| Elk | 41 |

BROWSE CHARACTERISTICS --
Herd unit 18 , Study no: 21

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) | | Total | |
|------------------------------------------------|--------|----------------------------|---|---------------------|---|---|------------------|---|---|-------------------|-------------|-----|----------------|------|-----------------|------------------|----|-------|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | Ht. Cr. | | | |
| Chrysothamnus nauseosus albicaulis | | | | | | | | | | | | | | | | | | | |
| M | 90 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 97 | 5 | 1 | 1 | - | - | - | - | - | - | - | - | - | 7 | 140 | 26 | 42 | 7 | |
| | | % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| | | '90 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| | | '97 | | 14% | | | 14% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '90 | 0 | Dec: | - | | | | |
| | | | | | | | | | | | | '97 | 140 | | - | | | | |
| Gutierrezia sarothrae | | | | | | | | | | | | | | | | | | | |
| Y | 90 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 1 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 0 |
| M | 90 | 5 | - | - | - | - | - | - | - | - | - | - | - | 5 | 166 | 17 | 11 | 5 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | - | - | - | 2 | 40 | - | - | 2 | |
| | | % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| | | '90 | | 00% | | | 00% | | | 00% | | | -80% | | | | | | |
| | | '97 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '90 | 199 | Dec: | - | | | | |
| | | | | | | | | | | | | '97 | 40 | | - | | | | |

Trend Study 18-22-97

Study site name: Rodgers Canyon.

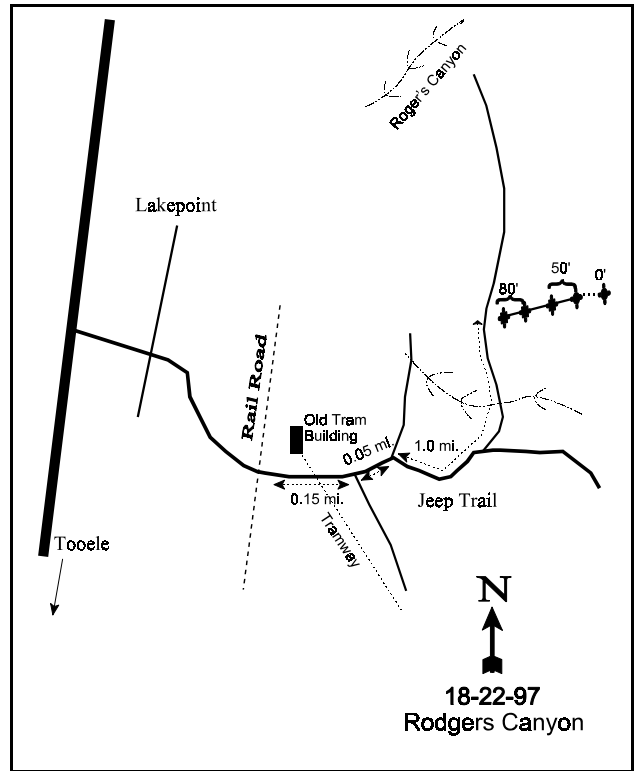
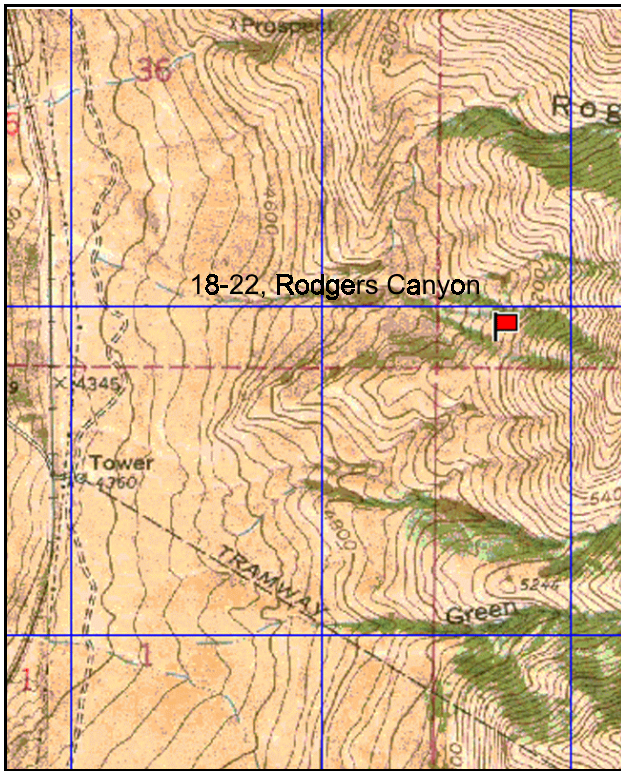
Vegetation type: Perennial Grass.

Compass bearing: frequency baseline 240 degrees magnetic.

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

LOCATION DESCRIPTION

Drive around the Oquirrh Mountains towards Tooele. Turn east towards Lake Point, the mountains, and the mouth of Rodgers Canyon. Continue past Lake Point and cross the railroad tracks. Follow the jeep trail up towards the mouth of a small canyon approximately 1.1 miles. Bear left across a steep wash and continue 100 yards then stop. The study is located on the hill to the east. The 0-foot baseline is marked by a 3 foot tall fencepost with a white top. The 400 ft. stake is about 8 feet from the side of the road.



Map Name: Farnsworth Peak

Diagrammatic Sketch

Township 2S Range 4W, Section 1

GPS: NAD 27, UTM 12S 4504261 N 395504 E

DISCUSSION

Rodgers Canyon - Trend Study No. 18-22

***SUSPENDED - This site was suspended in 2002 due to access problems. Text and tables from the 1997 report have been retained.

The Rodgers Canyon study is in lower Rodgers Canyon and is unique as it is an untreated area. This study samples a depleted and untreated site on the northwest side of the Oquirrh Mountains. The slope of the site varies from 40% near the top to only about 10% near the bottom of the transect. The elevation of the area is 4,800 feet with an aspect to the west-southwest. Wildlife use is limited, but the pellet-group transect shows use for elk at 34 elk days use/acre and deer use at about 5 deer days use/acre. The lack of any preferred browse would limit use by deer during the winter.

The soil is very rocky with a surface cover value currently at almost 30% with current erosion appearing to be less than in the past. Percent bare soil is now relatively low at 12%. Erosion is minimal, however some of the nearby gullies are partially stabilized, but they still show some signs of ongoing erosion. Effective soil depth is 11 inches with a relatively high soil temperature of 69°F at 14 inches. The high soil temperature would limit the establishment and development of cool season species through the hot summer because most of the surface soil moisture would have been utilized early in the year by the weedy winter annuals. This is too long of a period for seedlings to go without moisture until the late summer monsoonal rains. Soil textural analysis indicates a clay-loam soil with a neutral pH (7.0). Soil phosphorus is below 10ppm (8ppm) and could be a limiting factor to plant development on this site.

Broom snakeweed is very common with a density estimated at 6,533 plants/acre estimated in 1990. This population increased 84% to an incredible 39,620 plants/acre. That equates to nearly one plant every square foot. Strip frequency is 100%, indicating a widespread population over the whole site. There are no other shrubs found on the site.

Perennial grasses provide virtually the only dependable source of forage. Grasses make up 69% of the herbaceous understory cover. Although, 51% of the cover is contributed by weedy species (cheatgrass and bulbous bluegrass). Forb composition is dominated by increaser and invader species. About three-fourths of the forb cover comes from weeds. Without treatment, there does not appear to be much potential for significant production of desirable forage, especially in terms of browse for deer winter range.

1990 APPARENT TREND ASSESSMENT

The trend for soil is thought to be stable with relatively good cover values from herbaceous species. The browse trend would be down with only broom snakeweed on the site, and with mostly young plants, an increase would be expected in the future. Trend for the herbaceous understory is thought to be stable to slightly downward because of the high amounts of weeds in the composition.

1997 TREND ASSESSMENT

The trend for soil is slightly improved with a decrease in the amount of bare soil. The herbaceous understory makes up more than half of the vegetative cover. The trend for browse is down because it is made up totally of broom snakeweed which is of little use to wildlife. The population is now almost 40,000 plants/acre. The herbaceous understory trend is mixed with the perennial component of the grasses increasing, but this was mostly from increases in bulbous bluegrass, an increaser species. This increase is probably at the expense of bluebunch wheatgrass. The forbs have decreased, but three-fourths of the forb cover comes from weedy species. Trend for herbaceous understory overall is down.

TREND ASSESSMENT

soil - slightly improved (4)

browse - down, broom snakeweed is the only species on the site (1)

herbaceous understory - down, mostly composed of weedy species (1)

HERBACEOUS TRENDS --
Herd unit 18 , Study no: 22

| Type | Species | Nested Frequency | | Quadrat Frequency | | Average Cover % |
|-----------------------------|------------------------------------|------------------|------------------|-------------------|-----|-----------------|
| | | '90 | '97 | '90 | '97 | '97 |
| G | <i>Agropyron spicatum</i> | _b 132 | _a 83 | 53 | 33 | 3.23 |
| G | <i>Aristida purpurea</i> | 69 | 51 | 31 | 24 | 1.21 |
| G | <i>Bromus tectorum</i> (a) | - | 254 | - | 88 | 2.29 |
| G | <i>Muhlenbergia</i> spp. | - | 3 | - | 1 | .03 |
| G | <i>Poa bulbosa</i> | _a 50 | _b 134 | 19 | 44 | 4.30 |
| G | <i>Poa fendleriana</i> | - | 3 | - | 2 | .03 |
| G | <i>Poa secunda</i> | 13 | 70 | 6 | 26 | 1.83 |
| Total for Annual Grasses | | 0 | 254 | 0 | 88 | 2.29 |
| Total for Perennial Grasses | | 264 | 344 | 109 | 130 | 10.65 |
| Total for Grasses | | 264 | 598 | 109 | 218 | 12.96 |
| F | <i>Alyssum alyssoides</i> (a) | - | 52 | - | 19 | .19 |
| F | <i>Ambrosia psilostachya</i> | _b 149 | _a 88 | 64 | 41 | 1.39 |
| F | <i>Astragalus amphioxys</i> | - | 4 | - | 2 | .18 |
| F | <i>Asclepias asperula</i> | 1 | 3 | 1 | 1 | .18 |
| F | <i>Astragalus</i> spp. | _a 27 | _b - | 14 | - | - |
| F | <i>Astragalus utahensis</i> | _b 117 | _a 27 | 51 | 11 | .81 |
| F | <i>Calochortus nuttallii</i> | _a 8 | _b 23 | 5 | 12 | .06 |
| F | <i>Cirsium</i> spp. | _a 35 | _b 56 | 15 | 31 | 1.68 |
| F | <i>Cirsium undulatum</i> | _b 139 | _a - | 59 | - | - |
| F | <i>Collinsia parviflora</i> (a) | - | 5 | - | 2 | .01 |
| F | <i>Draba</i> spp. (a) | - | 1 | - | 1 | .00 |
| F | <i>Epilobium brachycarpum</i> (a) | - | 13 | - | 8 | .09 |
| F | <i>Erigeron</i> spp. | - | 2 | - | 1 | .00 |
| F | <i>Grindelia squarrosa</i> | _b 59 | _a 38 | 27 | 20 | .92 |
| F | <i>Helianthus annuus</i> (a) | 5 | 2 | 4 | 2 | .01 |
| F | <i>Lactuca serriola</i> | 2 | 6 | 1 | 3 | .04 |
| F | <i>Linaria dalmatica</i> | - | 1 | - | 1 | .00 |
| F | <i>Lithospermum</i> spp. | _b 29 | _a 3 | 14 | 1 | .03 |
| F | <i>Oenothera</i> spp. | 11 | 16 | 9 | 8 | .11 |
| F | <i>Phlox longifolia</i> | 5 | 2 | 3 | 1 | .00 |
| F | <i>Ranunculus testiculatus</i> (a) | - | 3 | - | 1 | .03 |
| F | <i>Tragopogon dubius</i> | 24 | 18 | 12 | 10 | .10 |
| F | <i>Zigadenus paniculatus</i> | 3 | 1 | 3 | 1 | .00 |
| Total for Annual Forbs | | 5 | 76 | 4 | 33 | 0.34 |
| Total for Perennial Forbs | | 609 | 288 | 278 | 144 | 5.55 |
| Total for Forbs | | 614 | 364 | 282 | 177 | 5.89 |

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

BROWSE TRENDS --
Herd unit 18 , Study no: 22

| Type | Species | Strip Frequency '97 | Average Cover % '97 |
|------------------|-----------------------|---------------------|---------------------|
| B | Gutierrezia sarothrae | 100 | 16.20 |
| Total for Browse | | 100 | 16.20 |

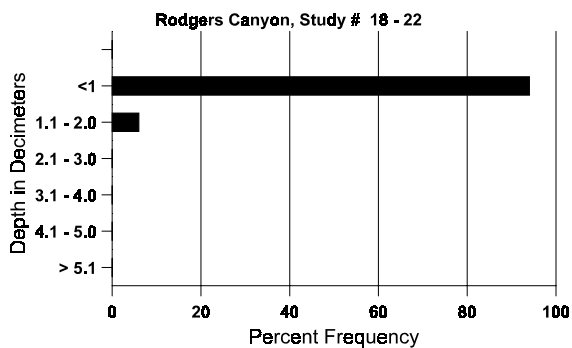
BASIC COVER --
Herd unit 18 , Study no: 22

| Cover Type | Nested Frequency '97 | Average Cover % | |
|-------------|----------------------|-----------------|-------|
| | | '90 | '97 |
| Vegetation | 333 | 8.75 | 32.81 |
| Rock | 262 | 21.25 | 14.00 |
| Pavement | 305 | 14.75 | 15.04 |
| Litter | 389 | 33.50 | 36.31 |
| Cryptogams | 47 | .25 | .58 |
| Bare Ground | 225 | 21.50 | 11.62 |

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 22, Rodgers Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 11.3 | 69.0 (14.1) | 7.0 | 40.0 | 32.1 | 27.9 | 2.3 | 8.0 | 144.0 | 2.3 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 18 , Study no: 22

| Type | Quadrat Frequency '97 |
|------|-----------------------|
| Elk | 4 |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 22

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-------|------|--------------------|--------------------------------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | |
| Gutierrezia sarothrae | | | | | | | | | | | | | | | | | |
| S | 90 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | 80 | | 4 |
| Y | 90 | 56 | - | - | 1 | - | - | - | - | - | - | - | - | 57 | - | - | 57 |
| | 97 | 385 | - | - | 15 | - | - | - | - | - | - | - | - | 387 | - | 13 | 400 |
| M | 90 | 32 | - | - | - | - | - | - | - | - | - | - | - | 32 | - | - | 32 |
| | 97 | 1473 | - | - | 6 | - | - | - | - | - | - | - | - | 1479 | - | - | 1479 |
| D | 90 | 8 | - | 1 | - | - | - | - | - | - | - | - | - | 5 | - | 4 | 9 |
| | 97 | 102 | - | - | - | - | - | - | - | - | - | - | - | 57 | - | 45 | 102 |
| X | 90 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 19 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '90 | | 00% | | | 01% | | | 04% | | | +84% | | | | | | |
| '97 | | 00% | | | 00% | | | 03% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '90 | 6533 | Dec: | 9% | | |
| | | | | | | | | | | | | '97 | 39620 | | 5% | | |

Trend Study 18-28-97

Study site name: Condie Meadows.

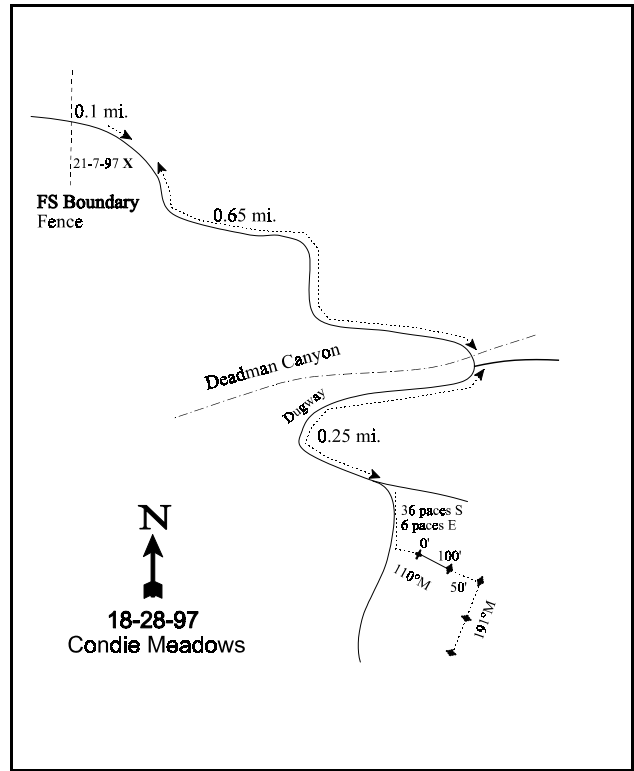
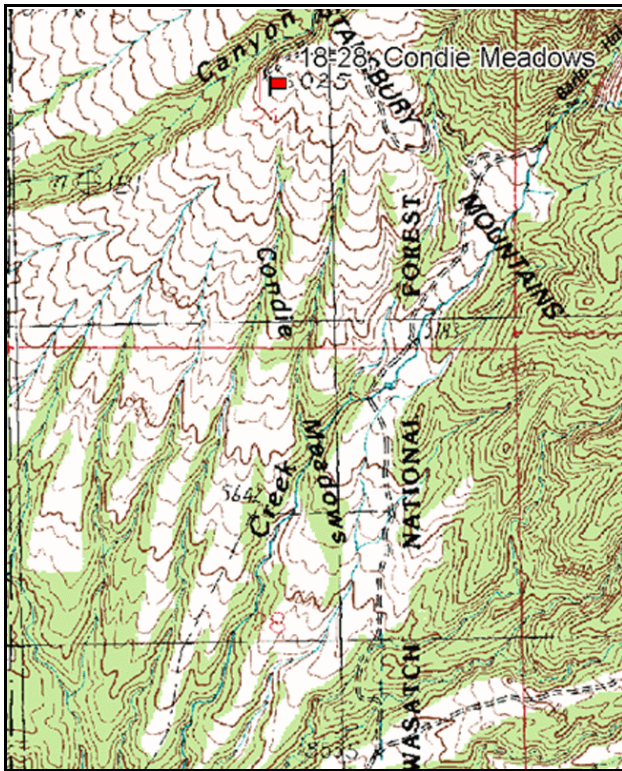
Vegetation type: Perennial Grass.

Compass bearing: frequency baseline 110 degrees magnetic (Lines 3 & 4 @ 191°M).

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

LOCATION DESCRIPTION

Although this study is easily accessed from the Johnson Pass road (U-199) to the south, directions are given from the nearby study 18-29. From that site in the chaining, continue southerly on the main road for 0.55 miles to a sharp bend in the bottom of Deadman Canyon. Go up the dugway out of the canyon for 0.25 miles to intersection in the burned area on top. From the intersection, the 0-foot baseline stake is 36 paces south down the road, then 6 paces east. The baseline stake is marked by browse tag #3906.



Map Name: Terra

Diagrammatic Sketch

Township 5S, Range 7W, Section 21

GPS: NAD 27, UTM 12S 4469705 N 360816 E

DISCUSSION

Condie Meadows - Trend Study No. 18-28

***SUSPENDED - This site was suspended in 2002. Text and tables from the 1997 report have been retained and are found below.

This study is located near the upper end of Condie Meadows. It is a large burned and seeded area lying between Deadman Canyon and Barlow Creek. The study is near the upper limit of the winter range at approximately 6,000 feet elevation. It has a gentle slope (7%) and a south-southwest facing aspect. Native and seeded perennial grasses, along with cheatgrass, comprise the dominant vegetative cover. Deer use is light because of a lack of browse forage. Initially cattle were present in large numbers and had utilized the grasses to a moderate degree. Currently use by livestock is light.

Soil is medium fine in texture and only slightly rocky. Soil textural analysis indicates a sandy clay loam with a neutral pH (6.7). The area appears to be an alluvial bench where soil depth is relatively deep but unconsolidated. Effective rooting depth is 12 inches with a soil temperature of 68° F at 15 inches. This relatively high temperature through the summer would be advantageous to cheatgrass's continued influence of the site. The fire that occurred shortly before 1983 was apparently hot enough to consume much of the soil organic matter. However, this is not a problem because the moderately dense grass cover has rapidly replenished organic content. Erosion is minimal and will continue to be so as the site develops through time.

Browse forage was initially in short supply. Originally, the site supported a mixed stand of juniper, pinyon, Stansbury cliffrose and mountain big sagebrush. However, the fire effectively eliminated all shrub and tree species. Isolated individuals of cliffrose, mountain big sagebrush, white-stemmed rubber rabbitbrush, antelope bitterbrush, and some transplanted seedlings of fourwing saltbush comprised the available browse composition in 1983. Overall density and production was low and although some slow increase can be expected, the area will probably continue to be a poor producer of browse forage unless a concerted effort to interseed or transplant shrubs is undertaken. The fourwing saltbush seedlings were originally transplanted with a transplanter. Although, establishment has been poor to fair and the surviving plants are closely hedged and some in poor vigor. Cliffrose, big sagebrush, and bitterbrush are probably better suited for this site than fourwing saltbush. Currently it appears that the white-stemmed rabbitbrush have increased significantly and show mostly light use. An important invader and increaser shrub to this site is broom snakeweed. Currently it is the most abundant species and continues to show increase, but white-stemmed rabbitbrush still produces most of the browse cover. Yet, all the browse cover together only makes up 8% of the total vegetative cover.

Seeded and native perennial grasses currently dominate the site by producing 55% of the grass cover, but cheatgrass by itself contributes the remaining grass cover (45%). Composition is mostly made up of two seeded species, crested and intermediate wheatgrass, which have sustained the heaviest grazing use in the past. There are five other native species that are perhaps more numerous but apparently are less preferred. Cheatgrass brome was very common in 1983, but was thought it would rapidly be suppressed by perennial grasses. This did not occur because of the extended drought which has allowed it to successfully compete with the perennial species.

Forbs occur infrequently and consist of only a few species. These include: yellow salsify, rose pussytoes and sego lily, none of which are commonly seeded. Currently the forbs only make up 8% of the total herbaceous cover. Surprisingly, no evidence of alfalfa was found. It is a valuable rangeland forb often included in seed mixtures.

1983 APPARENT TREND ASSESSMENT

Soil trend appears to be improving. The dense grass cover has effectively stabilized the site. Litter accumulation, vegetative cover, and soil organic content are continuing to build up. Vegetative trend also appears to be improving but more slowly than soil trend parameters. In fact, too slowly to provide satisfactory deer wintering habitat within a reasonable period. The most negative factor is the apparent increase of broom snakeweed. Transplanting and/or interseeding of desirable browse species is strongly recommended.

1989 TREND ASSESSMENT

Seeded and native perennial grasses still dominate this old burn in upper Condie Meadows. Production of browse forage continues to be very low. Crested wheatgrass has increased to be the most abundant grass on the frequency lines. Bluebunch and intermediate wheatgrass are also very abundant. The small natives, bottlebrush squirreltail and Sandberg bluegrass, show slight declines. Overall, the frequency of grass occurrence is the same between years. Only one individual forb, salsify, was encountered on the study. The only browse species encountered on the frequency lines was broom snakeweed, with an unchanged frequency. Snakeweed still makes up 97% of the browse composition, but decreased to less than 1,000 plants/acre. One rabbitbrush was counted on the density plots. The seeded four-wing saltbush seems to have been completely eliminated from the site. The few bitterbrush in the meadow are lightly used. Along the edges of the burn, there are some mountain big sagebrush, cliffrose, and juniper. The cover data detected a moderate reduction in the amount of bare soil to 28%. There was more vegetative cover, but also more rock and pavement in 1989. With the uniform and dense grass cover, there is very little erosion. The soil trend is stable. Shrubs have not responded or cannot compete with the dense grass cover on this old burn. There is virtually no sign of big game use. Any improvements as far as deer winter range is concerned will be very slow to occur. Shrub seed sources are far removed and seedling establishment would be hindered by the dense grass cover. The 1983 trend study report suggested direct intervention by transplanting or interseeding shrubs. Although, continued moderate to heavy cattle spring grazing should eventually have the same effect. Since the area is at the upper elevational limit for deer winter range, the composition could be considered a valuable transitional and spring forage source.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

1997 TREND ASSESSMENT

The trend for soil has continued to improve with percent bare soil decreasing to 13% and the proportion of cover contributed by herbaceous species is still very high at 92%. The trend for browse is not of importance to this site because of such low numbers, but it has improved slightly. However, the density of white-stemmed rabbitbrush has increased to 540 plants/acre while showing light use. Broom snakeweed has also increased, but is now second to white-stemmed rabbitbrush in total cover and its percent mature age-class has increased to over 70%, indicating a future downward trend for this short-lived species. The herbaceous understory is showing a slightly downward trend for the perennial species with significant losses for both crested wheatgrass and bluebunch wheatgrass.

TREND ASSESSMENT

soil - slightly improved (4)

browse - slightly improved (4)

herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --
Herd unit 18 , Study no: 28

| T y p e | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|-----------------------------|------------------------|------------------|------------------|------------------|-------------------|-----|-----|--------------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | '97 |
| G | Agropyron cristatum | _a 19 | _b 193 | _a 7 | 8 | 60 | 4 | .13 |
| G | Agropyron intermedium | _b 158 | _a 52 | _b 166 | 53 | 21 | 56 | 8.59 |
| G | Agropyron spicatum | _b 165 | _b 131 | _a 72 | 66 | 49 | 25 | 3.90 |
| G | Aristida purpurea | - | - | 2 | - | - | 1 | .18 |
| G | Bromus tectorum (a) | - | - | 263 | - | - | 80 | 11.25 |
| G | Oryzopsis hymenoides | 12 | 18 | 7 | 6 | 9 | 5 | .43 |
| G | Poa secunda | 6 | 9 | 6 | 4 | 5 | 3 | .19 |
| G | Sitanion hystrix | _b 46 | _a 19 | _a 10 | 25 | 11 | 8 | .34 |
| G | Stipa columbiana | - | - | 2 | - | - | 1 | .15 |
| G | Stipa comata | - | - | 4 | - | - | 2 | .01 |
| Total for Annual Grasses | | 0 | 0 | 263 | 0 | 0 | 80 | 11.25 |
| Total for Perennial Grasses | | 406 | 422 | 276 | 162 | 155 | 105 | 13.94 |
| Total for Grasses | | 406 | 422 | 539 | 162 | 155 | 185 | 25.20 |
| F | Agoseris glauca | - | - | 4 | - | - | 2 | .01 |
| F | Alyssum alyssoides (a) | - | - | 292 | - | - | 87 | 1.45 |
| F | Antennaria rosea | 2 | - | - | 1 | - | - | - |
| F | Argemone spp. | _a - | _a - | _b 7 | - | - | 5 | .16 |
| F | Astragalus spp. | - | - | 2 | - | - | 1 | .03 |
| F | Calochortus nuttallii | _b 9 | _a - | _b 11 | 5 | - | 6 | .03 |
| F | Helianthus annuus (a) | - | - | 2 | - | - | 2 | .01 |
| F | Lactuca serriola | _a - | _a - | _b 8 | - | - | 4 | .22 |
| F | Salsola iberica (a) | - | - | 2 | - | - | 1 | .00 |
| F | Taraxacum officinale | - | - | 3 | - | - | 1 | .00 |
| F | Tragopogon dubius | _b 14 | _a 1 | _b 24 | 9 | 1 | 14 | .21 |
| Total for Annual Forbs | | 0 | 0 | 296 | 0 | 0 | 90 | 1.47 |
| Total for Perennial Forbs | | 25 | 1 | 59 | 15 | 1 | 33 | 0.67 |
| Total for Forbs | | 25 | 1 | 355 | 15 | 1 | 123 | 2.15 |

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

BROWSE TRENDS --

Herd unit 18 , Study no: 28

| Type | Species | Strip Frequency | Average Cover % |
|------------------|------------------------------------|-----------------|-----------------|
| | | '97 | '97 |
| B | Chrysothamnus nauseosus albicaulis | 14 | 1.19 |
| B | Gutierrezia sarothrae | 62 | 1.14 |
| Total for Browse | | 76 | 2.33 |

BASIC COVER --

Herd unit 18 , Study no: 28

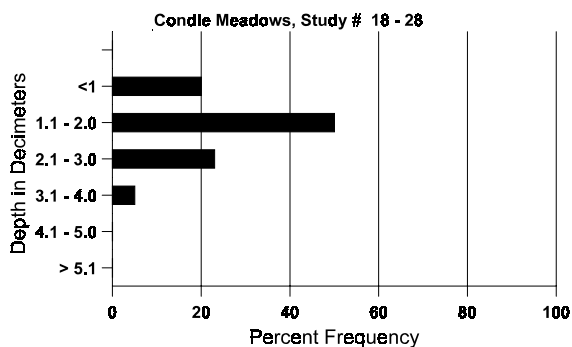
| Cover Type | Nested Frequency | Average Cover % | | |
|-------------|------------------|-----------------|-------|-------|
| | '97 | '83 | '89 | '97 |
| Vegetation | 372 | 1.25 | 6.00 | 32.70 |
| Rock | 139 | 1.00 | 6.00 | 1.74 |
| Pavement | 216 | 1.75 | 5.75 | 3.73 |
| Litter | 391 | 55.50 | 54.25 | 53.20 |
| Cryptogams | 13 | 0 | 0 | .05 |
| Bare Ground | 233 | 40.50 | 28.00 | 13.29 |

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 28, Condie Meadows

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 11.7 | 65.8 (15.2) | 7.7 | 66.4 | 11.4 | 22.2 | 2.4 | 6.3 | 176.0 | .5 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 18 , Study no: 28

| Type | Quadrat Frequency |
|--------|-------------------|
| | '97 |
| Rabbit | 31 |
| Deer | 20 |
| Cattle | 2 |

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 28

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | |
|--------------------------------------------------|----------------------------|---------------------|------------------|-------------------|----------------|--------------------|--------------------------------|------|-------|-------|----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | |
| <i>Chrysothamnus nauseosus albicaulis</i> | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | 0 | 0 | |
| | 89 | - | - | - | - | - | - | - | 0 | 0 | |
| | 97 | 3 | - | - | - | - | - | - | 60 | 3 | |
| Y | 83 | - | - | - | - | - | - | - | 0 | 0 | |
| | 89 | - | - | - | - | - | - | - | 0 | 0 | |
| | 97 | 5 | 1 | 1 | - | - | - | - | 140 | 7 | |
| M | 83 | 2 | - | - | - | - | - | - | 66 | 19 30 | 2 |
| | 89 | 1 | - | - | - | - | - | - | 33 | 28 32 | 1 |
| | 97 | 19 | - | - | - | - | - | - | 380 | 25 37 | 19 |
| D | 83 | - | - | - | - | - | - | - | 0 | 0 | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | 0 | 0 |
| | 97 | 1 | - | - | - | - | - | - | 20 | 1 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | <u>Heavy Use</u> | <u>Poor Vigor</u> | <u>%Change</u> | | | | | | |
| '83 | | 00% | 00% | 00% | -50% | | | | | | |
| '89 | | 00% | 00% | 00% | +94% | | | | | | |
| '97 | | 04% | 04% | 04% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 66 | Dec: | 0% | | |
| | | | | | | '89 | 33 | | 0% | | |
| | | | | | | '97 | 540 | | 4% | | |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | 0 | - - | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | - - | 0 |
| | 97 | - | - | - | - | - | - | - | 0 | 18 31 | 0 |
| % Plants Showing | | <u>Moderate Use</u> | <u>Heavy Use</u> | <u>Poor Vigor</u> | <u>%Change</u> | | | | | | |
| '83 | | 00% | 00% | 00% | | | | | | | |
| '89 | | 00% | 00% | 00% | | | | | | | |
| '97 | | 00% | 00% | 00% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 0 | Dec: | - | | |
| | | | | | | '89 | 0 | | - | | |
| | | | | | | '97 | 0 | | - | | |
| <i>Cowania mexicana stansburiana</i> | | | | | | | | | | | |
| M | 83 | - | - | 2 | - | - | - | - | 66 | 25 22 | 2 |
| | 89 | - | - | - | - | - | - | - | 0 | - - | 0 |
| | 97 | - | - | - | - | - | - | - | 0 | - - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | <u>Heavy Use</u> | <u>Poor Vigor</u> | <u>%Change</u> | | | | | | |
| '83 | | 00% | 100% | 00% | | | | | | | |
| '89 | | 00% | 00% | 00% | | | | | | | |
| '97 | | 00% | 00% | 00% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 66 | Dec: | - | | |
| | | | | | | '89 | 0 | | - | | |
| | | | | | | '97 | 0 | | - | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Gutierrezia sarothrae | | | | | | | | | | | | | | | | | | |
| S | 83 | 35 | - | - | - | - | - | - | - | - | 35 | - | - | - | 1166 | | 35 | |
| | 89 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | 43 | - | - | - | - | - | - | - | - | 43 | - | - | - | 1433 | | 43 | |
| | 89 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | 66 | | 2 | | |
| | 97 | 18 | - | - | - | - | - | - | - | - | 17 | - | - | 360 | | 18 | | |
| M | 83 | 11 | - | - | - | - | - | - | - | - | 11 | - | - | 366 | 6 | 7 | 11 | |
| | 89 | 15 | - | - | - | - | - | - | - | - | 5 | - | 7 | 500 | 8 | 11 | 15 | |
| | 97 | 117 | 6 | 1 | 8 | - | - | - | - | - | 132 | - | - | 2700 | 9 | 14 | 135 | |
| D | 83 | 1 | - | - | - | - | - | - | - | - | - | - | - | 33 | | 1 | | |
| | 89 | 13 | - | - | - | - | - | - | - | - | 4 | 1 | 3 | 433 | | 13 | | |
| | 97 | 30 | 1 | - | - | - | - | - | - | - | 11 | - | - | 620 | | 31 | | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 1160 | | 58 | | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 02% | | | -45% | | | | | | | |
| '89 | | 00% | | | 00% | | | 67% | | | +73% | | | | | | | |
| '97 | | 04% | | | .54% | | | 11% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 1832 | Dec: | 2% | | | |
| | | | | | | | | | | | | '89 | 999 | | 43% | | | |
| | | | | | | | | | | | | '97 | 3680 | | 17% | | | |

Trend Study 18-33-97

Study site name: Clover Creek .

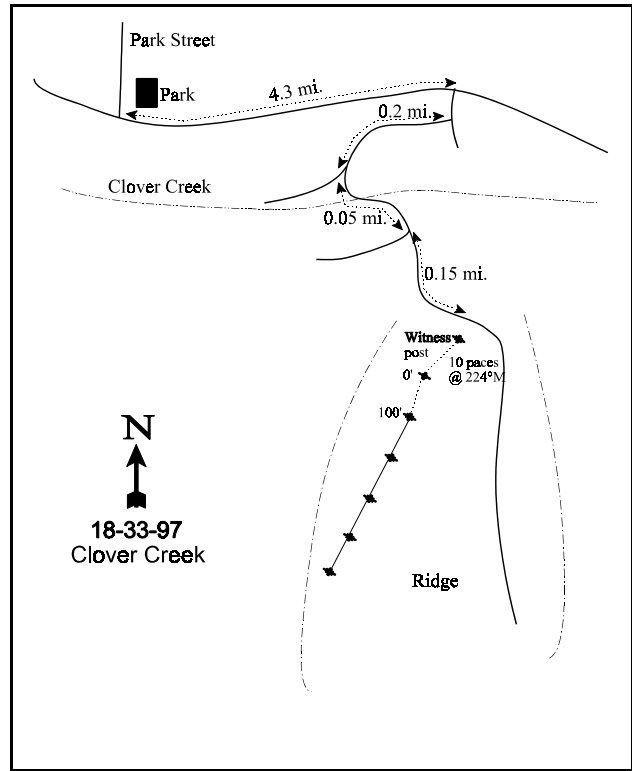
Vegetation type: Chained, seeded P-J .

Compass bearing: frequency belt 211 degrees magnetic (Line 2-5 @ 218°M).

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

LOCATION DESCRIPTION

From the park across from the fire department (Park Street) in Clover, drive west 4.3 miles to a dirt road on the right. This road forks almost immediately, take the left fork for 0.2 miles to another fork. Take the left fork and drive 0.05 miles to another fork. Stay on the main road (left) for 0.15 miles to a witness post on the right. From the witness post walk 10 paces at 224°M to the 0-foot stake. The study is marked with green, steel fenceposts 12-18 inches in height.



Map name: Johnson Pass

Diagrammatic Sketch

Township 6W, Range 5S, Section 32

GPS: NAD 27, UTM 12S 4466360 N 369321 E

DISCUSSION

Clover Creek - Trend Study No. 18-33

***SUSPENDED - This site was suspended in 2002 and will be reevaluated in 2007. The site was established to monitor a burn treatment which has not yet taken place. Text and tables from the 1997 report have been retained and are found below.

The Cover Creek study is a new site which is located on an old chaining just south of Clover Creek. This study was initiated by the habitat manager of the Central Region as it is a site that is to be burned and seeded in the near future. Pretreatment data is wanted so that the effectiveness of the treatment and how it effects community structure and diversity can be determine through time. The site has a north-northwest aspect with a slope from 5-10% and an elevation of 5,700 feet. Deer use is light as determined by a pellet group transect at 4 deer days use/acre. Cow use was higher at 10 cow days use/acre.

Soil is a clay-loam with an effective rooting depth of 13 inches with a soil temperature of 54° F at 13 inches. Percent bare soil is moderate for this type of site at 15%. It is fairly rocky on the surface with a rock-pavement cover of 21%. There is not very much litter cover on this site at only 34%. Herbaceous cover is spotty, leaving many spots of bare soil. Erosion on the site is light to moderate.

The site will eventually become dominated by juniper again. The point-quarter method estimated the density of juniper to be 241 trees/acre. The trees are now only 6-9 feet in height. Canopy cover is only a little over 5% at this time, but with time they will grow much larger and will eventually have canopy cover values over 30% when it will totally suppress the understory species as they have done on the East Hickman Canyon site. The key browse on this site are primarily snowberry, bitterbrush, and mountain big sagebrush. Together they make up 38% of the browse cover. The density of mountain big sagebrush are very low at only about 60 plants/acre. Age structure for this population is good, except most use is classified as heavy with one-third classified with poor vigor. However, the ratio of dead to live plants is not good (1:3). When seen in the right perspective, as it only makes up 3% of the browse cover, it is not that critical to this site as snowberry and bitterbrush are the primary utilized browse species. Most browse on the site are scattered throughout the site in relatively low numbers and in good vigor.

The herbaceous understory is in fairly good condition with 89% of the cover contributed by perennial grasses where bluebunch wheatgrass is dominant. It alone makes up 75% of the grass cover. Kentucky bluegrass and Indian ricegrass make up the majority of the remaining grass cover. There are 29 forb species, yet all together they only total to 2% cover. Forbs are generally scattered throughout the site in relatively low numbers.

1997 APPARENT TREND ASSESSMENT

The soil appears stable. Vegetation and litter cover are abundant and adequate to protect against most erosion. Trend for browse appears to be in a state of decline because of the high density of young juniper trees which will become much larger in a relatively short time. Competition with the juniper is already causing some losses to the understory browse species. The herbaceous understory appears more stable at this time, but this to will change soon, especially if there is severe drought. However, the downward changes in trend will not occur as soon to the herbaceous species as the browse species. The proposed burn and seeding treatment should help improve community structure and species diversity immensely.

HERBACEOUS TRENDS --
Herd unit 18 , Study no: 33

| T y p e | Species | Nested Frequency | Quadrat Frequency | Average Cover % |
|-----------------------------|--------------------------|---------------------|----------------------|--------------------|
| | | '97 | '97 | '97 |
| G | Agropyron spicatum | 284 | 75 | 12.40 |
| G | Bromus tectorum (a) | 17 | 6 | .03 |
| G | Oryzopsis hymenoides | 55 | 23 | 1.24 |
| G | Poa fendleriana | 27 | 9 | .14 |
| G | Poa pratensis | 67 | 21 | 2.04 |
| G | Poa secunda | 56 | 29 | .54 |
| G | Sitanion hystrix | 20 | 9 | .12 |
| Total for Annual Grasses | | 17 | 6 | 0.03 |
| Total for Perennial Grasses | | 509 | 166 | 16.50 |
| Total for Grasses | | 526 | 172 | 16.53 |
| F | Agoseris glauca | 1 | 1 | .00 |
| F | Alyssum alyssoides (a) | 34 | 15 | .07 |
| F | Allium spp. | 8 | 3 | .04 |
| F | Antennaria rosea | 2 | 1 | .00 |
| F | Arabis spp. | 8 | 4 | .02 |
| F | Astragalus beckwithii | 15 | 5 | .07 |
| F | Astragalus convallarius | 5 | 2 | .03 |
| F | Astragalus humistratus | 6 | 3 | .01 |
| F | Cirsium spp. | 5 | 2 | .18 |
| F | Comandra pallida | 31 | 12 | .26 |
| F | Collinsia parviflora (a) | 26 | 11 | .05 |
| F | Crepis acuminata | 15 | 7 | .30 |
| F | Erigeron spp. | 6 | 4 | .07 |
| F | Eriogonum racemosum | 2 | 1 | .03 |
| F | Hackelia patens | 5 | 2 | .01 |
| F | Hedysarum boreale | 1 | 1 | .03 |
| F | Holosteum umbellatum (a) | 3 | 1 | .00 |
| F | Lathyrus brachycalyx | 7 | 3 | .21 |
| F | Lappula occidentalis (a) | - | - | .00 |
| F | Lesquerella spp. | 11 | 4 | .04 |
| F | Machaeranthera canescens | 29 | 10 | .15 |
| F | Penstemon spp. | 5 | 3 | .06 |
| F | Petradoria pumila | 12 | 4 | .13 |
| F | Phlox hoodii | 2 | 1 | .00 |
| F | Phlox longifolia | 19 | 7 | .06 |
| F | Senecio multilobatus | 9 | 7 | .11 |
| F | Veronica biloba (a) | 16 | 8 | .04 |

| T y p e | Species | Nested Frequency | Quadrat Frequency | Average Cover % |
|---------------------------|-----------------------|---------------------|----------------------|--------------------|
| | | '97 | '97 | '97 |
| F | Zigadenus paniculatus | - | - | .00 |
| Total for Annual Forbs | | 79 | 35 | 0.18 |
| Total for Perennial Forbs | | 204 | 87 | 1.88 |
| Total for Forbs | | 283 | 122 | 2.06 |

BROWSE TRENDS --

Herd unit 18 , Study no: 33

| T y p e | Species | Strip Frequency | Average Cover % |
|------------------|----------------------------------------------|--------------------|--------------------|
| | | '97 | '97 |
| B | Artemisia tridentata vaseyana | 2 | .15 |
| B | Chrysothamnus nauseosus albicaulis | 18 | .59 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 12 | 1.12 |
| B | Eriogonum microthecum | 1 | - |
| B | Gutierrezia sarothrae | 50 | 1.20 |
| B | Juniperus osteosperma | 22 | - |
| B | Purshia tridentata | 2 | .18 |
| B | Symphoricarpos oreophilus | 23 | 1.48 |
| B | Tetradymia canescens | 0 | .00 |
| Total for Browse | | 130 | 4.73 |

BASIC COVER --

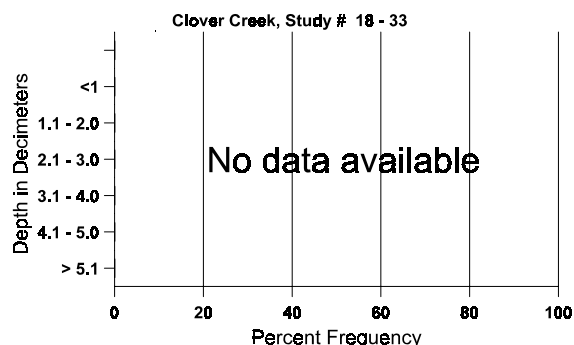
Herd unit 18 , Study no: 33

| Cover Type | Nested Frequency | Average Cover % |
|-------------|---------------------|--------------------|
| | '97 | '97 |
| Vegetation | 395 | 32.68 |
| Rock | 259 | 7.53 |
| Pavement | 351 | 13.54 |
| Litter | 484 | 33.92 |
| Cryptogams | 148 | 2.33 |
| Bare Ground | 300 | 14.50 |

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 33, Clover Creek

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %0M | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 13.4 | 53.6 (13.3) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 18 , Study no: 33

| Type | Quadrat Frequency '97 |
|--------|-----------------------|
| Rabbit | 13 |
| Deer | 2 |

BROWSE CHARACTERISTICS --
Herd unit 18 , Study no: 33

| A Y G R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | |
|------------------------------------------------|----------------------------|-------------------------|---|---|----------------------|---|---|-----------------------|---|-------------|----------------|---|-----|-----------------|--------------------------|-------|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | | | | | | |
| Y | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 |
| M | 97 | - | - | 1 | - | - | - | - | - | - | 1 | - | - | - | 20 | - | 1 |
| D | 97 | - | - | 1 | - | - | - | - | - | - | - | - | 1 | 20 | | 1 | |
| X | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| % Plants Showing '97 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 67% | | | <u>Poor Vigor</u> 33% | | | <u>%Change</u> | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | '97 | 60 | Dec: | 33% | |
| <i>Cercocarpus montanus</i> | | | | | | | | | | | | | | | | | |
| M | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 13 | 19 | 0 |
| % Plants Showing '97 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | '97 | 0 | Dec: | - | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|--------------------------------------------------|--------|----------------------------|---|---|-------------------------|---|---|--------------------------|---|---|----------------|---|---|-----|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Chrysothamnus nauseosus albicaulis</i> | | | | | | | | | | | | | | | | | | |
| Y | 97 | 4 | - | - | 1 | - | - | - | - | - | 5 | - | - | - | 100 | | 5 | |
| M | 97 | 14 | - | - | - | - | - | - | - | - | 14 | - | - | - | 280 | 29 | 33 | |
| D | 97 | 2 | - | - | - | - | - | - | - | - | 1 | - | 1 | - | 40 | | 2 | |
| % Plants Showing '97 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 05% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | '97 | 420 | Dec: | 10% | |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | | | | | | | | | | | |
| Y | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 97 | 16 | - | - | - | - | - | - | - | - | 16 | - | - | - | 320 | 19 | 23 | |
| D | 97 | 4 | - | - | 1 | - | - | - | - | - | 1 | - | - | 4 | 100 | | 5 | |
| % Plants Showing '97 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 18% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | '97 | 440 | Dec: | 23% | |
| <i>Eriogonum microthecum</i> | | | | | | | | | | | | | | | | | | |
| M | 97 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | - | - | |
| % Plants Showing '97 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | '97 | 20 | Dec: | - | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | | |
| S | 97 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | | 5 | |
| Y | 97 | 27 | - | - | - | - | - | - | - | - | 27 | - | - | - | 540 | | 27 | |
| M | 97 | 142 | - | - | - | - | - | - | - | - | 142 | - | - | - | 2840 | 9 | 10 | |
| D | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| X | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 80 | | 4 | |
| % Plants Showing '97 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | '97 | 3420 | Dec: | 1% | |
| <i>Juniperus osteosperma</i> | | | | | | | | | | | | | | | | | | |
| Y | 97 | 8 | - | - | - | - | - | - | - | - | 8 | - | - | - | 160 | | 8 | |
| M | 97 | 15 | - | - | - | - | - | 1 | - | - | 14 | 2 | - | - | 320 | - | - | |
| X | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 100 | | 5 | |
| % Plants Showing '97 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | '97 | 480 | Dec: | - | |

| A G R E | Y | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|----|----------------------------|---|---|-------------------------|---|---|--------------------------|---|---|----------------|---|-----|-----|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | | |
| M | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 5 | 17 | 0 |
| % Plants Showing '97 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | '97 | 0 | Dec: | - | | |
| Purshia tridentata | | | | | | | | | | | | | | | | | | |
| M | 97 | - | 1 | 1 | - | - | - | - | - | - | - | - | - | 40 | 29 | 56 | 2 | |
| % Plants Showing '97 | | <u>Moderate Use</u> 50% | | | <u>Heavy Use</u> 50% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | '97 | 40 | Dec: | - | | |
| Symphoricarpos oreophilus | | | | | | | | | | | | | | | | | | |
| Y | 97 | 2 | - | - | 1 | - | - | - | - | - | - | - | - | 60 | | | 3 | |
| M | 97 | 23 | 6 | 2 | 6 | - | - | - | - | - | - | - | - | 740 | 16 | 28 | 37 | |
| D | 97 | 2 | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 | |
| X | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 60 | | | 3 | |
| % Plants Showing '97 | | <u>Moderate Use</u> 14% | | | <u>Heavy Use</u> 05% | | | <u>Poor Vigor</u> 17% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | '97 | 840 | Dec: | 5% | | |
| Tetradymia canescens | | | | | | | | | | | | | | | | | | |
| M | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 12 | 11 | 0 | |
| % Plants Showing '97 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | '97 | 0 | Dec: | - | | |

SUMMARY

WILDLIFE MANAGEMENT UNIT 18 - OQUIRRH-STANSBURY

Most of the trend studies on unit 18 were established in 1983. A total of 18 trend studies were established that year. All sites were reread in 1989. In 1990, ten new trend studies were established on Kennocott property to monitor their rehabilitation efforts on deer and elk ranges. During the 1997 field season, a total of 20 of unit 18's trend studies were reread and three additional sites were established. Many of the Kennocott sites were suspended. In 2002, fourteen trend studies were reread on unit 18 and two new studies were established. All of the trend studies read in 2002 sample big game winter range except for one summer range site at Black Rock East (18-20). This study samples a high elevation elk summer range near the top of Black Rock Mountain.

Precipitation is the main driving force for soil, browse, and herbaceous trends. Data from weather stations in unit 18 show above normal precipitation from 1983, when trend studies were originally established, through 1986. A three year dry period followed from 1988 to 1990. Trend studies were reread in 1989 and new sites established in 1990, during this dry period. Another four year period of above average precipitation followed from 1995 to 1998, so rereads in 1997 were during this wet period. Precipitation was slightly below normal (89%) in 1999, normal in 2000, and again below normal in 2002 (86%). Drought conditions in unit 18 were not as severe as seen in other management units in 2002. One similar trend, however, is an extended period of dry springs (March, April, and May). Precipitation was well below normal during the springs of 2000, 2001 and 2002. In addition, the fall period (September, October, and November) of 1999 was also extremely dry with only about 19% of normal precipitation recorded. Dry conditions during the fall and spring period greatly effect grass and forb production, especially annual species. Of the 14 trend studies read in 1997 and reread in 2002, data show four sites increased in sum of nested frequency for perennial grasses. However, one of these sites was East Hickman Canyon which was chained and seeded in 1999. Three sites showed a slight decline in sum of nested frequency for perennial grasses while the other six sites remained stable. Annual grasses displayed a more general downward trend. Cheatgrass declined in sum of nested frequency on six study sites, while two increased slightly and the other 3 sites remained stable. The dry spring periods also had a overall negative effect on forb abundance. Most trend studies showed a decline in the sum of nested frequency for forbs and in the total number of forb species sampled.

Overall trends on unit 18 are stable to improving. The only declining soil trends were slightly downward trends found on three sites, Big Dip Gulch (18-5), Deadman Canyon (18-29), and Hatch Ranch (18-30). Only one study, Manning Canyon (18-3), displayed a slightly downward browse trend. Improving browse trends were found at South Palmer Point (18-23), Salt Mountain (18-26), South of Broons Canyon (18-27), Hatch Ranch (18-30), and East Hickman Canyon (18-32). All other sites were considered stable. Herbaceous trends were down or slightly down at three sites, Salt Mountain (18-26), South of Broons Canyon (18-27), and Carr Fork (18-31). The trend study at East Hickman Canyon (18-32) had upward trends in all categories. This site was established in a thick juniper-pinyon woodland in 1997 which was chained and seeded in 1999.

Many sites in unit 18 displayed a decline in forb abundance in 2002. Average number of forb species sampled per site was estimated at 18 in 1997, dropping to 12 in 2002. Sites which displayed the largest decline in forbs also had high soil temperatures. Of the 16 sites read in 2002, seven studies had soil temperatures that averaged over 60° F at a average depth of nearly one foot (11.7 inches). The average number of forb species sampled on these sites with high soil temperatures, dropped from 20 in 1997 to 10 in 2002. These sites also supported higher cover and nested frequencies of cheatgrass. Most of these sites maintained stable herbaceous trends due to the fact that forbs provided a small portion of their herbaceous understories. Even though many sites showed stable herbaceous trends, the herbaceous understories on many sites are poor and some are dominated by poor value perennial grasses and weeds.

A trend summary of each study is listed below.

SUMMARY

| | Category | 1983 | 1990 | 1997 | 2002 |
|--------------------------------------|-----------------------|------|------|------|------|
| 18-3 Manning Canyon | soil | est | 4 | 4 | 3 |
| | browse | est | 2 | 4 | 2 |
| | herbaceous understory | est | 3 | 4 | 3 |
| | Category | 1983 | 1989 | 1997 | 2002 |
| 18-5 Big Dip Gulch | soil | est | 3 | 3 | 2 |
| | browse | est | 3 | 3 | 3 |
| | herbaceous understory | est | 4 | 1 | 4 |
| 18-6 South of Soldier Canyon | soil | est | 4 | 3 | 3 |
| | browse | est | 3 | 3 | 3 |
| | herbaceous understory | est | 5 | 2 | 3 |
| | Category | | 1990 | 1997 | 2002 |
| 18-15 Upper Kessler | soil | | est | 3 | 3 |
| | browse | | est | NA | NA |
| | herbaceous understory | | est | 3 | 3 |
| 18-20 Black Rock East | soil | | est | 3 | 3 |
| | browse | | est | 3 | 3 |
| | herbaceous understory | | est | 3 | 3 |
| | Category | 1983 | 1989 | 1997 | 2002 |
| 18-23 South of Palmer Point | soil | est | 3 | 4 | 3 |
| | browse | est | 1 | 5 | 4 |
| | herbaceous understory | est | 4 | 3 | 3 |
| 18-24 Salt Mountain Stock Pond | soil | est | 4 | 4 | 3 |
| | browse | est | 2 | 3 | 3 |
| | herbaceous understory | est | 4 | 4 | 3 |

1 = down, 2 = slightly down, 3 = stable, 4 = slightly up, 5 = up, est = established, susp = suspended, NR = not read, NA = not applicable, no trend

| | Category | 1983 | 1989 | 1997 | 2002 |
|-----------------------------------------|-----------------------|------|------|------|------|
| 18-25 Below Chokecherry Spring | soil | est | 5 | 5 | 3 |
| | browse | est | 3 | 5 | 3 |
| | herbaceous understory | est | 4 | 3 | 3 |
| 18-26 Salt Mountain | soil | est | 2 | NR | 3 |
| | browse | est | 2 | NR | 5 |
| | herbaceous understory | est | 4 | NR | 2 |
| 18-27 South of Broons Canyon | soil | est | 3 | 4 | 3 |
| | browse | est | 3 | 4 | 4 |
| | herbaceous understory | est | 3 | 3 | 1 |
| 18-29 Deadman Canyon | soil | est | 3 | 4 | 2 |
| | browse | est | 4 | 3 | 3 |
| | herbaceous understory | est | 3 | 4 | 3 |
| 18-30 Hatch Ranch | soil | est | 3 | 4 | 2 |
| | browse | est | 3 | 3 | 4 |
| | herbaceous understory | est | 4 | 2 | 3 |
| 18-31 Carr Fork | soil | | | est | 5 |
| | browse | | | est | 4 |
| | herbaceous understory | | | est | 2 |
| 18-32 East Hickman Canyon | soil | | | est | 5 |
| | browse | | | est | 5 |
| | herbaceous understory | | | est | 5 |
| 18-34 Three O' Clock | soil | | | | est |
| | browse | | | | est |
| | herbaceous understory | | | | est |
| 18-35 Settlement Canyon Reservoir | soil | | | | est |
| | browse | | | | est |
| | herbaceous understory | | | | est |

1 = down, 2 = slightly down, 3 = stable, 4 = slightly up, 5 = up, est = established, susp = suspended, NR = not read, NA = not applicable, no trend

| | Category | 1983 | 1989 | 1997 | 2002 |
|----------------------------------------|-----------------------|------|------|------|------|
| SUSPENDED SITES | | | | | |
| 18-4 Silverado Canyon | soil | est | 4 | 3 | susp |
| | browse | est | 2 | 4 | susp |
| | herbaceous understory | est | 2 | 3 | susp |
| 18-7 Calumet Mine | soil | est | 3 | 4 | susp |
| | browse | est | 2 | 5 | susp |
| | herbaceous understory | est | 4 | 4 | susp |
| 18-9 Left Fork Settlement Canyon | soil | est | 3 | 3 | susp |
| | browse | est | 3 | 3 | susp |
| | herbaceous understory | est | 5 | 5 | susp |
| 18-10 Bates Canyon | soil | est | 5 | 3 | susp |
| | browse | est | 1 | 4 | susp |
| | herbaceous understory | est | 5 | 4 | susp |
| | Category | | 1990 | 1997 | 2002 |
| 18-14 Little Valley | soil | | est | 5 | susp |
| | browse | | est | NA | susp |
| | herbaceous understory | | est | 1 | susp |
| 18-19 Black Rock West | soil | | est | 4 | susp |
| | browse | | est | 3 | susp |
| | herbaceous understory | | est | 2 | susp |
| 18-21 Black Rock Canyon | soil | | est | 3 | susp |
| | browse | | est | 3 | susp |
| | herbaceous understory | | est | 1 | susp |
| 18-22 Rodgers Canyon | soil | | est | 4 | susp |
| | browse | | est | 1 | susp |
| | herbaceous understory | | est | 1 | susp |

1 = down, 2 = slightly down, 3 = stable, 4 = slightly up, 5 = up, est = established, susp = suspended, NR = not read, NA = not applicable, no trend

| | Category | 1983 | 1989 | 1997 | 2002 |
|-------------------------|-----------------------|------|------|------|------|
| 18-28 Condie Meadows | soil | est | 3 | 4 | susp |
| | browse | est | 3 | 4 | susp |
| | herbaceous understory | est | 3 | 2 | susp |
| | Category | | | 1997 | 2002 |
| 18-33 Clover Creek | soil | | | est | susp |
| | browse | | | est | susp |
| | herbaceous understory | | | est | susp |

1 = down, 2 = slightly down, 3 = stable, 4 = slightly up, 5 = up, est = established, susp = suspended, NR = not read, NA = not applicable, no trend

WILDLIFE MANAGEMENT UNIT 19 - WEST DESERT

Boundary Description

Tooele, Utah, Juab, and Millard counties - Boundary begins at the Utah-Nevada state line and I-80 in Wendover; east on I-80 to the Dugway road at Rowley Junction; south on this road to the Pony Express Road; east on this road to SR-36; north on SR-36 to SR-73; east on SR-73 to I-15; south on I-15 to SR-132 at Nephi; west on SR-132 to US-6; southwest on US-6 to its junction with US-50 near Delta; west on US-50 & 6 to the Utah-Nevada state line; north along this state line to I-80 at Wendover.

Management Unit Description

Management unit 19 is subdivided into three smaller subunits, Deep Creek, Vernon, and Tintic. All trend studies within these subunits were sampled in 2002. The Deep Creek subunit is numbered 19A, and all studies within that unit are numbered accordingly. The Vernon and Tintic subunits are numbered as 19B, and the trend studies within those boundaries are numbered accordingly.

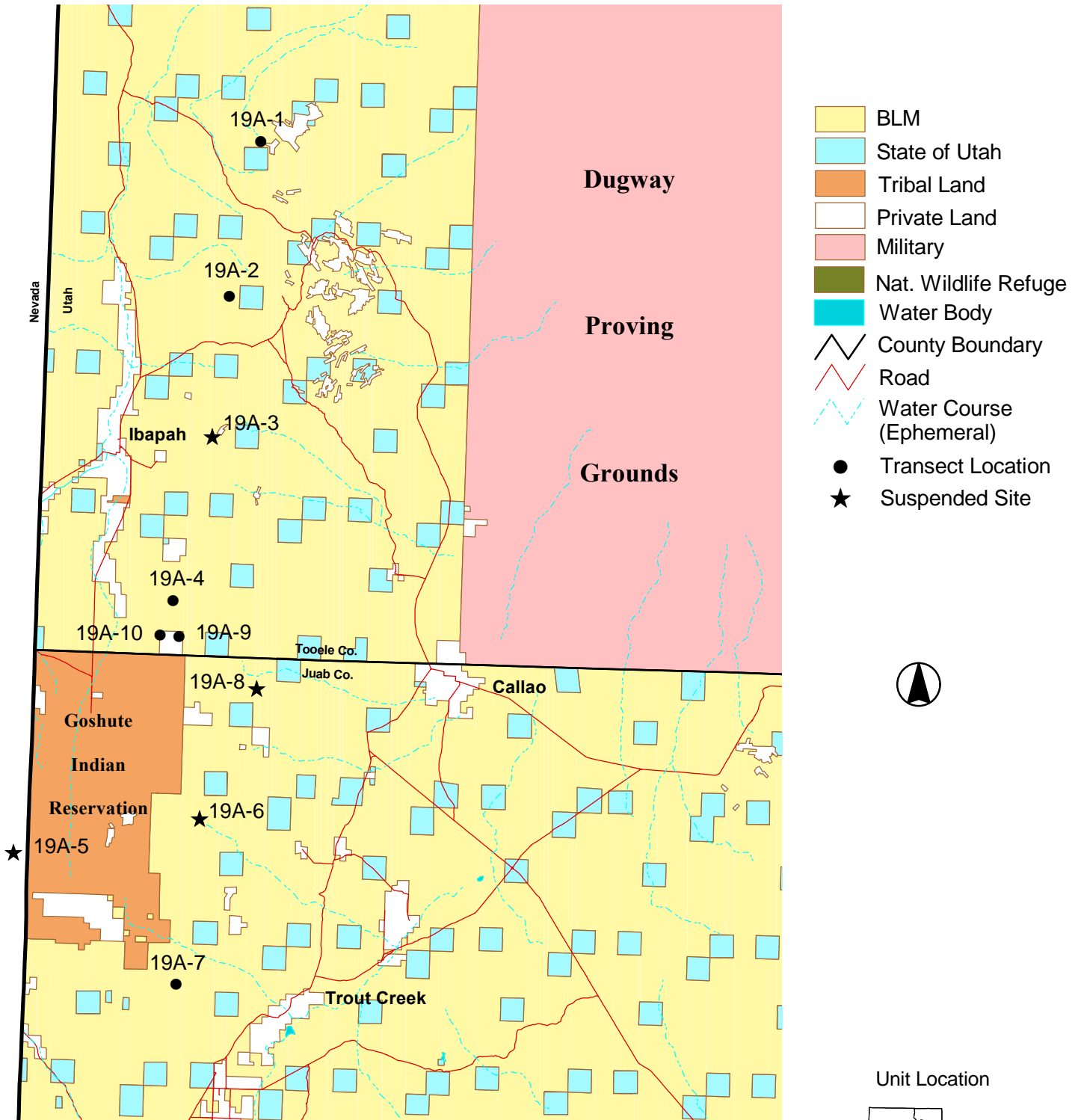
Of the total land area within unit 19, the majority are categorized as either year-long or winter range. Winter, year-long, and summer ranges respectively make up 61%, 23%, and 16% of the area. The vast majority of the land within unit 19 is managed by the Bureau of Land Management.

As with nearly all of the management units within the state, the deer herds are managed to achieve a buck to doe ratio of 15:100 with 30% of the bucks being 3-point or better. The management plan calls for a wintering population of 11,200 deer. Elk are less abundant in this management unit compared to the other units within the Central region administrative area. Most of the elk in this unit are found on the Deep Creek's (subunit 19A).

Population and Habitat Management Strategies

The Vernon subunit is currently managed under the limited entry hunting status. Other portions of unit 19 are open to general season hunting for deer. Limiting factors that may prevent management objectives being reached include crop depredation, habitat, and predation by cougars. To minimize these limiting factors, several habitat management strategies will be used. These are: 1) monitor the permanent range trend studies throughout the unit; 2) maintain and/or enhance forage production through direct range improvements throughout the unit; and 3) work with private and federal agencies to maintain and protect critical summer ranges from future losses and degradation (Deer Herd Unit Management Plan 2001).

Management Unit 19A



WILDLIFE MANAGEMENT UNIT - 19A - WEST DESERT, DESERT MOUNTAIN RANGES

Boundary Description

Tooele, Utah, Juab, and Millard counties - Boundary begins at the Utah-Nevada state line and I-80 in Wendover; then east on I-80 to the Dugway road at Rowley Junction; south on this road to the Pony Express Road; southwest on this road to the Dugway Valley Road; south on this road to Highway SR-174; southeast on SR-174 to Highway US-6 to its conjunction with Highway US-50; west on US-50 & 6 to the Utah-Nevada state line; north along the Utah-Nevada state line to I-80 at Wendover and beginning point.

Management Unit Description

With few exceptions, deer summer range on the Deep Creek Mountains is generally above 7,500 feet in elevation. Quality summer range and water distribution are the limiting factors for this herd unit's deer population. There is approximately 65,654 acres of winter range in the unit. A majority of the winter range (72%) is located on BLM administered land. Very little winter range (4%) is presently in private ownership, while 6% of the land is on the Goshute Indian Reservation. The Deep Creek mountains are surrounded by winter range, from roughly 7,500 feet down to the more xeric zones of the valley floor. Forty-four percent of the winter range is located on land administered by the State of Utah either as State Trust Lands or DWR lands. The BLM administers 36% of the winter range, while 18% of the winter range is privately owned. Some year-long range was identified, most of which (87%) is located on BLM lands.

Range Trend Studies

In 1983, six key areas were identified and sampled with trend studies. Two additional studies were added in 1989. All studies within the unit were reread in 1997. In 2002, several studies were suspended and two new studies were established. Suspended studies included Sevy Canyon, Chokecherry Spring, Granite Creek, and The Basin. Sevy Canyon, Granite Creek, and The Basin all lie within BLM wilderness study areas so the transects at these locations were not read due to lack of access. The study at Chokecherry Spring was placed on Indian lands and lies within Nevada. This site is not critical range for big game and was not read after consultation with the biologist. Two new studies were established on the west side of the Deep Creek Mountains in Rocky Canyon to monitor big game use on westerly aspects that border privately owned lands.

Trend Study 19A-1-02

Study site name: Trail Gulch.

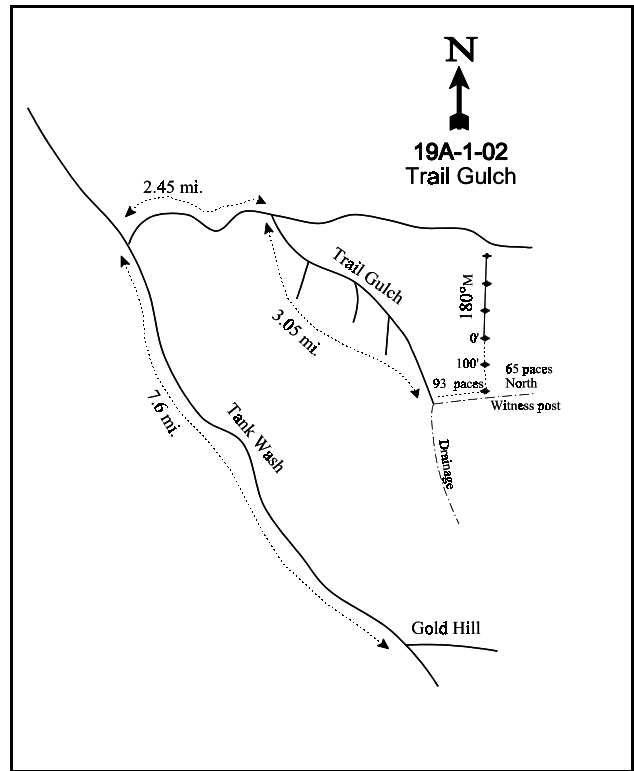
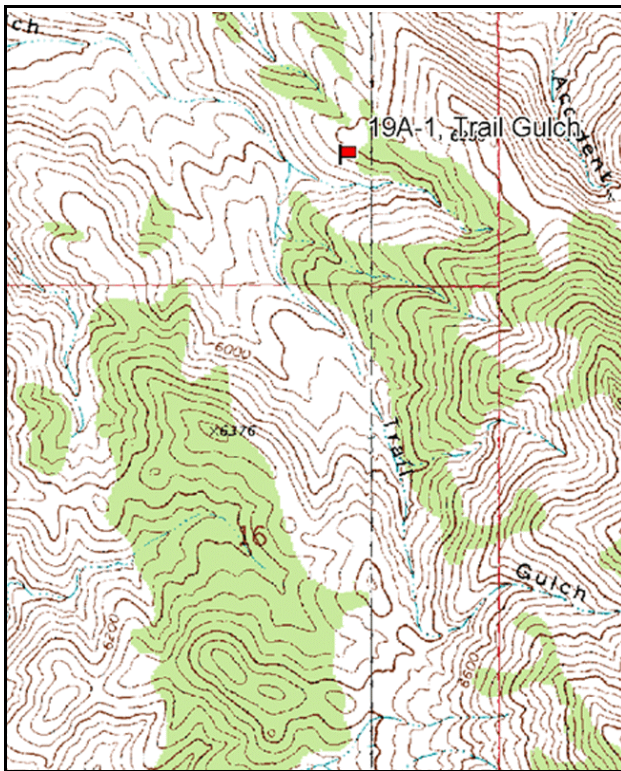
Vegetation type: Stansbury Cliffrose.

Compass bearing: frequency baseline 180 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: none on site, too rocky.

LOCATION DESCRIPTION

Beginning at Gold Hill, proceed northwesterly toward Gold Hill Pass and Tank Wash for 7.60 miles to a road to the north. Turn right and proceed northerly for 2.45 miles to a dirt road to the southeast up Trail Gulch. Proceed up Trail Gulch for 3.05 miles staying to the left (straight) at all intersections. Stop where the road ends and two drainages come together. From the intersection of the streambeds, walk 93 paces easternly, along the left drainage to a green steel "T" fencepost on the north side of the streambed. From the fencepost, walk 65 paces north to the 0-foot baseline stake. The study is marked by green steel "T" fenceposts approximately 12 to 18 inches in height. The 0-foot baseline stake has a red browse tag, number 3970, attached.



Map Name: Ochre Mountain

Diagrammatic Sketch

Township 7S, Range 18W, Section 9

GPS: NAD 27, UTM 12S 4456887 N 255287 E

DISCUSSION

Trail Gulch - Trend Study No. 19A-1

The Trail Gulch study monitors winter range on the north end of the Deep Creek Mountains. The site is dry, rocky, and occupied by a sparse stand of Stansbury cliffrose in association with scattered Utah juniper. Elevation is approximately 5,800 feet with a south aspect. Slope varies on the site from 30% to 40%. In 1983, forage utilization was reportedly intense, although relatively few deer pellet groups were observed. In 1989 and 1997, utilization by livestock and wildlife was noted as infrequent. A pellet group transect read on site in 2002 estimated 22 deer days use/acre (55 ddu/ha), but there was no evidence of livestock use on the site. Several broods of chukars were observed in the area in 1983.

The soil is very rocky and highly eroded. Rocks are angular shaped and uniformly dark grey in color. Textural and chemical analysis indicates a clay soil with a neutral reaction (pH 7.1). The effective rooting depth was estimated at 15 inches, with a soil temperature averaging 61°F at 17 inches in depth. Phosphorous levels were measured at 7.7 ppm in the soil. Phosphorous levels less than 10 ppm may limit normal plant growth and development. Bare ground has been low to moderately low in all years, while vegetation and litter are moderately abundant on the site. Rock and pavement cover are very high being estimated from 44%-51% in all readings. The erosion condition class was assessed as slight in 2002, with soil build-up noted around the baseline posts.

The key browse species are Stansbury cliffrose, Nevada ephedra, and black sagebrush. Stansbury cliffrose density was estimated at 340 plants/acre in 1997 and 380 plants/acre in 2002. The Stansbury cliffrose age structure is indicative of a stable population with mostly mature plants and few young in 2002. Utilization of cliffrose was moderate to heavy in 2002, but lighter in the previous readings. Decadence was moderately low in 1997 and 2002 at less than 20%, a decline from 40% in 1989. Vigor has been generally good in all readings, with 11% of the population displaying poor vigor in 2002. Even with drought in 2002, cliffrose had an abundance of flowers and annual leaders, although the growth of annual leaders was low at less than two inches. Nevada ephedra had an estimated density of 660 plants/acre in 2002, a decline from 820 plants/acre in 1997. The decline in density is due to the loss of most of the young age class in 2002. Decadence has been moderately high in all years, except in 1997, when only 7% of the population was classified as decadent. Vigor was normal in 1989 and 1997, but poor in 1983 and 2002. Use was heavy in 1983, light to moderate in 1989 and 1997, and moderate to heavy in 2002. The population of black sagebrush was estimated at 1,400 plants/acre in 2002. Use on black sagebrush has been moderate overall and vigor has been generally good. Decadence has ranged from 11% in 1983 to 53% in 1989. Annual leaders averaged less than one inch of growth on black sagebrush in 2002. Many plants were experiencing leaf drop due to the very dry conditions.

Other browse sampled on the site include shadscale, California brickellia, broom snakeweed, low rabbitbrush, and littleleaf horsebrush. Broom snakeweed was the most abundant shrub on the site in 1983 and 1989, but declined considerably in 1997 and 2002. Single-leaf pinyon and Utah juniper are scattered throughout the site as well. Point-center quarter data estimated 14 pinyon/acre and 53 juniper/acre in 1997.

The dominant grass on the site is cheatgrass. It provided 64% of the grass cover in 1997 and 52% in 2002. Cheatgrass nested frequency significantly decreased in 2002 with drought as most plants were very small. It is not uniformly distributed throughout the site, rather it occurs in dense patches. Bluebunch wheatgrass is the most abundant perennial grass. It maintained a stable frequency in 1997 and 2002. Bluebunch wheatgrass had good stature and vigor for the most part in 2002, although a few plants were starting to yellow because of the dry conditions. Other less abundant grasses that have been sampled on the site include galleta, Indian ricegrass, Sandberg bluegrass, bottlebrush squirreltail, and sand dropseed. The forb component, including annual species, is basically non-existent. Longleaf phlox is the most abundant species but was sampled in only a handful of quadrats in all years.

1983 APPARENT TREND ASSESSMENT

This is a very dry site with minimal ground cover. Soil erosion is ongoing and of considerable magnitude. High intensity storms are capable of moving large amounts of soil downslope. Soil trend appears to be declining. Vegetation condition is fair to poor, but trend appears essentially stable. Productivity on the site is limited by low precipitation and shallow soils. Although browse utilization is intense, there is not an obvious negative effect on any species, except Nevada ephedra, which may be declining.

1989 TREND ASSESSMENT

Trend for soil is stable. Soil erosion is ongoing and unavoidable, though not severe due to the limited precipitation. Bare ground slightly declined in 1989. The browse trend is stable. The key species, black sagebrush, Stansbury cliffrose, and Nevada ephedra, show slight increases in density. However, they also have increased in percent decadence due to drought conditions. Trend for the herbaceous understory is stable. The sum of nested frequency for perennials has slightly increased since 1983, although herbaceous plants remain limited.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

1997 TREND ASSESSMENT

Erosion is present but not accelerated. Percent bare ground again declined from 1989 levels. Rock and pavement cover remain very high. Although this may protect the soil in some areas, rock and pavement can also accelerate runoff in other areas. Soil trend is stable. Stansbury cliffrose density appears stable with slight increases in black sagebrush and Nevada ephedra densities. Utilization is lower than reported in past years which coincides with the lack of pellet groups encountered. The broom snakeweed density has greatly declined, likely due to the drought conditions. Browse trend is stable for the key browse species. The perennial herbaceous understory has changed very little since 1989. Bluebunch wheatgrass sum of nested frequency has significantly increased while galleta grass sum of nested frequency has significantly decreased. Cheatgrass is the dominant grass at this time and will always be a part of this community. Herbaceous understory trend is stable.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

2002 TREND ASSESSMENT

Trend for soil is slightly down. Vegetation and litter cover declined, while bare ground increased. These changes in soil surface conditions are drought induced and should reverse as precipitation patterns return to normal. Slight erosion is occurring as determined by the erosion condition classification. Trend for browse is stable, but the key species are showing obvious negative signs of drought, specifically minimal annual leader growth and increased decadence. Black sagebrush has increased in density since 1997, but also shows increased use and decadence. Cliffrose shows stability in density and percent decadence, but did display increased utilization. Nevada ephedra, while not the most important browse, does have additive value. The ephedra population shows increases in utilization, poor vigor, and decadence. The herbaceous understory has a stable trend. Herbaceous species remain limited, especially forbs. Bluebunch wheatgrass is the only moderately abundant perennial, but has slightly declined in nested frequency. However, the decline was not statistically significant. Cheatgrass significantly declined in nested frequency in 2002 with continued drought.

TREND ASSESSMENT

soil - slightly down (2)

browse - stable (3) but showing negative effects of drought

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 19A, Study no: 1

| T y p e | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|--------------------------|------------------|------|------|------|-------------------|-----|-----|-----|-----------------|-------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | Agropyron spicatum | a43 | a47 | b97 | b82 | 20 | 24 | 36 | 39 | 3.09 | 4.33 |
| G | Bromus tectorum (a) | - | - | b248 | a196 | - | - | 80 | 65 | 7.17 | 5.39 |
| G | Hilaria jamesii | c37 | bc33 | ab13 | a5 | 17 | 13 | 6 | 4 | .36 | .09 |
| G | Oryzopsis hymenoides | 5 | 6 | 6 | 1 | 3 | 3 | 3 | 1 | .21 | .15 |
| G | Poa secunda | 3 | 14 | 15 | 19 | 3 | 7 | 7 | 10 | .40 | .29 |
| G | Sitanion hystrix | - | - | 6 | 7 | - | - | 2 | 4 | .03 | .07 |
| G | Sporobolus cryptandrus | a- | b20 | a- | a4 | - | 8 | - | 1 | - | .00 |
| Total for Annual Grasses | | 0 | 0 | 248 | 196 | 0 | 0 | 80 | 65 | 7.17 | 5.39 |
| Total for Perennial Grasses | | 88 | 120 | 137 | 118 | 43 | 55 | 54 | 59 | 4.11 | 4.95 |
| Total for Grasses | | 88 | 120 | 385 | 314 | 43 | 55 | 134 | 124 | 11.29 | 10.35 |
| F | Astragalus utahensis | - | - | 3 | - | - | - | 1 | - | .00 | - |
| F | Cirsium neomexicanum | a6 | b19 | a1 | a1 | 3 | 11 | 1 | 1 | .00 | .00 |
| F | Descurainia pinnata (a) | - | - | - | 4 | - | - | - | 2 | - | .01 |
| F | Draba spp. (a) | - | - | - | 1 | - | - | - | 1 | - | .00 |
| F | Erodium cicutarium (a) | - | - | - | 3 | - | - | - | 1 | - | .00 |
| F | Lappula occidentalis (a) | - | - | - | 1 | - | - | - | 1 | - | .00 |
| F | Lomatium spp. | - | - | 1 | 3 | - | - | 1 | 1 | .00 | .00 |
| F | Lygodesmia grandiflora | 3 | - | - | - | 1 | - | - | - | - | - |
| F | Machaeranthera spp | 1 | - | - | - | 1 | - | - | - | - | - |
| F | Phlox longifolia | - | 3 | 10 | 6 | - | 2 | 4 | 3 | .04 | .01 |
| F | Sphaeralcea coccinea | 2 | 10 | - | 3 | 2 | 4 | - | 1 | - | .00 |

| T y p e | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|---------------------------|------------------------------|------------------|-----|-----|-----|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| F | <i>Streptanthus cordatus</i> | - | - | - | 2 | - | - | - | 1 | - | .00 |
| F | Unknown forb-perennial | - | - | 8 | - | - | - | 3 | - | .06 | - |
| F | <i>Zigadenus paniculatus</i> | - | - | - | 4 | - | - | - | 2 | - | .01 |
| Total for Annual Forbs | | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 5 | 0 | 0.02 |
| Total for Perennial Forbs | | 12 | 32 | 23 | 19 | 7 | 17 | 10 | 9 | 0.12 | 0.04 |
| Total for Forbs | | 12 | 32 | 23 | 28 | 7 | 17 | 10 | 14 | 0.12 | 0.06 |

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

BROWSE TRENDS --

Herd unit 19A, Study no: 1

| T y p e | Species | Strip Frequency | | Average Cover % | |
|------------------|-------------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | <i>Artemisia nova</i> | 21 | 25 | 5.40 | 3.59 |
| B | <i>Atriplex confertifolia</i> | 5 | 3 | .53 | .03 |
| B | <i>Brickellia californica</i> | 5 | 2 | .03 | - |
| B | <i>Chrysothamnus viscidiflorus stenophyllus</i> | 10 | 5 | .15 | .38 |
| B | <i>Cowania mexicana stansburiana</i> | 15 | 15 | 2.54 | 4.02 |
| B | <i>Echinocereus</i> spp. | 0 | 1 | - | - |
| B | <i>Ephedra nevadensis</i> | 12 | 17 | 1.78 | .97 |
| B | <i>Gutierrezia sarothrae</i> | 19 | 7 | .60 | .00 |
| B | <i>Juniperus osteosperma</i> | 8 | 5 | 11.46 | 10.00 |
| B | <i>Opuntia</i> spp. | 2 | 3 | - | .00 |
| B | <i>Pinus monophylla</i> | 1 | 3 | - | .15 |
| B | <i>Tetradymia glabrata</i> | 12 | 4 | 1.09 | - |
| Total for Browse | | 110 | 90 | 23.60 | 19.16 |

CANOPY COVER -- LINE INTERCEPT

Herd unit 19A, Study no: 1

| Species | Percent Cover | |
|------------------------------------------|---------------|-------|
| | '97 | '02 |
| Artemisia nova | - | 4.17 |
| Brickellia californica | - | .08 |
| Chrysothamnus viscidiflorus stenophyllus | - | .67 |
| Cowania mexicana stansburiana | - | 7.42 |
| Ephedra viridis | - | 2.25 |
| Juniperus osteosperma | 15 | 13.08 |
| Pinus monophylla | - | 2.08 |
| Tetradymia glabrata | - | .08 |

Key Browse Annual Leader Growth

Herd unit 19A , Study no: 1

| Species | Average leader growth (in) |
|-------------------------------|----------------------------|
| | '02 |
| Artemisia nova | 0.9 |
| Cowania mexicana stansburiana | 1.8 |

Point-Quarter Tree Data

Herd unit 19A , Study no: 1

| Species | Trees per Acre | Average diameter (in) |
|-----------------------|----------------|-----------------------|
| | '97 | '97 |
| Juniperus osteosperma | 53 | 8.7 |
| Pinus monophylla | 14 | 4.1 |

BASIC COVER --

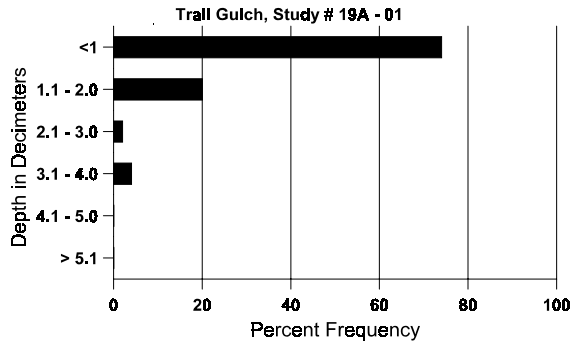
Herd unit 19A, Study no: 1

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 295 | 248 | .25 | 4.00 | 35.30 | 28.60 |
| Rock | 324 | 319 | 27.00 | 30.00 | 27.53 | 32.42 |
| Pavement | 285 | 312 | 20.25 | 21.50 | 16.47 | 18.55 |
| Litter | 361 | 335 | 39.50 | 33.50 | 30.37 | 27.46 |
| Cryptogams | 111 | 89 | .25 | 1.50 | 1.66 | 2.11 |
| Bare Ground | 140 | 237 | 12.75 | 9.50 | 3.34 | 13.38 |

SOIL ANALYSIS DATA --
 Herd Unit 19A, Study no: 1, Trail Gulch

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 8.9 | 64.4 (12.6) | 7.1 | 38.0 | 32.4 | 29.6 | 2.4 | 7.7 | 76.8 | 0.7 |

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 19A, Study no: 1

| Type | Quadrat Frequency | |
|--------|-------------------|-----|
| | '97 | '02 |
| Rabbit | 8 | 9 |
| Deer | - | 2 |

| Pellet Transect | |
|------------------------|------------------------|
| Pellet Groups per Acre | Days Use per Acre (ha) |
| 02 | 02 |
| - | - |
| 287 | 22 (55) |

BROWSE CHARACTERISTICS --
Herd unit 19A, Study no: 1

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | | | |
|------------------------------------------------|----------------------------|---------------------|----|------------------|---|--------------------|--------------------------------|----------------|----|------|-----|
| | | 1 | 2 | 3 | 4 | | | | | | |
| Artemisia nova | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 1 | - | - | - | - | - | - | 1 | - | 1 |
| | 97 | - | - | - | - | - | - | - | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | 0 |
| Y | 83 | - | - | - | - | - | - | - | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | 0 |
| | 97 | 1 | - | - | - | - | - | - | 1 | - | 1 |
| | 02 | 1 | - | - | - | - | - | - | 1 | - | 1 |
| M | 83 | - | 6 | 2 | - | - | - | - | 8 | - | 8 |
| | 89 | 3 | 2 | - | 2 | - | - | - | 7 | - | 7 |
| | 97 | 25 | 8 | - | - | - | - | - | 33 | - | 33 |
| | 02 | 17 | 26 | 6 | - | - | - | - | 49 | - | 49 |
| D | 83 | - | - | 1 | - | - | - | - | - | - | 1 |
| | 89 | - | 6 | - | 2 | - | - | - | 8 | - | 8 |
| | 97 | 8 | - | - | - | - | - | - | 5 | - | 8 |
| | 02 | 7 | 10 | 3 | - | - | - | - | 16 | - | 20 |
| X | 83 | - | - | - | - | - | - | - | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | 140 |
| | 02 | - | - | - | - | - | - | - | - | - | 140 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 67% | | 33% | | 11% | | +40% | | | |
| '89 | | 53% | | 00% | | 00% | | +41% | | | |
| '97 | | 19% | | 00% | | 07% | | +40% | | | |
| '02 | | 51% | | 13% | | 06% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | '83 | | 299 | |
| | | | | | | | | '89 | | 499 | |
| | | | | | | | | '97 | | 840 | |
| | | | | | | | | '02 | | 1400 | |
| | | | | | | | | Dec: | | 11% | |
| | | | | | | | | | | 53% | |
| | | | | | | | | | | 19% | |
| | | | | | | | | | | 29% | |
| Artemisia tridentata vaseyana | | | | | | | | | | | |
| Y | 83 | 1 | - | - | - | - | - | - | - | 1 | 1 |
| | 89 | - | - | - | - | - | - | - | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 00% | | 00% | | 100% | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | |
| '97 | | 00% | | 00% | | 00% | | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | '83 | | 33 | |
| | | | | | | | | '89 | | 0 | |
| | | | | | | | | '97 | | 0 | |
| | | | | | | | | '02 | | 0 | |
| | | | | | | | | Dec: | | - | |
| | | | | | | | | | | - | |
| | | | | | | | | | | - | |
| | | | | | | | | | | - | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | | | |
|------------------------------------------------|----------------------------|---------------------|------------------|-------------------|-----|--------------------|--------------------------------|-------|----------------|----|----|
| | | 1 | 2 | 3 | 4 | | | | | | |
| Atriplex confertifolia | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 97 | 1 | - | - | - | - | - | - | 20 | 8 | 11 |
| | 02 | - | - | - | - | - | - | - | 0 | 6 | 12 |
| M | 83 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 97 | 4 | - | - | - | - | - | - | 80 | 8 | 11 |
| | 02 | 1 | - | - | - | - | - | - | 20 | 6 | 12 |
| D | 83 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 97 | 2 | - | - | - | - | - | - | 40 | - | - |
| | 02 | 2 | - | - | - | - | - | - | 40 | - | - |
| % Plants Showing | | <u>Moderate Use</u> | <u>Heavy Use</u> | <u>Poor Vigor</u> | | | | | <u>%Change</u> | | |
| '83 | | 00% | 00% | 00% | | | | | | | |
| '89 | | 00% | 00% | 00% | | | | | | | |
| '97 | | 00% | 00% | 00% | | | | | -50% | | |
| '02 | | 00% | 00% | 33% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | '83 | 0 | Dec: | 0% | | | |
| | | | | | '89 | 0 | | 0% | | | |
| | | | | | '97 | 120 | | 33% | | | |
| | | | | | '02 | 60 | | 67% | | | |
| Brickellia californica | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 97 | 3 | - | - | - | - | - | - | 60 | 12 | 14 |
| | 02 | - | - | - | - | - | - | - | 0 | 10 | 15 |
| Y | 83 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 97 | 1 | - | - | - | - | - | - | 20 | - | - |
| | 02 | - | - | - | - | - | - | - | 0 | - | - |
| M | 83 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 97 | 7 | - | - | - | - | - | - | 140 | 12 | 14 |
| | 02 | 2 | - | - | - | - | - | - | 40 | 10 | 15 |
| % Plants Showing | | <u>Moderate Use</u> | <u>Heavy Use</u> | <u>Poor Vigor</u> | | | | | <u>%Change</u> | | |
| '83 | | 00% | 00% | 00% | | | | | | | |
| '89 | | 00% | 00% | 00% | | | | | | | |
| '97 | | 00% | 00% | 00% | | | | | -75% | | |
| '02 | | 00% | 00% | 00% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | '89 | 0 | | - | | | |
| | | | | | '97 | 160 | | - | | | |
| | | | | | '02 | 40 | | - | | | |

| A Y G R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | |
|-------------------------------------------------|----------------------------|---------------------|---|---|------------------|---|---|-------------------|---|-------------|----------------|-----|-----|--------------------|--------------------------------|----|-------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | | |
| <i>Chrysothamnus viscidiflorus stenophyllus</i> | | | | | | | | | | | | | | | | | | |
| M | '83 | 4 | - | - | - | - | - | - | - | - | 3 | 1 | - | - | 133 | 8 | 10 | 4 |
| | '89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | 4 | 6 | 2 |
| | '97 | 9 | - | - | - | - | - | - | - | - | 9 | - | - | - | 180 | 10 | 16 | 9 |
| | '02 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 80 | 11 | 24 | 4 |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '89 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 100 | | | 3 |
| | '97 | 1 | - | - | 1 | - | - | - | - | - | 1 | - | - | 1 | 40 | | | 2 |
| | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +20% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +25% | | | | | | | |
| '97 | | 00% | | | 00% | | | 09% | | | -55% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 133 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 166 | | 60% | | | |
| | | | | | | | | | | | | '97 | 220 | | 18% | | | |
| | | | | | | | | | | | | '02 | 100 | | 20% | | | |
| <i>Cowania mexicana stansburiana</i> | | | | | | | | | | | | | | | | | | |
| S | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| Y | '83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | | 1 |
| | '89 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 166 | | | 5 |
| | '97 | 1 | 2 | - | - | - | - | - | - | - | 3 | - | - | - | 60 | | | 3 |
| | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| M | '83 | 2 | 2 | 1 | - | - | - | - | - | - | 5 | - | - | - | 166 | 44 | 67 | 5 |
| | '89 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 33 | 55 | 71 | 1 |
| | '97 | 11 | - | - | - | - | - | - | - | - | 11 | - | - | - | 220 | 38 | 60 | 11 |
| | '02 | 2 | 4 | 3 | - | 3 | 3 | - | - | - | 15 | - | - | - | 300 | 44 | 63 | 15 |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '89 | 2 | 1 | - | 1 | - | - | - | - | - | 4 | - | - | - | 133 | | | 4 |
| | '97 | 3 | - | - | - | - | - | - | - | - | 2 | - | - | 1 | 60 | | | 3 |
| | '02 | 1 | 1 | - | - | - | 1 | - | - | - | 1 | - | - | 2 | 60 | | | 3 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 33% | | | 17% | | | 00% | | | +40% | | | | | | | |
| '89 | | 10% | | | 00% | | | 00% | | | +2% | | | | | | | |
| '97 | | 12% | | | 00% | | | 06% | | | +11% | | | | | | | |
| '02 | | 42% | | | 37% | | | 11% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 199 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 332 | | 40% | | | |
| | | | | | | | | | | | | '97 | 340 | | 18% | | | |
| | | | | | | | | | | | | '02 | 380 | | 16% | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | | | | | | |
|------------------------------------------------|----------------------------|---------------------|----|---|------------------|--------------------|--------------------------------|-------------------|-------|-----|----------------|------|-----|-----|----|----|----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | | | | | | | |
| Echinocactus spp. | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 3 | 5 | 1 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 4 | 5 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 33 | Dec: | - | | | | |
| | | | | | | | | | | '89 | 33 | | - | | | | |
| | | | | | | | | | | '97 | 0 | | - | | | | |
| | | | | | | | | | | '02 | 20 | | - | | | | |
| Ephedra nevadensis | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 5 | - | - | - | - | - | - | - | 5 | - | - | - | 166 | | 5 | |
| | 97 | 8 | - | - | - | - | - | - | - | 8 | - | - | - | 160 | | 8 | |
| | 02 | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 83 | - | - | 6 | - | - | - | - | - | - | - | 6 | - | 200 | 18 | 33 | 6 |
| | 89 | - | 2 | - | - | 2 | - | - | - | 4 | - | - | - | 133 | 15 | 24 | 4 |
| | 97 | 16 | 13 | - | 1 | - | - | - | - | 30 | - | - | - | 600 | 20 | 29 | 30 |
| | 02 | 6 | 4 | 2 | - | - | 6 | - | - | 12 | - | 6 | - | 360 | 18 | 32 | 18 |
| D | 83 | - | - | 3 | - | - | - | - | - | - | - | 3 | - | 100 | | 3 | |
| | 89 | 1 | 4 | - | 1 | 1 | - | - | - | 7 | - | - | - | 233 | | 7 | |
| | 97 | 2 | 1 | - | - | - | - | - | - | 3 | - | - | - | 60 | | 3 | |
| | 02 | 4 | 5 | 3 | - | - | 2 | - | - | 5 | - | - | 9 | 280 | | 14 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 80 | | 4 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | | 100% | | | 100% | | | +44% | | | | | | |
| '89 | | 56% | | | 00% | | | 00% | | | +35% | | | | | | |
| '97 | | 34% | | | 00% | | | 00% | | | -20% | | | | | | |
| '02 | | 27% | | | 39% | | | 45% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 300 | Dec: | 33% | | | | |
| | | | | | | | | | | '89 | 532 | | 44% | | | | |
| | | | | | | | | | | '97 | 820 | | 7% | | | | |
| | | | | | | | | | | '02 | 660 | | 42% | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Gutierrezia sarothrae | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 166 | | 5 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | 6 | - | - | - | - | - | - | - | - | 6 | - | - | - | 200 | | 6 | |
| | 89 | 9 | - | - | - | - | - | - | - | - | 9 | - | - | - | 300 | | 9 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 70 | - | - | - | - | - | - | - | - | 70 | - | - | - | 2333 | 8 | 8 | 70 |
| | 89 | 45 | - | - | 2 | - | - | - | - | - | 47 | - | - | - | 1566 | 5 | 7 | 47 |
| | 97 | 30 | - | - | - | - | - | - | - | - | 30 | - | - | - | 600 | 7 | 12 | 30 |
| | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | 8 | 12 | 2 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 25 | - | - | - | - | - | - | - | - | 25 | - | - | - | 833 | | 25 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | 7 | - | - | - | - | - | - | - | - | 1 | - | - | 6 | 140 | | 7 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 100 | | 5 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | + 6% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -76% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | -72% | | | | | | | |
| '02 | | 00% | | | 00% | | | 67% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 2533 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 2699 | | 31% | | | |
| | | | | | | | | | | | | '97 | 640 | | 0% | | | |
| | | | | | | | | | | | | '02 | 180 | | 78% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|---|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | 2 | - | - | - | - | - | - | - | - | - | - | - | 66 | | | 2 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | - | - | - | 33 | 118 | 197 | 1 | |
| | 97 | 3 | - | - | 2 | - | - | - | - | - | - | - | - | 100 | - | - | 5 | |
| | 02 | 2 | - | - | - | - | - | - | - | 3 | - | - | - | 100 | - | - | 5 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +38% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | -38% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 99 | | 0% | | | |
| | | | | | | | | | | | | '97 | 160 | | 13% | | | |
| | | | | | | | | | | | | '02 | 100 | | 0% | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | - | - | - | 33 | | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| M | 83 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | 33 | 4 | 18 | 1 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | - | 2 | - | 40 | 7 | 13 | 2 | |
| | 02 | 2 | - | - | 2 | - | - | - | - | - | - | 4 | - | 80 | 4 | 12 | 4 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | 33 | | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 100% | | | +50% | | | | | | | |
| '89 | | 00% | | | 00% | | | 50% | | | -39% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +50% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 33 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 66 | | 50% | | | |
| | | | | | | | | | | | | '97 | 40 | | 0% | | | |
| | | | | | | | | | | | | '02 | 80 | | 0% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|---|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Pinus monophylla</i> | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 | |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | - | - | 33 | | | 1 | | |
| | 89 | 1 | - | - | 1 | - | - | - | - | - | - | - | 66 | | | 2 | | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | | |
| | 02 | 2 | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | | |
| | 97 | 1 | - | - | - | - | - | - | - | - | - | - | 20 | - | - | 1 | | |
| | 02 | 1 | - | - | - | - | - | - | - | - | - | - | 20 | - | - | 1 | | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +50% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -70% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +67% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 33 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 66 | | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |
| | | | | | | | | | | | | '02 | 60 | | - | | | |
| <i>Tetradymia glabrata</i> | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | | |
| | 89 | 2 | - | - | - | - | - | - | - | - | - | - | 66 | | | 2 | | |
| | 97 | 1 | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 | | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | | |
| M | 83 | 2 | - | - | - | - | - | - | - | - | - | - | 66 | 26 | 38 | 2 | | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | | |
| | 97 | 8 | - | - | 1 | - | - | - | - | - | - | - | 180 | 23 | 21 | 9 | | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | 0 | 22 | 14 | 0 | | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | | |
| | 89 | 3 | - | - | 1 | - | - | - | - | - | - | - | 133 | | | 4 | | |
| | 97 | 7 | - | - | - | - | - | - | - | - | - | - | 140 | | | 7 | | |
| | 02 | 6 | - | - | - | - | - | - | - | - | - | - | 120 | | | 6 | | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | 80 | | | 4 | | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | 220 | | | 11 | | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +67% | | | | | | | |
| '89 | | 00% | | | 00% | | | 33% | | | +41% | | | | | | | |
| '97 | | 00% | | | 00% | | | 12% | | | -65% | | | | | | | |
| '02 | | 00% | | | 00% | | | 100% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 66 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 199 | | 67% | | | |
| | | | | | | | | | | | | '97 | 340 | | 41% | | | |
| | | | | | | | | | | | | '02 | 120 | | 100% | | | |

Trend Study 19A-2-02

Study site name: Ochre Mountain.

Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 249 degrees magnetic.

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

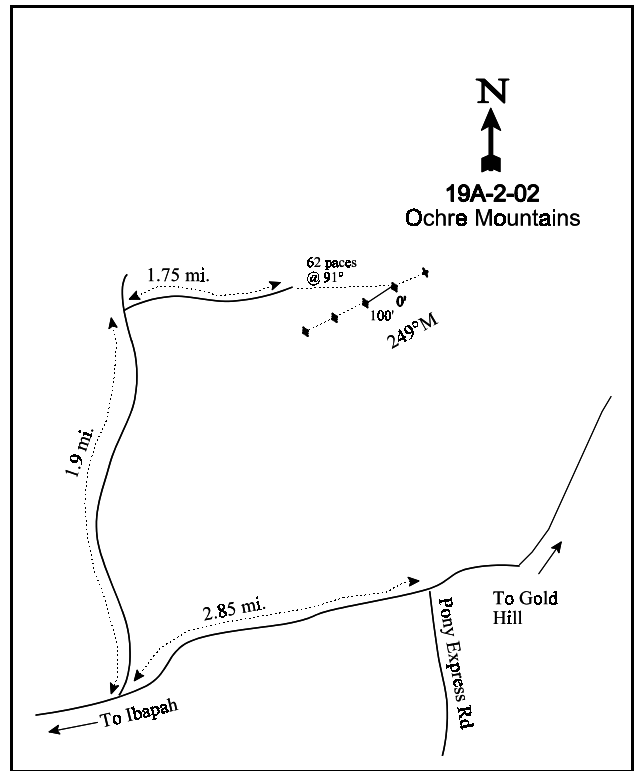
LOCATION DESCRIPTION

From Gold Hill, proceed southwest toward Pony Express Road. From the intersection at Pony Express Rd, continue on main road (east) towards Ibadah for another 2.85 miles to an intersection going north (right). Take the road going north for 1.91 miles to a road going east (right). Turn right and go 1.75 miles to a small box canyon. Stop and walk 62 paces at an azimuth of 91 degrees true to a green steel "T" fencepost with a red browse tag, number 3931, attached. This marks the 0-foot stake of the baseline. The study is marked by green steel "T" fenceposts approximately 12 to 18 inches in height.



Map Name: Ochre Mountain

Township 8S, Range 18W, Section 17



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4446113 N 253106 E

DISCUSSION

Ochre Mountain - Trend Study No. 19A-2

The Ochre Mountain study samples deer winter range on the west side of Ochre Mountain. Elevation is approximately 6,200 feet on a 15-20% west facing alluvial swale. The site samples a basin big sagebrush-grass community. The area is surrounded by steep, rocky pinyon-juniper hillsides which contain some Stansbury cliffrose. This transect is in the Ochre Mountain BLM grazing allotment, permitted for cattle use in winter and spring. In 1983, deer use appeared light, however there was considerable evidence of wild horses within the area. No livestock sign was evident on the study site in 1989 and big game use was reported light to moderate. In 1997, there was little evidence of animal use, with only a few fresh deer pellet groups noted. A pellet group transect read on site in 2002 estimated 44 deer days use/acre (107 ddu/ha), 15 elk days use/acre (36 edu/ha), and 4 cow days use/acre (9 cdu/ha). There was also sign of wild horses on the site in 2002. The deer and elk pellets sampled in 2002 appeared to be primarily from late winter and spring. There were several rub trees on the site that had been severely damaged by big game.

Soil is alluvial with an effective rooting depth of 15 inches. The soil type is Shontz Rexmont, a very gravelly soil highly susceptible to water erosion. Textural and chemical analysis indicates soils to be a loam with a neutral pH (7.1). Average soil temperature was 61°F at 17 inches in depth in 1997. Phosphorous levels in the soil profile measured 7.6 ppm, which may be limiting as 10 ppm is considered minimal for normal plant growth and development. Past soil erosion is evident by exposed rock, erosion pavement, and the presence of pedestalled plants. Vegetation and litter cover are currently abundant and effectively minimize erosion on the site. The erosion condition class index was determined as stable in 2002.

Browse composition consists almost entirely of basin big sagebrush. These plants are large averaging 3 feet in height by 4 feet in width. Density was estimated at 2,720 plants/acre in 1997, decreasing to 1,820 plants/acre in 2002. These estimates are much higher than the initial estimate of about 1,300 plants/acre. The difference can be attributed to the increased sample size used in 1997 which more accurately represents the area. The basin big sagebrush population has consisted almost entirely of mature and decadent plants in all years. Percent decadency has been moderate to high in all years, especially during the 1989 (70%) and 2002 (51%) readings which occurred during drought periods. In 1997 and 2002, the proportion of the decadent age class classified as dying was high at over 50%. Recruitment has been low with no young sampled in 2002. The population has had depressed vigor in each reading, with the highest levels of poor vigor being reported during the drought years of 1989 (55%) and 2002 (26%). With the number of dead plants increasing and low reproduction and recruitment, this population appears to be self-thinning with drought conditions. Use was moderate in 1983 and 1989, while mostly light to moderate in 1997 and 2002. Many of the sagebrush plants showed insect damage in 2002. Annual leader growth averaged only 1.7 inches. Other shrubs scattered throughout the area include narrowleaf low rabbitbrush, black sagebrush, ephedra, Stansbury cliffrose, and broom snakeweed.

In 1997, grass cover was dominated by a thick and nearly uniform cover of cheatgrass. This annual grass constitutes a definite fire hazard due to its abundance and distribution in the area. Cheatgrass poses a severe threat to basin big sagebrush as it is not tolerant of fire and would be eliminated from the site if a burn occurred. Cheatgrass did significantly decrease in nested frequency in 2002 with drought, but was still sampled in almost all of the quadrats. It was noted in 1989 that there was a noticeable lack of cheatgrass relative to 1983 when comparing photographs. Bluebunch wheatgrass was tall and vigorous and provided the most cover of any grass in 2002. Bluebunch declined in nested frequency in 2002, although the decrease was not significant. Sandberg bluegrass is also moderately abundant being sampled in nearly half of the quadrats during all readings. Sum of nested frequency for all perennial grasses declined in 2002, although perennial grass cover slightly increased overall.

With one exception, forbs occur infrequently. Peavine (*Lathyrus brachycalyx*) is moderately abundant with a similar nested frequency values from 1989 through 2002. It provided 95% and 84% of the forb cover in 1997 and 2002 respectively. Other forbs sampled include pale agoseris, longleaf phlox, low fleabane, rockcress, desert Indian paintbrush, and tumble mustard. Perennial forbs showed an increased sum of nested frequency value in 2002 which was surprising due to drought conditions. Forbs often show large declines in frequency during dry periods.

1983 APPARENT TREND ASSESSMENT

This site suffers from poor plant diversity and an overabundance of cheatgrass. The basin big sagebrush stand appears healthy, but constitutes a near monoculture. Herbaceous forage is very minimal. However, in spite of vegetation composition, vegetative trend appears stable. No signs of imminent vegetative change are apparent. Soil trend appears stable to slightly declining. Soils are poorly developed and have little organic content. Soils are also subject to light to moderate sheet and gully erosion.

1989 TREND ASSESSMENT

The soil trend is stable though soils are poorly developed and rocky. The browse trend is slightly downward for basin big sagebrush. Density is stable, but the population shows drastic increases in decadence and poor vigor. One positive factor is that 10% of the population is made up of young plants. The herbaceous understory trend is stable. Sum of nested frequency for perennial grasses slightly decreased, but that of perennial forbs increased with significant increases in peavine and longleaf phlox.

TREND ASSESSMENT

soil - stable (3)

browse - slightly downward (2)

herbaceous understory - stable (3)

1997 TREND ASSESSMENT

Although past erosion is evident, it is currently minimal due to abundant vegetation and litter cover. However, most of the vegetation cover is contributed by cheatgrass. Cheatgrass will slow erosion for a period of time, but for long term soil protection, perennial species are necessary. Soil trend is stable. The basin big sagebrush stand is a mature, decadent stand with little recruitment presently occurring. Fifty-six percent of the decadent plants were classified as dying and there is a dead to live ratio of 1:2.5. The age structure is fluctuating between mostly mature and decadent plants. The population will likely decline in the future with continued competition for spring moisture with cheatgrass. A thinning of the population may in fact allow a healthier remaining population. Even with decreased decadence and poor vigor, the browse trend is slightly down as many plants could be lost from the population. The herbaceous trend is slightly upward. The significant increase in bluebunch wheatgrass nested frequency is a step in the right direction. This site exhibits low diversity, so a significant increase in any perennial species will aid in soil stabilization. Cheatgrass is currently very thick, constituting a fire hazard which could ultimately eliminate the basin big sagebrush population. Forbs, with the exception of peavine, are rare.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - slightly upward (4)

2002 TREND ASSESSMENT

Trend for soil is stable. Bare soil remains low, while vegetation and litter cover are abundant. Cover from perennial grasses and forbs increased in 2002 even with drought. Trend for browse is down. Density of basin big sagebrush declined, whereas decadence and poor vigor increased. The proportion of the decadent plants classified as dying remains high at over 50%, indicating further losses in density could occur in the future. No young plants were sampled in 2002. A high proportion of the population showed insect damage of some kind. With drought conditions and a lot of cheatgrass in the understory, sagebrush is very depressed at the present time. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses declined, but that of perennial forbs increased. Cheatgrass also significantly decreased in nested frequency with the existing drought conditions.

TREND ASSESSMENT

soil - stable (3)

browse - down (1)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 19A, Study no: 2

| T y p e | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|---------------------------------|------------------|-------------------|-------------------|------------------|-------------------|-----|-----|-----|-----------------|-------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | <i>Agropyron cristatum</i> | - | - | 4 | - | - | - | 2 | - | .18 | - |
| G | <i>Agropyron spicatum</i> | _a 119 | _a 117 | _b 189 | _b 159 | 51 | 45 | 69 | 63 | 7.63 | 11.31 |
| G | <i>Bromus tectorum</i> (a) | - | - | _b 329 | _a 270 | - | - | 96 | 87 | 10.92 | 7.61 |
| G | <i>Poa fendleriana</i> | _c 37 | _b 14 | _a - | _{ab} 3 | 14 | 6 | - | 1 | - | .00 |
| G | <i>Poa secunda</i> | _b 153 | _{ab} 138 | _{ab} 121 | _a 98 | 56 | 54 | 43 | 43 | 1.63 | .91 |
| Total for Annual Grasses | | 0 | 0 | 329 | 270 | 0 | 0 | 96 | 87 | 10.92 | 7.61 |
| Total for Perennial Grasses | | 309 | 269 | 314 | 260 | 121 | 105 | 114 | 107 | 9.44 | 12.23 |
| Total for Grasses | | 309 | 269 | 643 | 530 | 121 | 105 | 210 | 194 | 20.36 | 19.85 |
| F | <i>Agoseris glauca</i> | _a - | _a - | _a - | _b 19 | - | - | - | 8 | - | .14 |
| F | <i>Arabis</i> spp. | - | 6 | 5 | 1 | - | 2 | 2 | 1 | .01 | .00 |
| F | <i>Castilleja chromosa</i> | - | 2 | 1 | - | - | 1 | 1 | - | .03 | - |
| F | <i>Cirsium</i> spp. | - | - | - | - | - | - | - | - | .03 | - |
| F | <i>Crepis acuminata</i> | - | - | 3 | 2 | - | - | 1 | 2 | .03 | .01 |
| F | <i>Delphinium nuttallianum</i> | - | - | - | 3 | - | - | - | 1 | - | .00 |
| F | <i>Descurainia pinnata</i> (a) | - | - | 7 | 4 | - | - | 4 | 2 | .02 | .03 |
| F | <i>Erigeron pumilus</i> | - | 8 | 3 | - | - | 4 | 1 | - | .00 | - |
| F | <i>Hackelia patens</i> | - | - | 2 | - | - | - | 1 | - | .00 | - |
| F | <i>Lathyrus brachycalyx</i> | _a 145 | _b 193 | _{ab} 182 | _b 196 | 56 | 66 | 70 | 76 | 5.74 | 8.05 |
| F | <i>Lappula occidentalis</i> (a) | - | - | _a - | _b 41 | - | - | - | 19 | - | .79 |
| F | <i>Lactuca serriola</i> | - | - | - | 4 | - | - | - | 2 | - | .03 |
| F | <i>Lomatium</i> spp. | - | - | - | 3 | - | - | - | 1 | - | .00 |
| F | <i>Machaeranthera canescens</i> | - | 1 | 1 | - | - | 1 | 1 | - | .03 | - |
| F | <i>Oenothera</i> spp. | - | 8 | - | - | - | 4 | - | - | - | - |
| F | <i>Phlox longifolia</i> | _a 4 | _b 25 | _{ab} 13 | _b 28 | 2 | 12 | 8 | 14 | .06 | .14 |

| T y p e | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|---------------------------|---------------------------|------------------|-----|-----|-----|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| F | Sisymbrium altissimum (a) | - | - | 12 | 14 | - | - | 7 | 6 | .08 | .35 |
| F | Unknown forb-perennial | 3 | - | - | - | 1 | - | - | - | - | - |
| Total for Annual Forbs | | 0 | 0 | 19 | 59 | 0 | 0 | 11 | 27 | 0.10 | 1.17 |
| Total for Perennial Forbs | | 152 | 243 | 210 | 256 | 59 | 90 | 85 | 105 | 5.96 | 8.40 |
| Total for Forbs | | 152 | 243 | 229 | 315 | 59 | 90 | 96 | 132 | 6.06 | 9.57 |

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

BROWSE TRENDS --

Herd unit 19A, Study no: 2

| T y p e | Species | Strip Frequency | | Average Cover % | |
|------------------|------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | Artemisia nova | 5 | 6 | .33 | .36 |
| B | Artemisia tridentata tridentata | 64 | 50 | 16.40 | 16.31 |
| B | Chrysothamnus viscidiflorus stenophyllus | 18 | 14 | .30 | .71 |
| Total for Browse | | 87 | 70 | 17.04 | 17.38 |

CANOPY COVER -- LINE INTERCEPT

Herd unit 19A, Study no: 2

| Species | Percent Cover | |
|------------------------------------------|---------------|-------|
| | '97 | '02 |
| Artemisia nova | - | .33 |
| Artemisia tridentata tridentata | - | 13.25 |
| Chrysothamnus viscidiflorus stenophyllus | - | .33 |

Key Browse Annual Leader Growth

Herd unit 19A, Study no: 2

| Species | Average leader growth (in) '02 |
|---------------------------------|-----------------------------------|
| Artemisia tridentata tridentata | 1.7 |

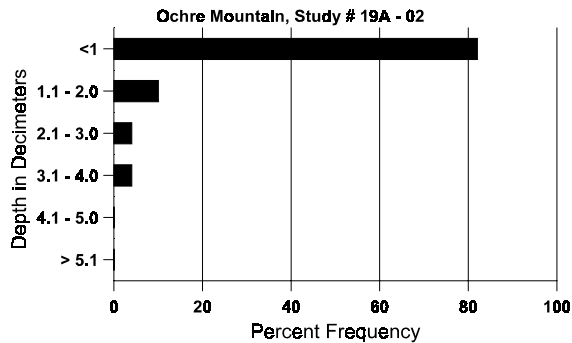
BASIC COVER --
Herd unit 19A, Study no: 2

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 376 | 338 | 2.00 | 12.00 | 39.64 | 45.36 |
| Rock | 179 | 189 | 6.75 | 11.50 | 5.11 | 8.21 |
| Pavement | 226 | 247 | 14.50 | 11.00 | 8.30 | 12.71 |
| Litter | 394 | 382 | 69.75 | 62.00 | 53.55 | 49.91 |
| Cryptogams | 75 | 70 | 1.75 | 1.25 | 1.38 | 1.75 |
| Bare Ground | 115 | 129 | 5.25 | 2.25 | 2.58 | 4.92 |

SOIL ANALYSIS DATA --
Herd Unit 19A, Study no: 2, Ochre Mountain

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 15.2 | 61.0 (16.5) | 7.1 | 50.0 | 32.4 | 17.6 | 3.4 | 7.6 | 150.4 | 1.0 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 19A, Study no: 2

| Type | Quadrat Frequency | | Pellet Transect | |
|--------|-------------------|-----|------------------------------|------------------------------|
| | '97 | '02 | Pellet Groups per Acre 02 | Days Use per Acre (ha) 02 |
| Rabbit | 1 | 2 | - | - |
| Horse | 1 | 1 | 78 | N/A |
| Elk | - | 5 | 191 | 15 (36) |
| Deer | 5 | 18 | 566 | 44 (107) |
| Cattle | 5 | 3 | 44 | 3 (9) |

BROWSE CHARACTERISTICS --

Herd unit 19A, Study no: 2

| A G R E | Y R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|-------------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Artemisia nova | | | | | | | | | | | | | | | | | | |
| M | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '97 | 9 | - | - | - | - | - | - | - | - | 9 | - | - | - | 180 | 9 | 17 | 9 |
| | '02 | - | 5 | 2 | - | - | - | - | - | - | 1 | 6 | - | - | 140 | 14 | 23 | 7 |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '97 | 2 | - | - | - | - | - | - | - | - | - | - | - | 2 | 40 | | | 2 |
| | '02 | 4 | 2 | - | - | - | - | - | - | - | - | 6 | - | - | 120 | | | 6 |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 220 | | | 11 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 18% | | | +15% | | | | | | | |
| '02 | | 54% | | | 15% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 0 | | 0% | | | |
| | | | | | | | | | | | | '97 | 220 | | 18% | | | |
| | | | | | | | | | | | | '02 | 260 | | 46% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Artemisia tridentata tridentata | | | | | | | | | | | | | | | | | | |
| S | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | 2 | - | - | - | - | - | - | - | - | - | 1 | 1 | - | 133 | | 2 | |
| | '97 | 3 | - | - | 5 | - | - | - | - | - | 8 | - | - | - | 160 | | 8 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | '83 | 10 | 4 | - | - | - | - | - | - | - | 14 | - | - | - | 933 | 43 45 | 14 | |
| | '89 | 2 | 1 | 1 | - | - | - | - | - | - | 3 | 1 | - | - | 266 | 35 39 | 4 | |
| | '97 | 68 | 12 | 2 | 1 | - | - | - | - | - | 79 | 4 | - | - | 1660 | 34 47 | 83 | |
| | '02 | 35 | 4 | 6 | - | - | - | - | - | - | 17 | 28 | - | - | 900 | 36 46 | 45 | |
| D | '83 | - | 5 | 1 | - | - | - | - | - | - | 2 | 2 | 2 | - | 400 | | 6 | |
| | '89 | 5 | 9 | - | - | - | - | - | - | - | 4 | - | 8 | 2 | 933 | | 14 | |
| | '97 | 33 | 8 | 3 | 1 | - | - | - | - | - | 20 | - | - | 25 | 900 | | 45 | |
| | '02 | 31 | 9 | 4 | - | 1 | 1 | - | - | - | 2 | 20 | - | 24 | 920 | | 46 | |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1060 | | 53 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1580 | | 79 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 45% | | | 05% | | | 10% | | | - 0% | | | | | | | |
| '89 | | 50% | | | 05% | | | 55% | | | +51% | | | | | | | |
| '97 | | 15% | | | 04% | | | 18% | | | -33% | | | | | | | |
| '02 | | 15% | | | 12% | | | 26% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 1333 | Dec: | 30% | | | |
| | | | | | | | | | | | | '89 | 1332 | | 70% | | | |
| | | | | | | | | | | | | '97 | 2720 | | 33% | | | |
| | | | | | | | | | | | | '02 | 1820 | | 51% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Chrysothamnus viscidiflorus stenophyllus | | | | | | | | | | | | | | | | | | |
| M | '83 | 6 | - | - | - | - | - | - | - | - | 6 | - | - | - | 400 | 19 | 20 | 6 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '97 | 16 | - | - | 5 | - | - | - | - | - | 21 | - | - | - | 420 | 18 | 24 | 21 |
| | '02 | 16 | - | - | - | - | - | - | - | - | 16 | - | - | - | 320 | 15 | 23 | 16 |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '89 | 2 | - | - | - | - | - | - | - | - | 1 | - | 1 | - | 133 | | | 2 |
| | '97 | 2 | - | - | - | - | - | - | - | - | - | - | - | 2 | 40 | | | 2 |
| | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | -67% | | | | | | | |
| '89 | | 00% | | | 00% | | | 50% | | | +71% | | | | | | | |
| '97 | | 00% | | | 00% | | | 09% | | | -26% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 400 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 133 | | 100% | | | |
| | | | | | | | | | | | | '97 | 460 | | 9% | | | |
| | | | | | | | | | | | | '02 | 340 | | 6% | | | |

Trend Study 19A-4-02

Study site name: Durse Canyon.

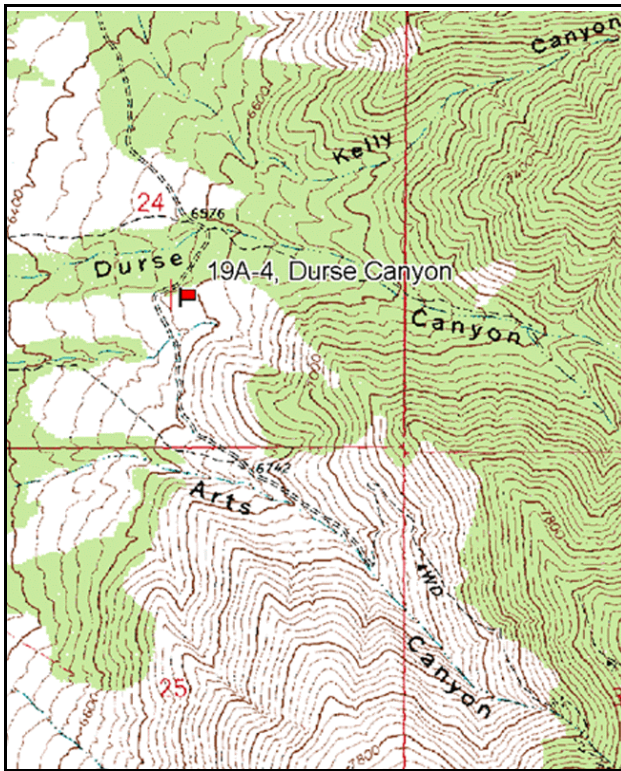
Vegetation type: Stansbury Cliffrose.

Compass bearing: frequency baseline 173 degrees magnetic.

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

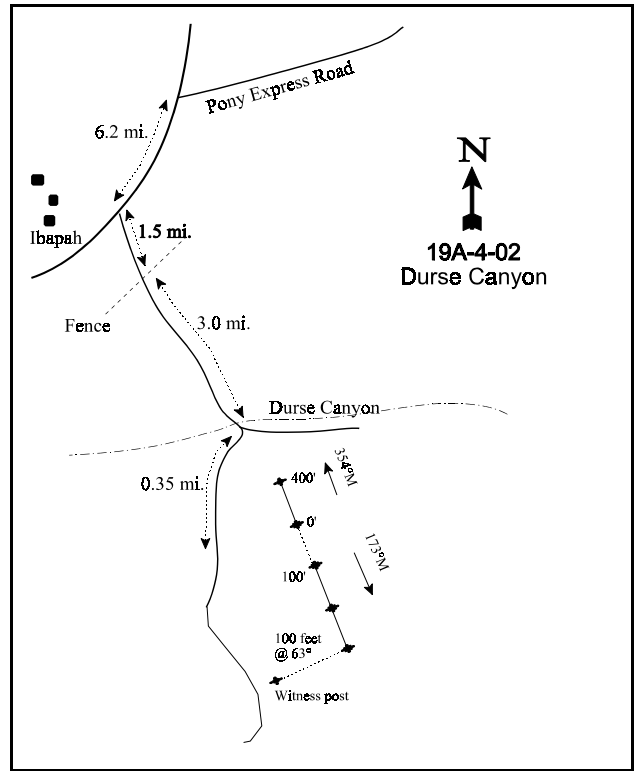
LOCATION DESCRIPTION

From the intersection of the Pony Express Road to Gold Hill, and the oiled road to Ibapah and Goshute, proceed southwest towards Goshute for 6.2 miles to a dirt road to the east. Turn left and proceed southeast for 4.55 miles, crossing numerous forks and side roads (keep going southeast and across Durse Canyon). After 4.55 miles, turn right and go 0.15 miles to another fork. Continue 0.2 miles farther to a red steel "T" fencepost on the left (east) side of the road. From the fencepost, the 0-foot baseline stake is located 100 feet away at an azimuth of 63 degrees true. The study is marked by green steel "T" fenceposts approximately 12 to 18 inches in height. A red browse tag, #3971 is attached to the 0-foot baseline stake.



Map Name: Goshute

Township 10S, Range 19W, Section 24



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4424939 N 249197 E

DISCUSSION

Durse Canyon - Trend Study No. 19A-4

This study is located on BLM administered land near the mouth of Durse Canyon at an elevation of 6,500 feet. The area is on a gentle (5%), west facing bench occupied by a sparse juniper-pinyon community which contains strong elements of Stansbury cliffrose, mountain big sagebrush, and black sagebrush. It has the appearance of an ecotone between the mature pinyon-juniper type at higher elevations and the more open sagebrush areas to the west. The Durse Canyon browse production-utilization transect is located in this area. Light to moderate densities of deer utilize the site in winter. Pellet group transect data collected on site in 2002 estimated 34 deer days use/acre (84 ddu/ha) and 6 elk days use/acre (15 edu/ha). Rabbit pellets were also somewhat abundant.

Soil is alluvially deposited and gravelly with both angular and rounded rocks present. Soil horizons are not sharply differentiated. Effective rooting depth was estimated at 9 inches, with a soil temperature averaging 58°F at 12 inches in depth in 1997. Textural and chemical analysis indicates soils to be a loam with a neutral reaction (pH 7.2). Erosion on the site has been minimal because of the gentle slope and moderate protective vegetation and litter cover. Soils are shallow and rocky. The erosion condition class was classified as stable in 2002.

Browse composition is visually dominated by a vigorous and productive population of Stansbury cliffrose. Cliffrose accounts for one-third of the total browse cover on the site. Cliffrose density was estimated at just over 800 plants/acre in 1997 and 2002. Age class analysis indicates a stable to slightly increasing population that has moderately high recruitment and low decadence. Vigor has been good throughout the entire population in all years. Use has been mostly light. Cliffrose plants were noted as having good flower production in 2002, but most plants had very few annual leaders and growth was minimal averaging about 1.5 inches. Photographic comparisons also illustrate excellent cliffrose seed production in 1989 and 1997. The mountain big sagebrush and black sagebrush populations were combined in the past and reported as mostly mountain big sagebrush. In 1997 and 2002, the two species were separated by morphological characteristics (plant size, leaf size, and leaf glands). Black sagebrush density was estimated at 2,120 plants/acre in 2002. The population appears healthy overall with good reproduction and light use. Decadence and poor vigor both increased in 2002 with drought conditions, but neither is extreme. The mountain big sagebrush population had an estimated density of 1,100 plants/acre in 1997, increasing to 1,400 plants/acre in 2002. Mountain big sagebrush has displayed high levels of decadence and poor vigor in most sampling years. It does not appear to be doing as well as the black sagebrush population. The shallow, rocky soils found on this site are more conducive for black sagebrush than mountain big sagebrush, so a healthier black sagebrush population is not unexpected. Mountain big sagebrush has had moderate recruitment from the young age class in most years. However, the proportion of decadent plants classified as dying has been high and the number of dead in the population has remained constant since 1997.

Broom snakeweed is a relatively numerous plant but of small stature. Density was estimated at 1,520 plants/acre in 1997. Nearly half of the population was classified as young in 1997. It appeared that the population could expand under the right climatic conditions. With drought in 2002, density declined to 1,180 plants/acre. Very few young were sampled. Broom snakeweed often decreases during dry conditions so the decline was not unexpected. Point-center quarter data determined 442 Utah juniper and 286 single-leaf pinyon trees/acre in 2002. Most of the remaining shrubs are undesirable increasers including stickyleaf low rabbitbrush and prickly pear cactus.

Due to the abundance of the browse component, the herbaceous understory is somewhat limited. Grasses have low diversity. Except for Sandberg bluegrass, perennials occur infrequently. Sandberg bluegrass nested

frequency has slowly increased since 1989, although the increase has not been significant. Other perennials include bluebunch wheatgrass, mutton bluegrass, and bottlebrush squirreltail. Cheatgrass was moderately abundant in 1997 being sampled in 75% of the quadrats. In 2002 with drought, cheatgrass was only sampled in 10% of the quadrats. A significant decrease in nested frequency. Forbs are more diverse than grasses, but provide less cover and have a lower sum of nested frequency value. Perennial forbs showed a large reduction in frequency with the drought conditions in 2002. Longleaf phlox, rock goldenrod, lobeleaf groundsel, and Utah sweetvetch are the most abundant species. Annual forbs have been quite low in all samples with none being sampled in 2002. There was no noticeable utilization on grasses or forbs in 1997 or 2002. This site is a good candidate for a chaining and seeding treatment to decrease the overabundant pinyon-juniper overstory and stimulate the growth of herbaceous species and key browse. Although, special consideration should be addressed to preventing the loss of the cliffrose mixed throughout this community.

1983 APPARENT TREND ASSESSMENT

The soil trend appears stable and will probably remain so unless vegetation cover is depleted. However, if pinyon and juniper become more dominant and crowd out other shrub species, erosion is likely to increase. The observable vegetation trends are contradictory. Tree species are increasing, but at the same time, cliffrose and possibly even black sagebrush are doing likewise. Big sagebrush is declining, while increaser shrubs are either static or slightly increasing. Herbaceous composition and density are stable to declining.

1989 TREND ASSESSMENT

Soil trend is slightly upward with less bare ground and more protective ground cover in 1989 than reported in 1983. The browse trend is stable. The Stansbury cliffrose and sagebrush populations appear stable, although both have increased decadence. Use on the key browse is light at the present time with very high reproduction as one-half of the population consists of young plants. Perennial grass sum of nested frequency has increased while perennial forb sum of nested frequency exhibits a decline. Overall, perennial herbaceous understory sum of nested frequency is slightly increased leading to a slightly upward herbaceous understory trend.

TREND ASSESSMENT

soil - slightly up (4)

browse - stable (3)

herbaceous understory - slightly upward (4)

1997 TREND ASSESSMENT

The soil trend is stable with only minimal amounts of erosion apparent. Much of the vegetation cover is contributed by browse and tree species. The minimal erosion rate is mostly due to the gentle terrain. The browse trend appears to be stable with improvements in cliffrose and black sagebrush making up for the losses in mountain big sagebrush. The Stansbury cliffrose population is vigorous and productive with few decadent or dead plants present. Mountain big sagebrush has a high decadency rate (42%) with 96% of these classified as dying. Dead plants account for 44% of the population, while 40% of the population displays poor vigor. It appears that mountain big sagebrush is declining on the site. The black sagebrush population seems to be up slightly with many young (38%) and only moderate decadence. The herbaceous understory is slightly upward. Sum of nested frequency for perennial species has increased since 1989.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly upward (4)

2002 TREND ASSESSMENT

Trend for soil is stable. Due to drought conditions in 2002, there are several negative aspects with the soil component. However, these are not significant enough to warrant a downward trend. Bare soil increased but not excessively. Vegetation and litter cover remains stable. Herbaceous species declined in frequency and cover overall, but perennial grasses remained stable in both categories. The erosion condition class was assessed as stable in 2002. Trend for browse is stable. The key browse populations have stable to slightly increasing densities. Stansbury cliffrose, black sagebrush, and mountain big sagebrush all show increased decadence, although the increase is within acceptable limits for cliffrose and black sagebrush. The mountain big sagebrush population is 50% decadent, but the proportion of the decadent plants classified as dying has decreased since 1997. This site is marginal for mountain big sagebrush with the shallow, rocky soils, and coupled with the dense pinyon-juniper overstory and drought in 2002. These negative parameters should be expected. The herbaceous understory has a slightly downward trend due to a decline in sum of nested frequency for perennial forbs. Perennial grasses maintained stable frequency and cover levels in 2002. The understory is limited and suppressed due to the dense canopy. This site is a good candidate for a chaining and seeding treatment to decrease the overstory and stimulate the herbaceous and key browse components. However, precautions should be utilized that will prevent the loss of cliffrose that occurs throughout this community.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --

Herd unit 19A, Study no: 4

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|--------------------------|------------------|------|------|------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | Agropyron spicatum | a3 | ab13 | b25 | ab15 | 1 | 6 | 10 | 5 | .20 | .10 |
| G | Bromus tectorum (a) | - | - | b235 | a27 | - | - | 75 | 10 | 3.73 | .24 |
| G | Poa fendleriana | a- | b17 | a1 | a- | - | 6 | 1 | - | .03 | - |
| G | Poa pratensis | 2 | 9 | - | - | 1 | 3 | - | - | - | - |
| G | Poa secunda | a77 | b188 | b194 | b213 | 31 | 69 | 71 | 78 | 4.24 | 5.47 |
| G | Sitanion hystrix | 42 | 46 | 36 | 24 | 21 | 22 | 19 | 12 | .91 | .21 |
| Total for Annual Grasses | | 0 | 0 | 235 | 27 | 0 | 0 | 75 | 10 | 3.73 | 0.24 |
| Total for Perennial Grasses | | 124 | 273 | 256 | 252 | 54 | 106 | 101 | 95 | 5.39 | 5.79 |
| Total for Grasses | | 124 | 273 | 491 | 279 | 54 | 106 | 176 | 105 | 9.13 | 6.03 |
| F | Alyssum alyssoides (a) | - | - | b12 | a- | - | - | 5 | - | .05 | - |
| F | Antennaria spp. | - | 1 | - | - | - | 1 | - | - | - | - |
| F | Arabis spp. | B19 | ab6 | b6 | a- | 10 | 4 | 5 | - | .40 | - |
| F | Asclepias labrifomis | 4 | - | 5 | - | 2 | - | 3 | - | .09 | - |
| F | Astragalus spp. | - | - | 1 | - | - | - | 1 | - | .00 | - |
| F | Astragalus utahensis | a13 | a3 | b58 | a9 | 5 | 2 | 28 | 7 | 1.55 | .03 |
| F | Camelina microcarpa (a) | - | - | b15 | a- | - | - | 8 | - | .26 | - |
| F | Castilleja spp. | - | - | 4 | - | - | - | 2 | - | .03 | - |
| F | Collinsia parviflora (a) | - | - | b17 | a- | - | - | 7 | - | .06 | - |
| F | Cryptantha spp. | B48 | b37 | a19 | a6 | 23 | 21 | 8 | 3 | .06 | .01 |

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|---------------------------|------------------------------------|------------------|-----------------|-----------------|-----------------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| F | <i>Descurainia pinnata</i> (a) | - | 1 | 2 | - | - | 1 | 2 | - | .01 | - |
| F | <i>Epilobium brachycarpum</i> (a) | - | - | 4 | - | - | - | 2 | - | .01 | - |
| F | <i>Ipomopsis aggregata</i> | _b 9 | _b 11 | _{ab} 9 | _a - | 5 | 7 | 4 | - | .02 | - |
| F | <i>Lathyrus brachycalyx</i> | - | 1 | - | 6 | - | 1 | - | 2 | - | .01 |
| F | <i>Linum lewisii</i> | 1 | 1 | - | - | 1 | 1 | - | - | - | - |
| F | <i>Lithospermum ruderales</i> | _a 1 | _b 13 | _a - | _a - | 1 | 6 | - | - | - | - |
| F | <i>Lygodesmia spinosa</i> | _b 10 | _{ab} 4 | _a - | _{ab} 4 | 6 | 2 | - | 2 | - | .01 |
| F | <i>Machaeranthera canescens</i> | _{ab} 6 | _a - | _b 12 | _a 2 | 2 | - | 5 | 2 | .05 | .01 |
| F | <i>Microsteris gracilis</i> (a) | - | - | 2 | - | - | - | 1 | - | .00 | - |
| F | <i>Oenothera</i> spp. | - | 2 | - | - | - | 1 | - | - | - | - |
| F | <i>Petrorhiza pumila</i> | _a - | _a 1 | _b 21 | _b 18 | - | 1 | 8 | 7 | .72 | .73 |
| F | <i>Phlox longifolia</i> | _a 20 | _a 14 | _b 65 | _a 23 | 12 | 9 | 29 | 11 | .24 | .08 |
| F | <i>Ranunculus testiculatus</i> (a) | - | - | _b 16 | _a - | - | - | 7 | - | .06 | - |
| F | <i>Senecio multilobatus</i> | _b 57 | _a 2 | _a 3 | _a 10 | 23 | 2 | 2 | 4 | .01 | .02 |
| F | <i>Streptanthus cordatus</i> | _a - | _a - | _b 31 | _a - | - | - | 15 | - | .67 | - |
| F | Unknown forb-perennial | - | 8 | - | - | - | 4 | - | - | - | - |
| F | <i>Zigadenus paniculatus</i> | 1 | 3 | - | 2 | 1 | 2 | - | 1 | .00 | .00 |
| Total for Annual Forbs | | 0 | 1 | 68 | 0 | 0 | 1 | 32 | 0 | 0.45 | 0 |
| Total for Perennial Forbs | | 189 | 107 | 234 | 80 | 91 | 64 | 110 | 39 | 3.89 | 0.91 |
| Total for Forbs | | 189 | 108 | 302 | 80 | 91 | 65 | 142 | 39 | 4.34 | 0.91 |

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

BROWSE TRENDS --

Herd unit 19A, Study no: 4

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|--------------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | <i>Artemisia nova</i> | 20 | 16 | 1.96 | 1.50 |
| B | <i>Artemisia tridentata vaseyana</i> | 33 | 39 | 3.84 | 6.97 |
| B | <i>Chrysothamnus viscidiflorus viscidiflorus</i> | 21 | 11 | .53 | .61 |
| B | <i>Cowania mexicana stansburiana</i> | 33 | 32 | 8.11 | 12.01 |
| B | <i>Grayia spinosa</i> | 15 | 8 | - | .30 |
| B | <i>Gutierrezia sarothrae</i> | 23 | 22 | .65 | .35 |
| B | <i>Juniperus osteosperma</i> | 10 | 9 | 6.03 | 4.03 |
| B | <i>Opuntia</i> spp. | 8 | 8 | .09 | .15 |
| B | <i>Pinus monophylla</i> | 8 | 13 | 2.78 | 8.22 |
| B | <i>Purshia tridentata</i> | 0 | 1 | - | - |
| Total for Browse | | 171 | 159 | 24.03 | 34.16 |

CANOPY COVER --

Herd unit 19A, Study no: 4

| Species | Percent Cover | |
|-------------------------------------------|---------------|-------|
| | '97 | '02 |
| Artemisia nova | - | 2.08 |
| Artemisia tridentata vaseyana | - | 3.42 |
| Chrysothamnus viscidiflorus viscidiflorus | - | .05 |
| Cowania mexicana stansburiana | 3 | 12.75 |
| Grayia spinosa | - | .33 |
| Gutierrezia sarothrae | - | 1.00 |
| Juniperus osteosperma | 3 | 6.42 |
| Pinus monophylla | 4 | 14.83 |

Key Browse Annual Leader Growth

Herd unit 19A , Study no: 4

| Species | Average leader growth (in) |
|-------------------------------|----------------------------|
| | '02 |
| Cowania mexicana stansburiana | 1.5 |

Point-Quarter Tree Data

Herd unit 19A , Study no: 4

| Species | Trees per Acre | | Average diameter (in) | |
|-----------------------|----------------|-----|-----------------------|-----|
| | '97 | '02 | '97 | '02 |
| Juniperus osteosperma | 374 | 442 | 3.9 | 2.7 |
| Pinus monophylla | 347 | 286 | 4.1 | 2.5 |

BASIC COVER --

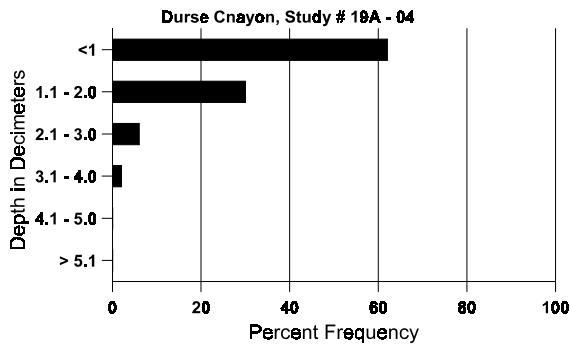
Herd unit 19A, Study no: 4

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 337 | 276 | 1.25 | 6.00 | 35.58 | 38.04 |
| Rock | 202 | 208 | 5.75 | 4.50 | 5.16 | 7.74 |
| Pavement | 290 | 283 | 16.50 | 25.00 | 19.35 | 24.56 |
| Litter | 378 | 366 | 54.00 | 53.25 | 39.18 | 41.39 |
| Cryptogams | 135 | 114 | 1.50 | 3.75 | 1.75 | 3.37 |
| Bare Ground | 195 | 217 | 21.00 | 7.50 | 8.62 | 13.97 |

SOIL ANALYSIS DATA --
 Herd Unit 19A, Study no: 4, Durse Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 9.1 | 58.0 (11.8) | 7.2 | 38.0 | 37.4 | 24.6 | 4.0 | 15.9 | 150.4 | 0.7 |

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 19A, Study no: 4

| Type | Quadrat Frequency | |
|--------|-------------------|-----|
| | '97 | '02 |
| Rabbit | 11 | 9 |
| Elk | - | - |
| Deer | 10 | 10 |

| Pellet Transect | |
|------------------------|------------------------|
| Pellet Groups per Acre | Days Use per Acre (ha) |
| 02 | 02 |
| - | - |
| 78 | 6 (15) |
| 444 | 34 (84) |

BROWSE CHARACTERISTICS --
Herd unit 19A, Study no: 4

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Artemisia nova | | | | | | | | | | | | | | | | | | |
| S | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | | 5 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | 21 | - | - | - | - | - | - | - | - | 21 | - | - | - | 420 | | 21 | |
| | '02 | 28 | - | - | - | - | - | - | - | - | 28 | - | - | - | 560 | | 28 | |
| M | '83 | - | 3 | - | - | - | - | - | - | - | 3 | - | - | - | 100 | 29 43 | 3 | |
| | '89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 7 12 | 1 | |
| | '97 | 24 | 1 | - | - | - | - | - | - | - | 25 | - | - | - | 500 | 13 20 | 25 | |
| | '02 | 45 | 3 | - | - | - | - | - | - | - | 48 | - | - | - | 960 | 11 18 | 48 | |
| D | '83 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | 9 | - | - | - | - | - | - | - | - | 6 | - | - | 3 | 180 | | 9 | |
| | '02 | 30 | - | - | - | - | - | - | - | - | 8 | - | - | 22 | 600 | | 30 | |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 380 | | 19 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 360 | | 18 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 100% | | | 00% | | | 00% | | | -75% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +97% | | | | | | | |
| '97 | | 02% | | | 00% | | | 05% | | | +48% | | | | | | | |
| '02 | | 03% | | | 00% | | | 21% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 133 | Dec: | 25% | | | |
| | | | | | | | | | | | | '89 | 33 | | 0% | | | |
| | | | | | | | | | | | | '97 | 1100 | | 16% | | | |
| | | | | | | | | | | | | '02 | 2120 | | 28% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Artemisia tridentata vaseyana | | | | | | | | | | | | | | | | | | |
| S | '83 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 100 | | 3 | |
| | '89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | '97 | 2 | - | - | 2 | - | - | - | - | - | 4 | - | - | - | 80 | | 4 | |
| | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| Y | '83 | 15 | - | - | - | - | - | - | - | - | 14 | 1 | - | - | 500 | | 15 | |
| | '89 | 8 | - | - | - | - | - | - | - | - | 8 | - | - | - | 266 | | 8 | |
| | '97 | 12 | - | - | - | - | - | - | - | - | 12 | - | - | - | 240 | | 12 | |
| | '02 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 140 | | 7 | |
| M | '83 | 9 | 28 | 5 | - | - | - | - | - | - | 35 | 3 | 4 | - | 1400 | 25 25 | 42 | |
| | '89 | 25 | 2 | - | - | - | - | - | - | - | 20 | 4 | 3 | - | 900 | 22 25 | 27 | |
| | '97 | 18 | 2 | - | - | - | - | - | - | - | 18 | 2 | - | - | 400 | 20 27 | 20 | |
| | '02 | 26 | 2 | - | - | - | - | - | - | - | 28 | - | - | - | 560 | 17 25 | 28 | |
| D | '83 | 7 | 10 | 3 | - | - | - | - | - | - | 10 | 3 | 7 | - | 666 | | 20 | |
| | '89 | 36 | 4 | - | 3 | - | - | - | - | - | 34 | 3 | 6 | - | 1433 | | 43 | |
| | '97 | 20 | 3 | - | - | - | - | - | - | - | 1 | - | - | 22 | 460 | | 23 | |
| | '02 | 29 | - | - | 6 | - | - | - | - | - | 15 | - | 2 | 18 | 700 | | 35 | |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 880 | | 44 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1080 | | 54 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 49% | | | 10% | | | 14% | | | + 1% | | | | | | | |
| '89 | | 08% | | | 00% | | | 12% | | | -58% | | | | | | | |
| '97 | | 09% | | | 00% | | | 40% | | | +21% | | | | | | | |
| '02 | | 03% | | | 00% | | | 29% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 2566 | Dec: | 26% | | | |
| | | | | | | | | | | | | '89 | 2599 | | 55% | | | |
| | | | | | | | | | | | | '97 | 1100 | | 42% | | | |
| | | | | | | | | | | | | '02 | 1400 | | 50% | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|---|--------------------|--------------------------------|----------------|-------|-------|----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | |
| Chrysothamnus viscidiflorus viscidiflorus | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 3 | - | - | - | - | - | - | 100 | | 3 |
| | 97 | 1 | - | - | - | - | - | - | 20 | | 1 |
| | 02 | - | - | - | - | - | - | - | 0 | | 0 |
| Y | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 4 | - | - | - | - | - | - | 133 | | 4 |
| | 97 | 9 | - | - | - | - | - | - | 180 | | 9 |
| | 02 | - | - | - | - | - | - | - | 0 | | 0 |
| M | 83 | 12 | - | - | - | - | - | - | 400 | 12 15 | 12 |
| | 89 | 7 | - | - | - | - | - | - | 233 | 8 14 | 7 |
| | 97 | 15 | - | - | 1 | - | - | - | 320 | 9 14 | 16 |
| | 02 | 22 | - | - | - | - | - | - | 500 | 8 16 | 25 |
| D | 83 | 3 | - | - | - | - | - | - | 100 | | 3 |
| | 89 | 10 | - | - | - | - | - | - | 333 | | 10 |
| | 97 | 1 | - | - | - | - | - | - | 20 | | 1 |
| | 02 | 4 | - | - | - | - | - | - | 80 | | 4 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 00% | | 00% | | 20% | | +28% | | | |
| '89 | | 00% | | 00% | | 19% | | -26% | | | |
| '97 | | 00% | | 00% | | 04% | | +10% | | | |
| '02 | | 00% | | 00% | | 07% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 500 | Dec: | 20% | | |
| | | | | | | '89 | 699 | | 48% | | |
| | | | | | | '97 | 520 | | 4% | | |
| | | | | | | '02 | 580 | | 14% | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Cowania mexicana stansburiana</i> | | | | | | | | | | | | | | | | | | |
| S | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 233 | | 7 | |
| | '97 | 6 | - | - | 1 | - | - | - | - | - | 7 | - | - | - | 160 | | 8 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | '83 | 15 | - | - | - | - | - | - | - | - | 15 | - | - | - | 500 | | 15 | |
| | '89 | 19 | - | - | - | - | - | - | - | - | 19 | - | - | - | 633 | | 19 | |
| | '97 | 14 | - | - | - | - | - | - | - | - | 14 | - | - | - | 280 | | 14 | |
| | '02 | 4 | 1 | - | 1 | - | - | - | - | - | 6 | - | - | - | 120 | | 6 | |
| M | '83 | 9 | 1 | - | 2 | - | - | 3 | - | - | 15 | - | - | - | 500 | 54 31 | 15 | |
| | '89 | 15 | - | - | 2 | - | - | - | - | - | 17 | - | - | - | 566 | 79 69 | 17 | |
| | '97 | 23 | 1 | - | 3 | - | - | - | - | - | 27 | - | - | - | 540 | 66 56 | 27 | |
| | '02 | 11 | 4 | 1 | 8 | 2 | - | 1 | 1 | - | 28 | - | - | - | 560 | 67 64 | 28 | |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | '97 | - | - | - | - | - | - | 1 | - | - | - | - | - | 1 | 20 | | 1 | |
| | '02 | 5 | - | - | - | - | - | - | 2 | - | 5 | - | - | 2 | 140 | | 7 | |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | 2 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 80 | | 4 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 03% | | | 00% | | | 00% | | | +19% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -32% | | | | | | | |
| '97 | | 02% | | | 00% | | | 02% | | | -2% | | | | | | | |
| '02 | | 17% | | | 02% | | | 05% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 1000 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 1232 | | 3% | | | |
| | | | | | | | | | | | | '97 | 840 | | 2% | | | |
| | | | | | | | | | | | | '02 | 820 | | 17% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|-----|--------------------|--------------------------------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | |
| Grayia spinosa | | | | | | | | | | | | | | | | | |
| S | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | '97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| Y | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | '97 | 21 | - | - | - | - | - | - | - | - | 21 | - | - | - | 420 | | 21 |
| | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 |
| M | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - |
| | '97 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 140 | 15 | 33 |
| | '02 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 140 | 17 | 30 |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | '02 | 4 | - | - | - | - | - | - | - | - | 3 | - | - | 1 | 80 | | 4 |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | -57% | | | | | | |
| '02 | | 00% | | | 00% | | | 08% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | '89 | 0 | | 0% | | | |
| | | | | | | | | | | | '97 | 560 | | 0% | | | |
| | | | | | | | | | | | '02 | 240 | | 33% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Gutierrezia sarothrae | | | | | | | | | | | | | | | | | | |
| S | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | 4 | - | - | 1 | - | - | - | - | - | 5 | - | - | - | 100 | | 5 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | '83 | 10 | - | - | - | - | - | - | - | - | 10 | - | - | - | 333 | | 10 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | 36 | - | - | - | - | - | - | - | - | 36 | - | - | - | 720 | | 36 | |
| | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | '83 | 67 | - | - | - | - | - | - | - | - | 67 | - | - | - | 2233 | 6 | 7 | 67 |
| | '89 | 49 | - | - | - | - | - | - | - | - | 49 | - | - | - | 1633 | 7 | 8 | 49 |
| | '97 | 39 | - | - | - | - | - | - | - | - | 39 | - | - | - | 780 | 8 | 10 | 39 |
| | '02 | 52 | - | - | - | - | - | - | - | - | 52 | - | - | - | 1040 | 6 | 6 | 52 |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | 20 | | 1 | |
| | '02 | 5 | - | - | 1 | - | - | - | - | - | 4 | - | - | 2 | 120 | | 6 | |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | 2 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | -36% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | - 7% | | | | | | | |
| '97 | | 00% | | | 00% | | | 01% | | | -22% | | | | | | | |
| '02 | | 00% | | | 00% | | | 03% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 2566 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 1633 | | 0% | | | |
| | | | | | | | | | | | | '97 | 1520 | | 1% | | | |
| | | | | | | | | | | | | '02 | 1180 | | 10% | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| S | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 4 | - | - | 1 | - | - | - | - | - | 5 | - | - | - | 100 | | 5 | |
| | 02 | 2 | - | - | 1 | - | - | - | - | - | 3 | - | - | - | 60 | | 3 | |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 89 | 4 | - | - | 1 | - | - | - | - | - | 5 | - | - | - | 166 | | 5 | |
| | 97 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 140 | | 7 | |
| | 02 | 2 | - | - | 2 | - | - | - | - | - | 4 | - | - | - | 80 | | 4 | |
| M | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 45 | 18 | 1 |
| | 89 | 2 | - | - | 1 | - | - | - | - | - | 3 | - | - | - | 100 | 209 | 89 | 3 |
| | 97 | 1 | - | - | - | - | - | 2 | - | - | 3 | - | - | - | 60 | - | - | 3 |
| | 02 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | - | - | 5 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +75% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -25% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | -10% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 66 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 266 | | - | | | |
| | | | | | | | | | | | | '97 | 200 | | - | | | |
| | | | | | | | | | | | | '02 | 180 | | - | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 83 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 133 | 7 | 12 | 4 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 8 | - | - | 1 | - | - | - | - | - | 9 | - | - | - | 180 | 6 | 13 | 9 |
| | 02 | 11 | - | - | - | - | - | - | - | - | 11 | - | - | - | 220 | 5 | 10 | 11 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | -80% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +85% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | + 8% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 166 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 33 | | - | | | |
| | | | | | | | | | | | | '97 | 220 | | - | | | |
| | | | | | | | | | | | | '02 | 240 | | - | | | |

| A G R E | Y R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|-------------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|---|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Pinus monophylla | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | 2 | - | - | - | - | - | - | - | - | - | - | - | 66 | | | 2 | |
| | 97 | 3 | - | - | - | - | - | - | - | - | - | - | - | 60 | | | 3 | |
| | 02 | 5 | - | - | 1 | - | - | - | - | - | - | - | - | 120 | | | 6 | |
| Y | 83 | 4 | - | - | - | - | - | - | - | - | - | - | - | 133 | | | 4 | |
| | 89 | 7 | - | - | - | - | - | - | - | - | - | - | - | 233 | | | 7 | |
| | 97 | 5 | - | - | - | - | - | 1 | - | - | - | - | - | 120 | | | 6 | |
| | 02 | 5 | - | - | 1 | - | - | - | - | - | - | - | 1 | 120 | | | 6 | |
| M | 83 | 3 | - | - | - | - | - | - | - | - | - | - | - | 100 | 67 | 71 | 3 | |
| | 89 | - | - | - | 2 | - | - | - | - | - | - | - | - | 66 | 138 | 98 | 2 | |
| | 97 | 2 | - | - | - | - | - | 1 | - | - | - | - | - | 60 | - | - | 3 | |
| | 02 | 2 | - | - | - | - | - | - | 5 | - | - | - | - | 140 | - | - | 7 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | 20 | | | 1 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +22% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -40% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +36% | | | | | | | |
| '02 | | 00% | | | 00% | | | 14% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 233 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 299 | | 0% | | | |
| | | | | | | | | | | | | '97 | 180 | | 0% | | | |
| | | | | | | | | | | | | '02 | 280 | | 7% | | | |
| Polygala acanthoclada | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | - | - | - | 33 | 13 | 8 | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | - | - | - | 33 | | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 66 | | 50% | | | |
| | | | | | | | | | | | | '97 | 0 | | 0% | | | |
| | | | | | | | | | | | | '02 | 0 | | 0% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Purshia tridentata | | | | | | | | | | | | | | | | | | |
| M | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 6 | 11 | 0 |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '02 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 100% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 0 | | 0% | | | |
| | | | | | | | | | | | | '97 | 0 | | 0% | | | |
| | | | | | | | | | | | | '02 | 20 | | 100% | | | |
| Tetradymia spinosa | | | | | | | | | | | | | | | | | | |
| M | '83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 10 | 10 | 1 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 33 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |

Trend Study 19A-7-02

Study site name: Wood Canyon.

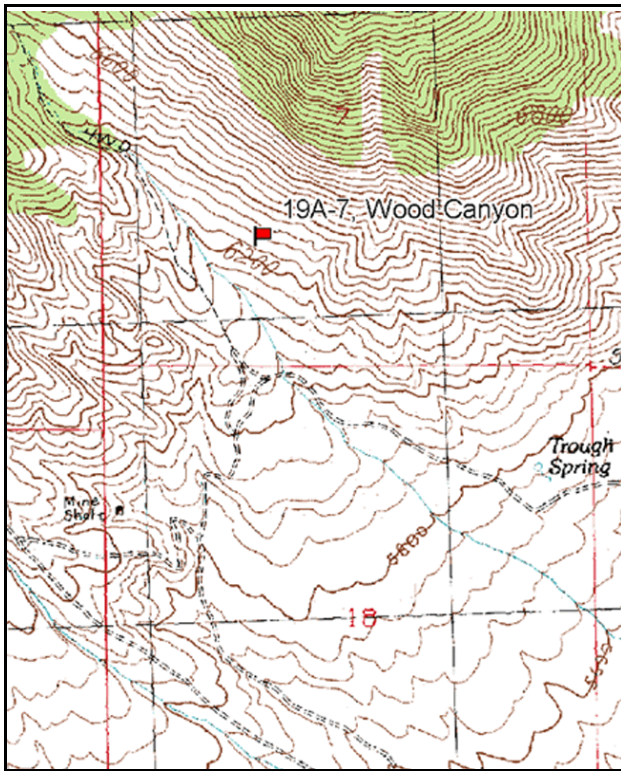
Vegetation type: Desert Shrub.

Compass bearing: frequency baseline 9 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 1 on 2ft, belt 2 on 1ft, and belt 2 on 1ft.

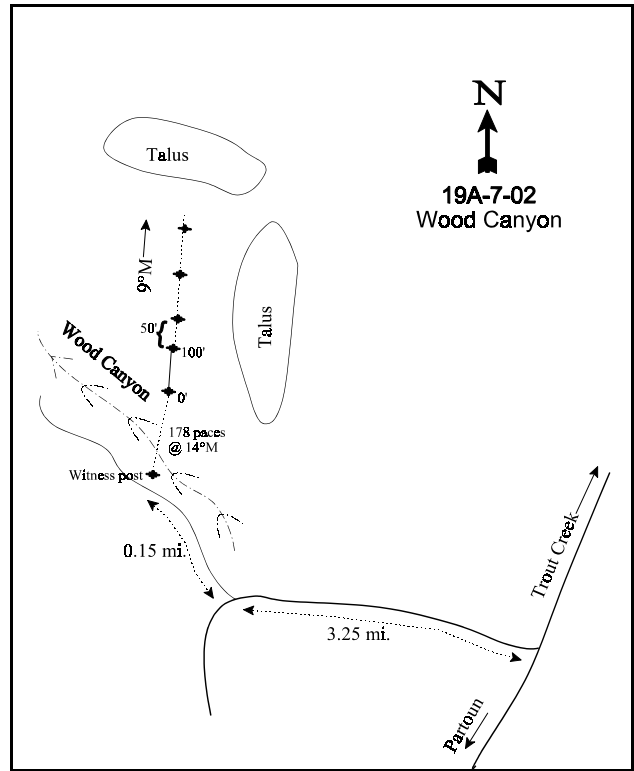
LOCATION DESCRIPTION

From Trout Creek on the Gandy Road through Snake Valley, go south to the old Partoun dump (Now covered over). Turn west and continue 0.7 miles to the Trough Springs turnoff. Take this road west for 3.25 miles to the turn-off to Wood Canyon. Turn right and go 0.15 miles to a witness post on the right side of the road. From the witness post, walk 178 paces north ($14^{\circ}M$) to the 0 foot baseline stake which is behind a large rock. The baseline runs uphill at 9 degrees magnetic.



Map Name: Partoun

Township 13S, Range 18W, Section 7



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4398242 N 249391 E

DISCUSSION

Wood Canyon - Trend Study No. 19A-7

The Wood Canyon study is located on the southeast end of the Deep Creek Mountains. Elevation is 6,300 feet on a moderately steep (32-35%), south facing slope. The study was established in 1989 primarily to monitor bighorn sheep habitat, but it receives mostly winter use by deer. The local fauna includes chukars which were heard on the nearby ledges in both 1989 and 1997. Rugged cliffs cap the ridge north of the site with miles of vast open desert to the south and east. A stock pond one mile to the east is the closest apparent water source. A pellet group transect read on site in 2002 estimated 10 deer days use/acre (25 ddu/ha), <1 elk day use/acre (2 edu/ha), and 8 cow days use/acre (20 cdu/ha). Rabbit, horse, and grouse pellets were also sampled within the transect.

Soils are the Spager type, which are very gravelly. Effective rooting depth was estimated at 10 inches with a soil temperature averaging 71°F at a depth of 11 inches. Chemical and textural analysis indicates soils to be a loam with a mildly alkaline reaction (pH 7.4). Phosphorous levels in the soil were low (8.3 ppm), which may be limiting to normal plant growth and development. Erosion has been negligible on this site in spite of only fair vegetation and litter cover. However, rock and pavement are very abundant which armor the soil surface. The erosion condition class was determined as stable in 2002.

The browse component consists of a variety of species, although none are particularly abundant with the exception of broom snakeweed. Shadscale had an estimated density of 1,400 plants/acre in 1997, declining to 1,140 plants/acre in 2002. Utilization has been mostly light on shadscale, with percent decadence and poor vigor increasing with every reading. The number of dead in the population has steadily increased. The proportion of decadent plants classified as dying has been high at 75% in 1997 and 2002. The number of young plants (recruitment) in the population increased from 11% in 1997 to 30% in 2002, although this is not an adequate level to replace the plants being lost. Shadscale was not producing flowering stocks in 2002. Nevada ephedra had an estimated density of 320 plants/acre in 2002, an increase from 160 plants/acre in 1997. The number of young increased in 2002, but three-fourths of the population displayed poor vigor. Use on ephedra has been mostly light to moderate in all years. Low density browse species that have also been sampled include winterfat, summer cypress, black sagebrush, cotton-thorn horsebrush, stickyleaf low rabbitbrush, prickly pear cactus, and yucca.

Broom snakeweed is the dominate browse on the site with an estimated density of 5,200 plants/acre in 1997 and 3,320 plants/acre in 2002. This is a mature population that is declining due to drought conditions. Percent decadence and poor vigor increased in 2002 whereas the number of young continues to decline.

Although cheatgrass is the most abundant grass on the site, it does not visually dominate due to its small stature. Cheatgrass significantly declined in nested frequency between 1997 and 2002, but still had the highest cover and frequency values in 2002. Galleta is the most abundant perennial grass. This species significantly increased in nested frequency between 1989 and 1997, but significantly decreased between 1997 and 2002 with the decrease in warm season precipitation. Other perennials sampled include Indian ricegrass, Sandberg bluegrass, bottlebrush squirreltail, sand dropseed, and needle-and-thread. Sum of nested frequency for perennial grasses increased between 1989 and 1997, but decreased between 1997 and 2002. Incidentally, the 1989 and 2002 readings occurred during periods of drought when perennial grass sum of nested frequency was lowest. The forb component is sparse, especially perennial species. No perennials were sampled in 2002, although only a few were sampled in either 1989 and 1997. Storksbill, a winter annual, was moderately abundant in 2002.

1989 APPARENT TREND ASSESSMENT

Soil erosion is detectable in small quantities, but overall trend appears to be moving towards stabilization. The excessive amounts of broom snakeweed should decrease as range conditions improve. Although limited, the key species are vigorous and productive under the current light utilization. Depending on domestic livestock management and possible changes in grazing strategies, the site can be expected to maintain the present equilibrium.

1997 TREND ASSESSMENT

Soil trend is stable with little erosion apparent. Much of the surface is covered by rock and pavement leaving little bare ground exposed. Trend for browse is stable, with little utilization on any browse species. Most browse species, with the exception of shadscale which makes up the majority of the key browse cover, appear to be stable with no great increases or decreases in densities. Shadscale increased in density with more young in the population in 1997. However, 75% of the decadent plants were classified as dying so the population could decline in the future. The herbaceous understory is slightly upward with an increase in sum of nested frequency for perennial grasses.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly up (4)

2002 TREND ASSESSMENT

Trend for soil is slightly down. With drought in 2002, vegetation and litter cover declined, while bare soil increased. Trend for browse is down. Shadscale declined in density. The decadent age class is still dominated by dying plants which could result in a future population reduction. Poor vigor and percent decadence have also increased since 1997. All other palatable browse species occur in such low densities that they are unimportant on the site. Trend for the herbaceous understory is slightly down. No perennial forbs were sampled in 2002 and perennial grasses have a decreased sum of nested frequency value in 2002.

TREND ASSESSMENT

soil - slightly down (2)

browse - down (1)

herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --

Herd unit 19A, Study no: 7

| T y p e | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % | |
|-----------------------------|-------------------------------|------------------|------------------|------------------|-------------------|-----|-----|-----------------|------|
| | | '89 | '97 | '02 | '89 | '97 | '02 | '97 | '02 |
| G | Bromus tectorum (a) | - | _b 351 | _a 304 | - | 100 | 100 | 6.15 | 2.00 |
| G | Hilaria jamesii | _a 59 | _b 119 | _a 78 | 25 | 47 | 35 | 4.03 | .97 |
| G | Oryzopsis hymenoides | _b 63 | _{ab} 47 | _a 27 | 31 | 21 | 13 | 1.81 | .60 |
| G | Poa secunda | - | 5 | 6 | - | 2 | 4 | .06 | .04 |
| G | Sitanion hystrix | _{ab} 15 | _b 17 | _a 2 | 8 | 10 | 1 | .34 | .03 |
| G | Sporobolus cryptandrus | _a - | _a 3 | _b 24 | - | 1 | 11 | .06 | .20 |
| G | Stipa comata | _a 8 | _b 52 | _b 50 | 6 | 24 | 23 | 1.50 | 1.16 |
| Total for Annual Grasses | | 0 | 351 | 304 | 0 | 100 | 100 | 6.15 | 2.00 |
| Total for Perennial Grasses | | 145 | 243 | 187 | 70 | 105 | 87 | 7.82 | 3.01 |
| Total for Grasses | | 145 | 594 | 491 | 70 | 205 | 187 | 13.98 | 5.01 |
| F | Alyssum alyssoides (a) | - | 11 | 5 | - | 5 | 2 | .02 | .01 |
| F | Astragalus spp. | 3 | 1 | - | 2 | 1 | - | .03 | - |
| F | Erodium cicutarium (a) | - | _a 83 | _b 239 | - | 33 | 85 | 1.17 | 1.92 |
| F | Erigeron spp. | - | 7 | - | - | 2 | - | .03 | - |
| F | Halogeton glomeratus (a) | _b 13 | _{ab} 3 | _a - | 5 | 1 | - | .00 | - |
| F | Sphaeralcea grossulariaefolia | 9 | 2 | - | 4 | 1 | - | .03 | - |
| F | Unknown forb-perennial | 2 | - | - | 1 | - | - | - | - |
| Total for Annual Forbs | | 13 | 97 | 244 | 5 | 39 | 87 | 1.20 | 1.93 |
| Total for Perennial Forbs | | 14 | 10 | 0 | 7 | 4 | 0 | 0.09 | 0 |
| Total for Forbs | | 27 | 107 | 244 | 12 | 43 | 87 | 1.29 | 1.93 |

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

BROWSE TRENDS --

Herd unit 19A, Study no: 7

| T y p e | Species | Strip Frequency | | Average Cover % | |
|------------------|------------------------------------------|-----------------|-----|-----------------|------|
| | | '97 | '02 | '97 | '02 |
| B | Atriplex confertifolia | 42 | 33 | 2.31 | .72 |
| B | Ceratoides lanata | 3 | 2 | - | - |
| B | Chrysothamnus viscidiflorus stenophyllus | 5 | 4 | .53 | .30 |
| B | Echinocereus spp. | 0 | 9 | - | .01 |
| B | Ephedra nevadensis | 6 | 10 | .78 | 1.25 |
| B | Gutierrezia sarothrae | 87 | 72 | 4.98 | 2.21 |
| B | Kochia americana | 0 | 5 | .03 | .03 |
| B | Opuntia spp. | 18 | 24 | 1.03 | .82 |
| B | Tetradymia spinosa | 5 | 5 | 1.34 | .21 |
| Total for Browse | | 166 | 164 | 11.01 | 5.58 |

CANOPY COVER -- LINE INTERCEPT

Herd unit 19A, Study no: 7

| Species | Percent Cover | |
|------------------------------------------|---------------|------|
| | '97 | '02 |
| Atriplex confertifolia | - | .83 |
| Chrysothamnus viscidiflorus stenophyllus | - | .17 |
| Ephedra viridis | - | 1.75 |
| Gutierrezia sarothrae | - | 2.33 |
| Kochia americana | - | .42 |
| Opuntia spp. | - | .83 |

BASIC COVER --

Herd unit 19A, Study no: 7

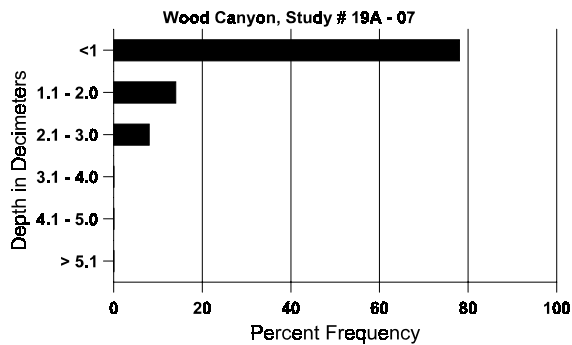
| Cover Type | Nested Frequency | | Average Cover % | | |
|-------------|------------------|-----|-----------------|-------|-------|
| | '97 | '02 | '89 | '97 | '02 |
| Vegetation | 362 | 325 | 7.25 | 29.85 | 13.73 |
| Rock | 330 | 342 | 23.25 | 29.92 | 34.00 |
| Pavement | 327 | 345 | 38.75 | 23.06 | 27.17 |
| Litter | 376 | 342 | 23.50 | 21.44 | 18.53 |
| Cryptogams | 63 | 19 | 0 | .31 | .44 |
| Bare Ground | 243 | 285 | 7.25 | 6.78 | 13.98 |

SOIL ANALYSIS DATA --

Herd Unit 19A, Study no: 7, Wood Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 10.4 | 71.0 (11.3) | 7.4 | 50.0 | 31.4 | 18.6 | 1.5 | 9.2 | 233.6 | 0.8 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19A, Study no: 7

| Type | Quadrat Frequency | | Pellet Transect | |
|----------|-------------------|-----|------------------------------|------------------------------|
| | '97 | '02 | Pellet Groups per Acre 02 | Days Use per Acre (ha) 02 |
| Rabbit | 4 | 4 | - | - |
| Horse | - | 1 | 44 | N/A |
| Elk | 2 | - | 9 | 1 (2) |
| Deer | 9 | 10 | 131 | 10 (25) |
| Cattle | - | - | 96 | 8 (20) |
| Antelope | - | - | 52 | 4 (10) |

BROWSE CHARACTERISTICS --

Herd unit 19A, Study no: 7

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|---|------|-----------------|-----------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Artemisia nova | | | | | | | | | | | | | | | | | | |
| M | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 13 | 20 | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 8 | 17 | 0 |
| X | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 60 | | | 3 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| | | '89 | | | 00% | | | 00% | | | 00% | | | | | | | |
| | | '97 | | | 00% | | | 00% | | | 00% | | | | | | | |
| | | '02 | | | 00% | | | 00% | | | 00% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |

| A G R E | Y R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|-------------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Atriplex confertifolia</i> | | | | | | | | | | | | | | | | | | |
| S | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 140 | | 7 | |
| | 02 | 17 | - | - | - | - | - | - | - | - | 17 | - | - | - | 340 | | 17 | |
| M | 89 | 28 | - | - | - | - | - | - | - | - | 28 | - | - | - | 933 | 10 | 17 | 28 |
| | 97 | 35 | 7 | 5 | - | - | - | - | - | - | 46 | - | - | 1 | 940 | 10 | 23 | 47 |
| | 02 | 14 | 1 | - | - | - | - | - | - | - | 14 | - | 1 | - | 300 | 6 | 15 | 15 |
| D | 89 | 6 | - | - | - | - | - | - | - | - | 6 | - | - | - | 200 | | | 6 |
| | 97 | 13 | 3 | - | - | - | - | - | - | - | 3 | - | 1 | 12 | 320 | | | 16 |
| | 02 | 22 | 1 | 1 | - | - | 1 | - | - | - | 6 | - | - | 19 | 500 | | | 25 |
| X | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 500 | | | 25 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1060 | | | 53 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +19% | | | | | | | |
| '97 | | 14% | | | 07% | | | 20% | | | -19% | | | | | | | |
| '02 | | 04% | | | 04% | | | 35% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 1133 | Dec: | 18% | | | |
| | | | | | | | | | | | | '97 | 1400 | | 23% | | | |
| | | | | | | | | | | | | '02 | 1140 | | 44% | | | |
| <i>Ceratoides lanata</i> | | | | | | | | | | | | | | | | | | |
| M | 89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | 11 | 15 | 2 |
| | 97 | 2 | 1 | - | - | - | - | - | - | - | 3 | - | - | - | 60 | 9 | 10 | 3 |
| | 02 | - | - | 1 | - | - | - | - | - | - | 1 | - | - | - | 20 | 5 | 10 | 1 |
| D | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | | 1 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | 1 | - | - | - | - | - | - | 1 | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -39% | | | | | | | |
| '97 | | 33% | | | 00% | | | 00% | | | -33% | | | | | | | |
| '02 | | 00% | | | 100% | | | 50% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 99 | Dec: | 33% | | | |
| | | | | | | | | | | | | '97 | 60 | | 0% | | | |
| | | | | | | | | | | | | '02 | 40 | | 50% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|-----|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Chrysothamnus viscidiflorus stenophyllus | | | | | | | | | | | | | | | | | | |
| M | 89 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 100 | 8 | 10 | 3 |
| | 97 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 80 | 48 | 16 | 4 |
| | 02 | 1 | - | 1 | - | - | - | - | - | - | 2 | - | - | - | 40 | 7 | 17 | 2 |
| D | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | 20 | | | 1 |
| | 02 | 2 | - | - | - | - | - | - | - | - | 1 | - | - | 1 | 40 | | | 2 |
| X | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '97 | | 00% | | | 00% | | | 20% | | | -20% | | | | | | | |
| '02 | | 00% | | | 25% | | | 25% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '89 | 100 | Dec: | 0% | | | | |
| | | | | | | | | | | | '97 | 100 | | 20% | | | | |
| | | | | | | | | | | | '02 | 80 | | 50% | | | | |
| Echinocereus spp. | | | | | | | | | | | | | | | | | | |
| Y | 89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | | 2 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | | 2 |
| M | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | 8 | - | - | - | - | - | - | - | - | 8 | - | - | - | 160 | 3 | 6 | 8 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '89 | 66 | Dec: | - | | | | |
| | | | | | | | | | | | '97 | 0 | | - | | | | |
| | | | | | | | | | | | '02 | 200 | | - | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Ephedra nevadensis</i> | | | | | | | | | | | | | | | | | | |
| Y | 89 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 133 | | 4 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | 1 | 3 | - | - | - | - | - | - | - | 2 | - | 2 | - | 80 | | 4 | |
| M | 89 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 133 | 11 | 21 | 4 |
| | 97 | 7 | 1 | - | - | - | - | - | - | - | 8 | - | - | - | 160 | 17 | 35 | 8 |
| | 02 | 4 | 5 | 1 | - | - | - | - | - | - | 2 | - | 8 | - | 200 | 18 | 46 | 10 |
| D | 89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | 1 | 1 | - | - | - | - | - | - | - | - | - | - | 2 | 40 | | 2 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -52% | | | | | | | |
| '97 | | 13% | | | 00% | | | 00% | | | +50% | | | | | | | |
| '02 | | 56% | | | 06% | | | 75% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 332 | Dec: | 20% | | | |
| | | | | | | | | | | | | '97 | 160 | | 0% | | | |
| | | | | | | | | | | | | '02 | 320 | | 13% | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | | |
| S | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | | 3 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 89 | 24 | - | - | - | - | - | - | - | - | 24 | - | - | - | 800 | | 24 | |
| | 97 | 18 | - | - | - | - | - | - | - | - | 18 | - | - | - | 360 | | 18 | |
| | 02 | 7 | - | - | - | - | - | - | - | - | 6 | - | 1 | - | 140 | | 7 | |
| M | 89 | 81 | - | - | - | - | - | - | - | - | 81 | - | - | - | 2700 | 7 | 6 | 81 |
| | 97 | 208 | - | - | - | - | - | - | - | - | 205 | - | - | 3 | 4160 | 8 | 12 | 208 |
| | 02 | 112 | - | - | - | - | - | - | - | - | 93 | - | 19 | - | 2240 | 5 | 9 | 112 |
| D | 89 | 31 | - | - | - | - | - | - | - | - | 15 | - | 13 | 3 | 1033 | | 31 | |
| | 97 | 34 | - | - | - | - | - | - | - | - | 8 | 1 | - | 25 | 680 | | 34 | |
| | 02 | 46 | - | 1 | - | - | - | - | - | - | 12 | - | 11 | 24 | 940 | | 47 | |
| X | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 860 | | 43 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 900 | | 45 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 00% | | | 00% | | | 12% | | | +13% | | | | | | | |
| '97 | | 00% | | | 00% | | | 11% | | | -36% | | | | | | | |
| '02 | | 00% | | | .60% | | | 33% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 4533 | Dec: | 23% | | | |
| | | | | | | | | | | | | '97 | 5200 | | 13% | | | |
| | | | | | | | | | | | | '02 | 3320 | | 28% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---------------------|---|---|------------------|---|---|-------------------|-------------|-----|----------------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Kochia americana</i> | | | | | | | | | | | | | | | | | | |
| Y | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 140 | | 7 | |
| M | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 02 | 4 | - | 1 | - | - | - | - | - | - | 5 | - | - | - | 100 | 5 | 8 | |
| | | <u>% Plants Showing</u> | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | |
| | | '89 | | 00% | | | 00% | | | 00% | | | | | | | | |
| | | '97 | | 00% | | | 00% | | | 00% | | | | | | | | |
| | | '02 | | 00% | | | 08% | | | 00% | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 240 | | - | | | |
| <i>Opuntia spp.</i> | | | | | | | | | | | | | | | | | | |
| Y | 89 | 10 | - | - | - | - | - | - | - | - | 10 | - | - | - | 333 | | 10 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| | 02 | 4 | - | - | - | - | - | - | - | - | 3 | - | 1 | - | 80 | | 4 | |
| M | 89 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 233 | 5 | 12 | |
| | 97 | 19 | - | - | 1 | - | - | - | - | - | 20 | - | - | - | 400 | 10 | 17 | |
| | 02 | 17 | - | - | - | - | - | - | - | - | 15 | 1 | 1 | - | 340 | 4 | 13 | |
| D | 89 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | 33 | | 1 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | 20 | | 1 | |
| | 02 | 4 | - | - | - | - | - | - | - | - | 1 | - | 1 | 2 | 80 | | 4 | |
| X | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | 2 | |
| | | <u>% Plants Showing</u> | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | |
| | | '89 | | 00% | | | 00% | | | 06% | | | -23% | | | | | |
| | | '97 | | 00% | | | 00% | | | 04% | | | + 8% | | | | | |
| | | '02 | | 00% | | | 00% | | | 20% | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 599 | Dec: | 6% | | | |
| | | | | | | | | | | | | '97 | 460 | | 4% | | | |
| | | | | | | | | | | | | '02 | 500 | | 16% | | | |
| <i>Tetradymia glabrata</i> | | | | | | | | | | | | | | | | | | |
| M | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 10 | 23 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | | <u>% Plants Showing</u> | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | |
| | | '89 | | 00% | | | 00% | | | 00% | | | | | | | | |
| | | '97 | | 00% | | | 00% | | | 00% | | | | | | | | |
| | | '02 | | 00% | | | 00% | | | 00% | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Tetradymia spinosa | | | | | | | | | | | | | | | | | | |
| M | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 2 | 1 | - | - | - | - | - | - | - | 3 | - | - | - | 60 | 16 | 29 | 3 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 18 | 32 | 0 |
| D | 89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | | 2 |
| | 97 | 2 | - | - | - | - | - | - | - | - | 1 | - | - | 1 | 40 | | | 2 |
| | 02 | 5 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | 100 | | | 5 |
| X | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +34% | | | | | | | |
| '97 | | 20% | | | 00% | | | 20% | | | + 0% | | | | | | | |
| '02 | | 00% | | | 00% | | | 100% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 66 | Dec: | 100% | | | |
| | | | | | | | | | | | | '97 | 100 | | 40% | | | |
| | | | | | | | | | | | | '02 | 100 | | 100% | | | |
| Yucca spp. | | | | | | | | | | | | | | | | | | |
| M | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 18 | 37 | 1 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 33 | Dec: | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |

Trend Study 19A-9-02

Study site name: Rocky Canyon

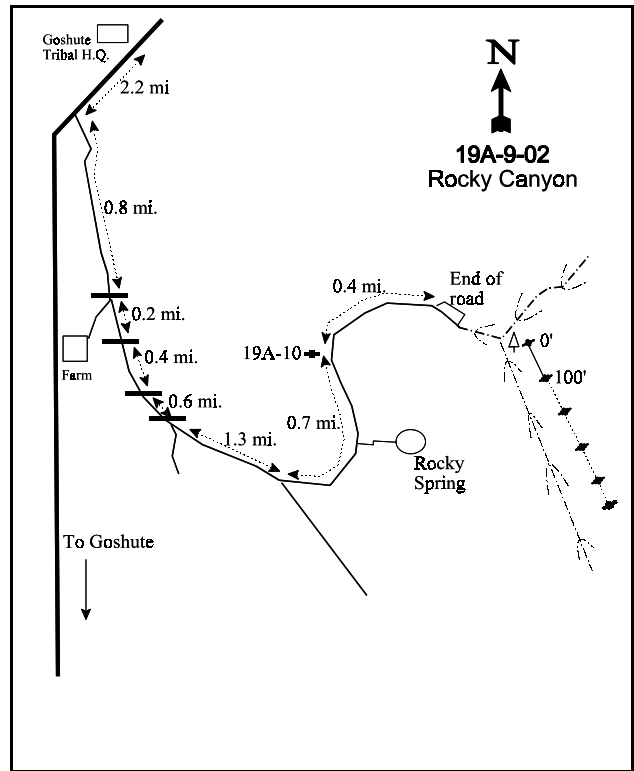
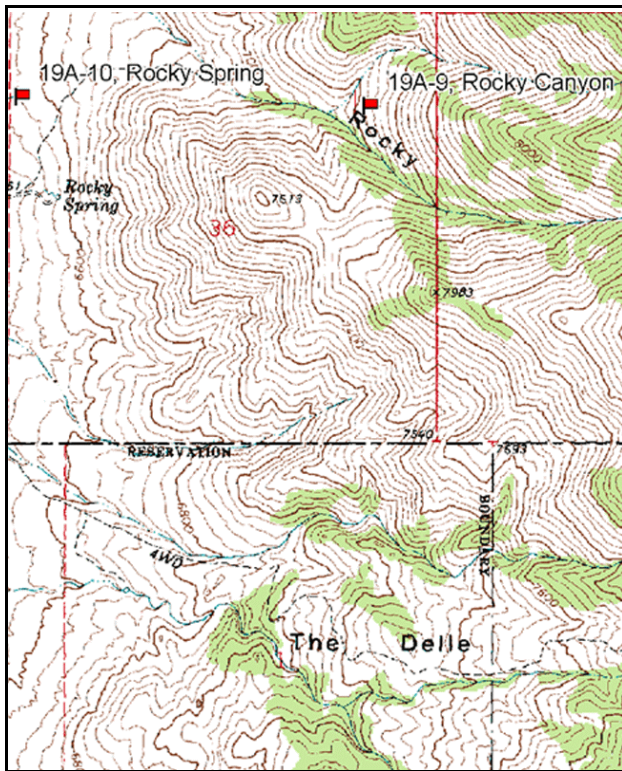
Vegetation type: Mountain Big Sagebrush

Compass bearing: frequency baseline 110 degrees magnetic.

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

LOCATION DESCRIPTION

From Ibapah, proceed southeast for ~5.11 miles to a road on the left (southeast) or from the Goshute Tribal Headquarters the road is 2.2 miles further south. Proceed on this road for 0.8 miles to a fence crossing the road and farm. Go through the fence to another fence 0.2 miles further. Go 0.4 miles to another fence with a big gate. Go 0.6 miles to road to the south crossing a gate just before the road. From the intersection, continue on previously travel road for another 1.3 miles to a road going southeast. Continue on main road for 0.7 miles to a witness post on the left side of the road. This witness post is for 19A-10. From the witness post, go 0.4 miles to the end of the road. Park here and walk easternly in the drainage. The drainage will split, from here walk 200 feet eastward out of the drainage toward a lone juniper. The 0-foot stake is 20ft east of the juniper. The 0-foot stake is marked by browse tag #413.



Map Name: Goshute

Diagrammatic Sketch

Township 10S, Range 19W, Section 36

GPS: NAD 27, UTM 12S 4422440 N 249606 E

DISCUSSION

Rocky Canyon - Trend Study No. 19A-9

This study was established in 2002 to monitor elk use on the west side of the Deep Creek Mountains. This area is a natural travel corridor for elk that move down in to the lower flats during winter months. The site lies on a moderately steep (34%), southwest facing slope at an elevation of 7,200 feet. This study monitors a mountain big sagebrush-grass community. A pellet group transect read on site in 2002 estimated 25 elk days use/acre (63 edu/ha), 16 deer days use/acre (40 ddu/ha), and 4 cow days use/acre (9 cdu/ha). Cattle were grazing the area quite heavily when the site was established, especially within the canyon bottom leading up to the site. Most of the deer and elk pellets were from winter and spring.

Soils on the site are loam in texture and slightly acidic in reactivity (pH of 6.4). Soils are very rocky both on the surface and throughout the profile. They are moderately shallow with an effective rooting depth of less than 10 inches. Vegetation and litter cover are abundant and minimize erosion even with the steepness of slope. Bare soil was low at under 10% in 2002. The erosion condition class was determined as stable in 2002.

The browse component is dominated by mountain big sagebrush. Mountain big sagebrush density was estimated at 5,340 plants/acre in 2002, and total canopy cover was estimated at over 24%. The population showed mostly light use, moderate decadence (21%), and low recruitment (6%). Thirteen percent of the population displayed poor vigor in 2002. Annual leader growth averaged just under 2 inches. Black sagebrush had an estimated density of 440 plants/acre in 2002. The population showed light use, good vigor, and moderate decadence. Mountain lover density was estimated at 2,400 plants/acre in 2002 with light use and good vigor. Other browse sampled on the site include rubber rabbitbrush, slenderbush eriogonum, broom snakeweed, Oregon grape, and pediocactus.

The herbaceous understory has only fair diversity. Bluebunch wheatgrass, Sandberg bluegrass, and mutton bluegrass provided respectively 42%, 31%, and 18% of the grass cover in 2002. Bluebunch wheatgrass showed light to moderate use. Cheatgrass was sampled in one-third of the quadrats in 2002 and provided 8% of the grass cover on the site. Silvery lupine dominated the forb component as it contributed 77% of the forb cover or 9% of the total vegetation cover on the site. Much of the lupine on the site was dried up and had been utilized by crickets in 2002.

2002 APPARENT TREND ASSESSMENT

The soils have good protective cover from vegetation and litter cover, and erosion is low. The erosion condition class was stable in 2002. Mountain big sagebrush is dense and has high canopy cover. The population is mostly mature and shows mostly light use. Trend appears stable. The herbaceous understory has only fair diversity and abundance. Bluebunch wheatgrass, Sandberg bluegrass, mutton bluegrass, and silvery lupine are the most abundant species. Annual grasses and forbs are present but not particularly abundant. The abundance of sagebrush on the site may be suppressing understory species, but that is difficult to determine until the next reading.

HERBACEOUS TRENDS --
Herd unit 19A, Study no: 9

| T y p e | Species | Nested Frequency | Quadrat Frequency | Average Cover % |
|-----------------------------|----------------------------|---------------------|----------------------|--------------------|
| | | '02 | '02 | '02 |
| G | Agropyron spicatum | 108 | 38 | 6.46 |
| G | Bromus tectorum (a) | 84 | 33 | 1.27 |
| G | Poa bulbosa | 9 | 5 | .17 |
| G | Poa fendleriana | 99 | 36 | 2.75 |
| G | Poa secunda | 214 | 76 | 4.73 |
| Total for Annual Grasses | | 84 | 33 | 1.27 |
| Total for Perennial Grasses | | 430 | 155 | 14.11 |
| Total for Grasses | | 514 | 188 | 15.39 |
| F | Agoseris glauca | 3 | 1 | .00 |
| F | Balsamorhiza hookeri | - | - | .00 |
| F | Chaenactis douglasii | 3 | 1 | .03 |
| F | Comandra pallida | 12 | 5 | .07 |
| F | Collinsia parviflora (a) | 91 | 34 | .37 |
| F | Epilobium brachycarpum (a) | 4 | 2 | .01 |
| F | Eriogonum brevicaule | 2 | 2 | .01 |
| F | Hackelia patens | 7 | 6 | .05 |
| F | Lupinus argenteus | 94 | 42 | 4.01 |
| F | Machaeranthera canescens | 3 | 2 | .06 |
| F | Microsteris gracilis (a) | 2 | 1 | .00 |
| F | Petradoria pumila | 3 | 1 | .38 |
| F | Phlox longifolia | 15 | 7 | .06 |
| F | Unknown forb-perennial | 15 | 8 | .14 |
| Total for Annual Forbs | | 97 | 37 | 0.38 |
| Total for Perennial Forbs | | 157 | 75 | 4.83 |
| Total for Forbs | | 254 | 112 | 5.22 |

BROWSE TRENDS --
Herd unit 19A, Study no: 9

| Type | Species | Strip Frequency | Average Cover % |
|------------------|------------------------------------|-----------------|-----------------|
| | | '02 | '02 |
| B | Artemisia nova | 5 | .74 |
| B | Artemisia tridentata vaseyana | 90 | 20.95 |
| B | Chrysothamnus nauseosus hololeucus | 1 | .03 |
| B | Eriogonum microthecum | 4 | .00 |
| B | Gutierrezia sarothrae | 15 | .63 |
| B | Juniperus osteosperma | 1 | - |
| B | Juniperus scopulorum | 1 | - |
| B | Mahonia repens | 39 | .87 |
| B | Pachistima myrsinites | 8 | 1.36 |
| B | Pediocactus simpsonii | 1 | .03 |
| B | Pinus monophylla | 1 | - |
| Total for Browse | | 166 | 24.62 |

CANOPY COVER -- LINE INTERCEPT
Herd unit 19A, Study no: 9

| Species | Percent Cover |
|-------------------------------|---------------|
| | '02 |
| Artemisia nova | 2.67 |
| Artemisia tridentata vaseyana | 24.58 |
| Gutierrezia sarothrae | 1.08 |
| Mahonia repens | .75 |
| Pachistima myrsinites | 1.67 |

Key Browse Annual Leader Growth
Herd unit 19A, Study no: 9

| Species | Average leader growth (in) |
|-------------------------------|----------------------------|
| | '02 |
| Artemisia tridentata vaseyana | 1.9 |

BASIC COVER --

Herd unit 19A, Study no: 9

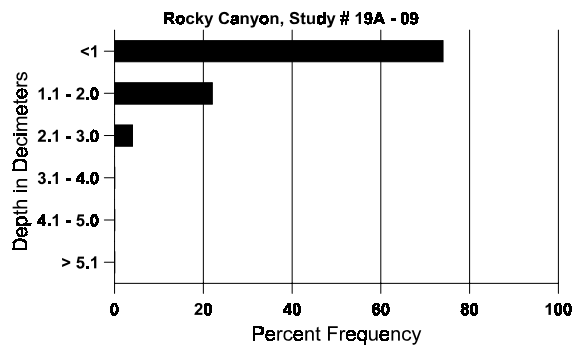
| Cover Type | Nested Frequency | Average Cover % |
|-------------|------------------|-----------------|
| | '02 | '02 |
| Vegetation | 377 | 42.00 |
| Rock | 330 | 27.06 |
| Pavement | 197 | 4.01 |
| Litter | 442 | 33.46 |
| Cryptogams | 29 | .33 |
| Bare Ground | 195 | 9.78 |

SOIL ANALYSIS DATA --

Herd Unit 19A, Study no: 9, Rocky Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 9.7 | 63.6 (11.5) | 6.4 | 41.3 | 34.7 | 24.0 | 4.7 | 19.0 | 361.6 | 0.7 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19A, Study no: 9

| Type | Quadrat Frequency | Pellet Transect | |
|--------|-------------------|------------------------|------------------------|
| | | Pellet Groups per Acre | Days Use per Acre (ha) |
| | | '02 | '02 |
| Rabbit | 3 | - | - |
| Elk | 15 | 331 | 25 (63) |
| Deer | 6 | 209 | 16 (40) |
| Cattle | - | 44 | 4 (9) |

BROWSE CHARACTERISTICS --

Herd unit 19A, Study no: 9

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total |
|--------------------------------------------------|----------------------------|----------------------------|-------------------------|--------------------------|----------------|--------------------|--------------------------------|-------|
| | | 1 | 2 | 3 | 4 | | | |
| <i>Artemisia nova</i> | | | | | | | | |
| Y | 02 | 1 | - | - | - | - | - | 1 |
| M | 02 | 17 | - | - | - | - | - | 17 |
| D | 02 | 4 | - | - | - | - | - | 4 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | <u>Heavy Use</u> 00% | <u>Poor Vigor</u> 05% | <u>%Change</u> | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | '02 | 440 | Dec: | 18% |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | |
| Y | 02 | 16 | - | - | 1 | - | - | 17 |
| M | 02 | 175 | 12 | 6 | - | - | - | 193 |
| D | 02 | 44 | 6 | 2 | 2 | 3 | - | 57 |
| X | 02 | - | - | - | - | - | - | 35 |
| % Plants Showing '02 | | <u>Moderate Use</u> 08% | <u>Heavy Use</u> 03% | <u>Poor Vigor</u> 13% | <u>%Change</u> | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | '02 | 5340 | Dec: | 21% |
| <i>Chrysothamnus nauseosus hololeucus</i> | | | | | | | | |
| M | 02 | 1 | - | - | - | - | - | 1 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | <u>Heavy Use</u> 00% | <u>Poor Vigor</u> 00% | <u>%Change</u> | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | '02 | 20 | Dec: | - |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | |
| M | 02 | - | - | - | - | - | - | 0 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | <u>Heavy Use</u> 00% | <u>Poor Vigor</u> 00% | <u>%Change</u> | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | '02 | 0 | Dec: | - |
| <i>Eriogonum microthecum</i> | | | | | | | | |
| Y | 02 | 1 | - | - | - | - | - | 1 |
| M | 02 | 5 | - | - | - | - | - | 5 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | <u>Heavy Use</u> 00% | <u>Poor Vigor</u> 00% | <u>%Change</u> | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | '02 | 120 | Dec: | - |

| A Y G R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | |
|------------------------------------------------|----------------------------|----------------------------|---|---|-------------------------|---|---|--------------------------|---|-------------|----------------|----|-----|--------------------|--------------------------------|----|-------|-----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | | |
| M | 02 | 30 | - | - | - | - | - | - | - | - | 28 | 1 | 1 | - | 600 | 8 | 12 | 30 |
| D | 02 | 2 | - | - | - | - | - | - | - | - | 1 | - | - | 1 | 40 | | | 2 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 06% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | '02 | 640 | Dec: | 6% | | |
| <i>Juniperus osteosperma</i> | | | | | | | | | | | | | | | | | | |
| M | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | - | - | 1 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | '02 | 20 | Dec: | - | | |
| <i>Juniperus scopulorum</i> | | | | | | | | | | | | | | | | | | |
| Y | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | '02 | 20 | Dec: | - | | |
| <i>Mahonia repens</i> | | | | | | | | | | | | | | | | | | |
| Y | 02 | 9 | - | - | - | - | - | - | - | - | 8 | 1 | - | - | 180 | | | 9 |
| M | 02 | 222 | - | - | 36 | - | - | 11 | - | - | 216 | 16 | 37 | - | 5380 | 3 | 4 | 269 |
| D | 02 | 21 | - | - | 1 | - | - | - | - | - | 2 | - | - | 20 | 440 | | | 22 |
| X | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 140 | | | 7 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 19% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | '02 | 6000 | Dec: | 7% | | |
| <i>Pachistima myrsinites</i> | | | | | | | | | | | | | | | | | | |
| S | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| Y | 02 | 2 | - | - | - | - | - | - | - | - | 1 | - | - | - | 40 | | | 2 |
| M | 02 | 104 | - | - | 11 | - | - | - | - | - | 115 | - | - | - | 2300 | 3 | 8 | 115 |
| D | 02 | 3 | - | - | - | - | - | - | - | - | 1 | - | - | 2 | 60 | | | 3 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 02% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | '02 | 2400 | Dec: | 3% | | |
| <i>Pediocactus simpsonii</i> | | | | | | | | | | | | | | | | | | |
| M | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 2 | 2 | 1 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | '02 | 20 | Dec: | - | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | |
|------------------------------------------------|--------|----------------------------|---|---|-------------------------|---|---|--------------------------|---|---|----------------|---|---|-----|--------------------|--------------------------------|-------|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Pinus monophylla | | | | | | | | | | | | | | | | | | |
| S | '02 | - | - | - | - | - | - | 2 | - | - | 2 | - | - | - | 40 | | 2 | |
| Y | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | '02 | 20 | Dec: | - | |
| Purshia tridentata | | | | | | | | | | | | | | | | | | |
| M | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 29 | 90 | 0 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | '02 | 0 | Dec: | - | |

Trend Study 19A-10-02

Study site name: Rocky Spring.

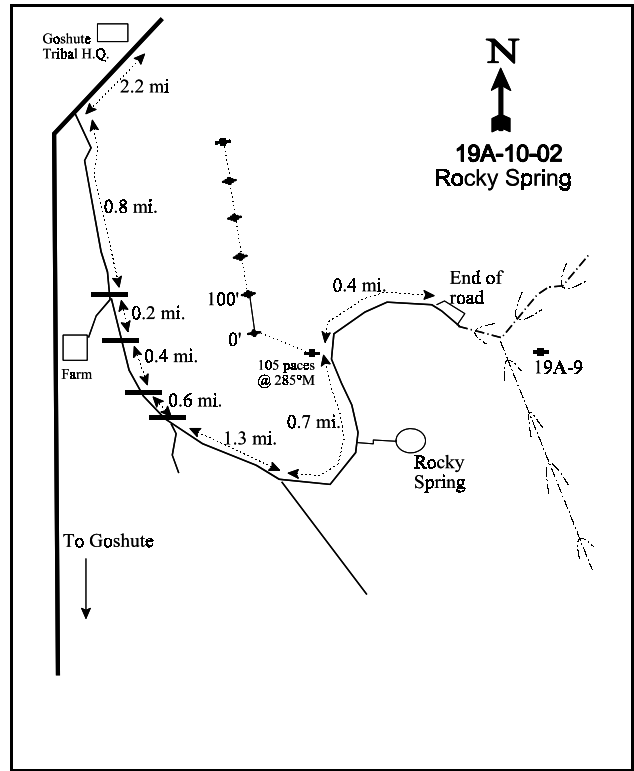
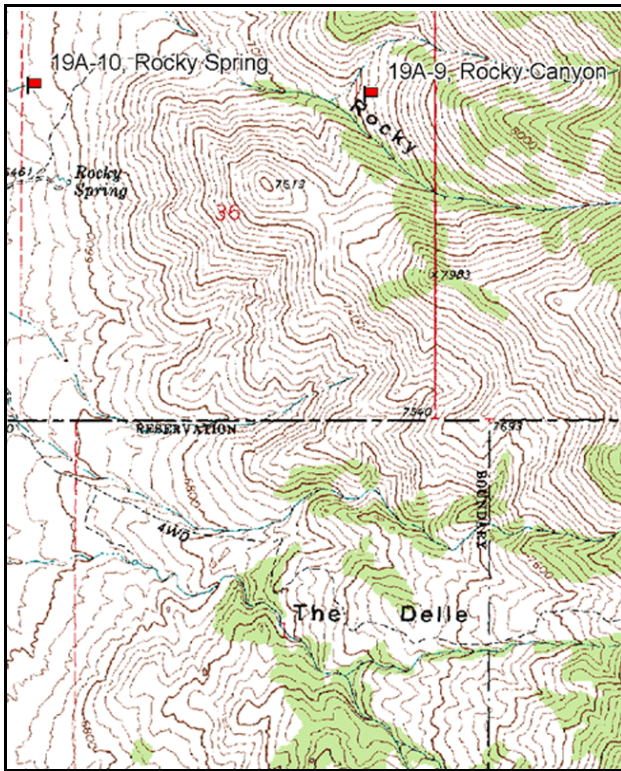
Vegetation type: Mountain Big Sagebrush.

Compass bearing: frequency baseline 326 degrees magnetic.

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

LOCATION DESCRIPTION

From Ibapah, proceed southeast for ~5.11 miles to a road on the left (southeast) or from the Goshute Tribal Headquarters the road is 2.2 miles further south. Proceed on this road for 0.8 miles to a fence crossing the road and farm. Go through the fence to another fence 0.2 miles further. Go 0.4 miles to another fence with a big gate. Go 0.6 miles to road to the south crossing a gate just before the road. From the intersection, continue on previously travel road for another 1.3 miles to a road going southeast. Continue on main road for 0.7 miles to a witness post on the left side of the road. From the witness post, walk 105 paces at 285 degrees magnetic to the 0-foot stake.



Map Name: Goshute

Diagrammatic Sketch

Township 10S, Range 19W, Section 36

GPS: NAD 27, UTM 12S 4422519 N 248306 E

DISCUSSION

Rocky Spring - Trend Study No. 19A-10

This study was established in 2002 to monitor winter big game use, primarily by elk, on the west side of the Deep Creek Mountains. This site lies on an alluvial fan at the mouth of Rocky Canyon. It samples a mountain big sagebrush flat that receives moderate to heavy deer and elk use during the winter. The transect slopes to southwest at an elevation of 6,500 feet. A pellet group transect read on site in 2002 estimated 33 elk days use/acre (83 edu/ha), 67 deer days use/acre (165 ddu/ha), and 3 cow days use/acre (9 cdu/ha). Most of the deer and elk pellet groups were from winter and spring use.

Soils on the site are very rocky, both on the surface and throughout the profile. Effective rooting depth was estimated at only 7 inches, and soils averaged nearly 70°F at a depth of 8 inches. High soil temperatures are often indicative that a site is prone to invasion by weedy species, particularly winter annuals such as cheatgrass. The soil has a loam texture and is slightly acidic in reactivity (pH of 6.5). Vegetation and litter cover are abundant and adequate to protect the surface for erosion is low. The erosion condition class was determined as stable in 2002.

Mountain big sagebrush dominates the site as it accounted for 97% of the browse cover and 55% of the total vegetation cover in 2002. Density of sagebrush was estimated at 2,840 plants/acre, with most plants being either mature (56%) or decadent (42%). Nearly half of the decadent plants were classified as dying in 2002. Recruitment by young sagebrush was low. Utilization was mostly light to moderate, while 19% of the population was classified as having poor vigor. Over 1,000 dead sagebrush plants were inventoried in 2002. High decadence and low recruitment in sagebrush are often the result of extended drought. In 2002, the dry conditions played a role in the sagebrush populations condition. If reproduction does not improve in the near future, this population will likely decline by the next reading due to the number of decadent/dying in the population. Annual leaders of sagebrush averaged about 1½ inches of growth in 2002. Other browse sampled on the site include broom snakeweed, prickly pear cactus, pediocactus, and Wood's rose.

The understory has poor diversity and contains few forage species. Cheatgrass was the most abundant grass in 2002 as it provided 44% of the grass cover. It occurred in 77% of the sampling quadrats and was well distributed over the site. Further increases in cheatgrass abundance would result in a fire hazard on this site. Perennial grasses are poorly represented with only bluebunch wheatgrass and Sandberg bluegrass being moderately abundant. Both species had a patchy distribution on the site and showed light use in 2002. Silvery lupine was the most abundant forb in 2002. Other forbs sampled include aster, milkweed, bastard toadflax, and skeleton weed.

2002 APPARENT TREND ASSESSMENT

Soils are well protected as vegetation and litter cover are abundant. Erosion is low at the present time and should remain so. The browse component is dominated by mountain big sagebrush. The sagebrush population is mostly mature and decadent with low recruitment. Nearly half of the decadent plants are classified as dying, so a population decline could occur in the future. The herbaceous understory has poor diversity and composition. Cheatgrass is the most abundant species in the understory even with drought in 2002. Trend for both the browse and herbaceous components appears to be moving in a downward direction.

HERBACEOUS TRENDS --
Herd unit 19A, Study no: 10

| T y p e | Species | Nested Frequency | Quadrat Frequency | Average Cover % |
|-----------------------------|----------------------|---------------------|----------------------|--------------------|
| | | '02 | '02 | '02 |
| G | Agropyron spicatum | 83 | 29 | 3.09 |
| G | Bromus tectorum (a) | 250 | 77 | 5.00 |
| G | Poa fendleriana | 28 | 10 | .34 |
| G | Poa secunda | 162 | 59 | 2.84 |
| G | Sitanion hystrix | 1 | 1 | .15 |
| G | Vulpia octoflora (a) | 3 | 2 | .01 |
| Total for Annual Grasses | | 253 | 79 | 5.01 |
| Total for Perennial Grasses | | 274 | 99 | 6.43 |
| Total for Grasses | | 527 | 178 | 11.45 |
| F | Asclepias spp. | 8 | 2 | .15 |
| F | Aster spp. | 21 | 7 | .54 |
| F | Comandra pallida | 18 | 8 | .29 |
| F | Eriogonum brevicaule | 3 | 1 | .00 |
| F | Lupinus argenteus | 59 | 25 | 2.92 |
| F | Lygodesmia spp. | 20 | 7 | .72 |
| Total for Annual Forbs | | 0 | 0 | 0 |
| Total for Perennial Forbs | | 129 | 50 | 4.64 |
| Total for Forbs | | 129 | 50 | 4.64 |

BROWSE TRENDS --
Herd unit 19A, Study no: 10

| T y p e | Species | Strip Frequency | Average Cover % |
|------------------|-------------------------------|--------------------|--------------------|
| | | '02 | '02 |
| B | Artemisia nova | 3 | - |
| B | Artemisia tridentata vaseyana | 75 | 20.21 |
| B | Cercocarpus montanus | 1 | - |
| B | Gutierrezia sarothrae | 14 | .51 |
| B | Juniperus osteosperma | 1 | - |
| B | Leptodactylon pungens | 1 | - |
| B | Opuntia spp. | 12 | .07 |
| B | Pediocactus simpsonii | 2 | .06 |
| B | Pinus monophylla | 3 | - |
| B | Rosa woodsii | 4 | .06 |
| Total for Browse | | 116 | 20.92 |

CANOPY COVER -- LINE INTERCEPT

Herd unit 19A, Study no: 10

| Species | Percent Cover '02 |
|-------------------------------|-------------------|
| Artemisia nova | 1.00 |
| Artemisia tridentata vaseyana | 18.58 |
| Gutierrezia sarothrae | .25 |
| Pinus monophylla | .50 |
| Rosa woodsii | .17 |

Browse Annual Leader Growth

Herd unit 19A , Study no: 10

| Species | Average leader growth (in) '02 |
|-------------------------------|--------------------------------|
| Artemisia tridentata vaseyana | 1.6 |

BASIC COVER --

Herd unit 19A, Study no: 10

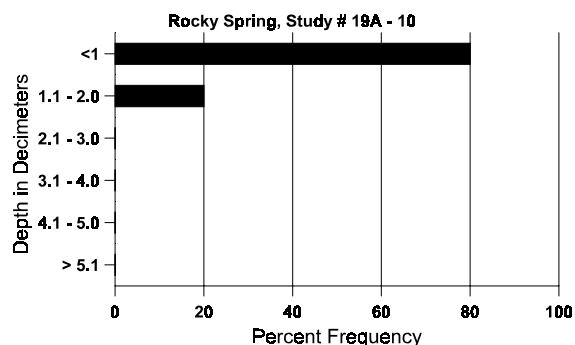
| Cover Type | Nested Frequency '02 | Average Cover % '02 |
|-------------|----------------------|---------------------|
| Vegetation | 378 | 34.56 |
| Rock | 277 | 16.34 |
| Pavement | 189 | 2.91 |
| Litter | 454 | 52.09 |
| Cryptogams | 43 | .35 |
| Bare Ground | 200 | 10.96 |

SOIL ANALYSIS DATA --

Herd Unit 19A, Study no: 10, Rocky Spring

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %0M | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 7.0 | 69.0 (8.3) | 6.5 | 45.3 | 36.7 | 18.0 | 4.6 | 20.4 | 233.6 | 0.8 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19A, Study no: 10

| Type | Quadrat Frequency | Pellet Transect | |
|--------|-------------------|------------------------|------------------------|
| | | Pellet Groups per Acre | Days Use per Acre (ha) |
| | '02 | '02 | '02 |
| Rabbit | 6 | - | - |
| Elk | 26 | 435 | 33 (83) |
| Deer | 15 | 870 | 67 (165) |
| Cattle | 2 | 44 | 4 (9) |

BROWSE CHARACTERISTICS --

Herd unit 19A, Study no: 10

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) | | Total |
|------------------------------------------------|--------|-----------------------------|----|---|-------------------------|---|---|--------------------------|---|---|----------------|---|---|----|-----------------|------------------|------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | Ht. Cr. | | |
| <i>Artemisia nova</i> | | | | | | | | | | | | | | | | | | |
| M | 02 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | - | - | 5 |
| D | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | | '02 | 120 | Dec: | 17% |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | | | | | | | |
| S | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| Y | 02 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | | | 3 |
| M | 02 | 64 | 11 | 4 | 1 | - | - | - | - | - | 79 | 1 | - | - | 1600 | 22 | 38 | 80 |
| D | 02 | 43 | 14 | - | 1 | 1 | - | - | - | - | 32 | - | - | 27 | 1180 | | | 59 |
| X | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1040 | | | 52 |
| % Plants Showing '02 | | <u>Moderate Use</u> 18% | | | <u>Heavy Use</u> 03% | | | <u>Poor Vigor</u> 19% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | | '02 | 2840 | Dec: | 42% |
| <i>Cercocarpus montanus</i> | | | | | | | | | | | | | | | | | | |
| M | 02 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 20 | - | - | 1 |
| % Plants Showing '02 | | <u>Moderate Use</u> 100% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | | '02 | 20 | Dec: | - |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | | |
| M | 02 | 23 | 5 | - | - | - | - | - | - | - | 28 | - | - | - | 560 | 9 | 14 | 28 |
| D | 02 | 4 | - | - | - | - | - | - | - | - | 2 | - | - | 2 | 80 | | | 4 |
| X | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 |
| % Plants Showing '02 | | <u>Moderate Use</u> 16% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 06% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | | '02 | 640 | Dec: | 13% |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | |
|------------------------------------------------|--------|----------------------------|---|---|-------------------------|---|---|--------------------------|---|---|----------------|---|---|---|--------------------|--------------------------------|-------|----|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| Y | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | | '02 | 20 | Dec: | - |
| Leptodactylon pungens | | | | | | | | | | | | | | | | | | |
| M | 02 | 6 | - | - | - | - | - | - | - | - | 6 | - | - | - | 120 | 7 | 11 | 6 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | | '02 | 120 | Dec: | - |
| Opuntia spp. | | | | | | | | | | | | | | | | | | |
| Y | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| M | 02 | 8 | - | - | 3 | - | - | - | - | - | 11 | - | - | - | 220 | 5 | 9 | 11 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | | '02 | 260 | Dec: | - |
| Pediocactus simpsonii | | | | | | | | | | | | | | | | | | |
| M | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | 2 | 4 | 2 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | | '02 | 40 | Dec: | - |
| Pinus monophylla | | | | | | | | | | | | | | | | | | |
| Y | 02 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | | 3 | |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | | '02 | 60 | Dec: | - |
| Rosa woodsii | | | | | | | | | | | | | | | | | | |
| M | 02 | 32 | - | - | - | - | - | - | - | - | 32 | - | - | - | 640 | 10 | 12 | 32 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | | '02 | 640 | Dec: | - |

SUSPENDED TREND STUDIES

Trend Study 19A-3-97

Study site name: Sevy Canyon

Vegetation type: Big Sagebrush-Grass

Compass bearing: frequency baseline 276 degrees magnetic (Line 3-4 @ 354°M).

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

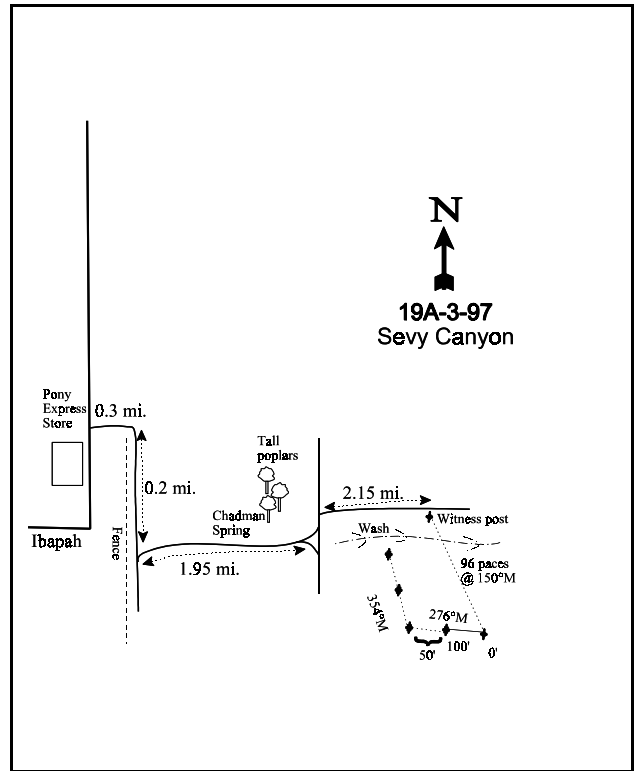
LOCATION DESCRIPTION

From The Pony Express store in Ibapah, proceed less than 0.1 miles north to the first road to the east. Turn right and proceed east for 0.30 miles to another intersection. Turn right and head south for 0.20 miles to another intersection. Turn left and proceed east for 1.95 miles toward Chadman Spring. Just past Chadman Spring the road comes to a “Y”. Stay to the left, then make a quick right. Proceed 2.15 miles up Sevy Canyon to a small rock pile with a witness post on the right side of the road. From the rock pile, the 0-foot baseline stake is located 96 paces away at an azimuth of 150 degrees magnetic. The study is marked by green steel "T" fenceposts approximately 12 to 18 inches in height. A red browse tag, number 3933, is attached to the 0-foot baseline stake.



Map Name: Ibapah

Township 9S, Range 18W, Section 17



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4436371 N 251933 E

DISCUSSION

Sevy Canyon - Trend Study No. 19A-3

***SUSPENDED - This site was suspended in 2002 upon request of the biologist. The site lies within a BLM wilderness study area and access to the site has been restricted. The site was surveyed by the project leader and was noted as being poor. The site narrative and data tables are included from the 1997 report.

The Sevy Canyon trend study is located on the west side of the Deep Creek Mountains within deer winter range. Elevation is approximately 6,520 feet on a 35% to 40% northwest facing slope. Animal use is primarily from wintering deer and domestic sheep. Deer pellet groups occur only occasionally. The study is located in a sagebrush-grass opening surrounded by pinyon-juniper woodland. The greatly increased sample size utilized in 1997 extended the study into part of the surrounding pinyon-juniper woodland. Chapman Spring is about three miles to the east and may be the closest water source.

Soils are of the Shontz type, which are characteristically very gravelly and rocky throughout the soil profile. Textural and chemical analysis indicates soils to be a loam with a neutral pH (7.3). Effective rooting depth is estimated to be 15 inches. Average soil temperature was 53.6°F at a depth of 15 inches in 1997. Phosphorous levels in the soil profile measured 5.6 ppm, which may be limiting to vegetative growth and development as 10 ppm is thought to be the minimum needed for normal plant development. The soil becomes progressively more shallow down the slope towards a wash. Signs of slight erosion are present throughout the sagebrush-grass area, while soil under the pinyon-juniper type is much more eroded and rocky.

The key browse species on this site are black sagebrush and Wyoming big sagebrush. Black sagebrush density has greatly fluctuated since the initial estimate of 8,666 plants/acre in 1983. Utilization was moderate to heavy in 1983 with a mostly mature age structure. In 1989, many more young and decadent plants were encountered increasing the density estimate to 13,866 plants/acre. Utilization was mostly light but there was a higher percentage of plants classified with poor vigor. With the greatly increased sample size used in 1997, the density estimate declined to 4,320 plants/acre. Utilization was light, but again, a larger percent of the population was classified in poor vigor. The percentage of young plants in the population declined, while the percentage of decadent plants increased to 50%, with 44% of these plants classified as dying. There is a consistent increase in the percent of the population classified as decadent. Percent decadency has increased from 15% in 1983, to 29% in 1989, peaking at 50% in 1997. The dead to live ratio was estimated to be 1:4 in 1997. Wyoming sagebrush had an estimated density of 740 plants/acre in 1997. This is similar to the 1989 estimate of 666 plants/acre. It was reported in 1989 that some of the Wyoming big sagebrush had a moth infestation which would account for the apparent stress in the population with 60% of the plants encountered classified as decadent. The proportion of the population with moderate utilization steadily declined from 100% in 1983 to only 11% in 1997. The dead to live ratio in 1997 was 1:2.

Narrowleaf low rabbitbrush, slenderbush eriogonum, and broom snakeweed are scattered throughout the site in low densities. In 1997, point-center quarter data estimated 69 Utah juniper trees/acre and 313 single-leaf pinyon trees/acre. The Utah juniper trees had an average diameter of 4.5 inches and the single-leaf pinyon trees averaged three inches in diameter. The Utah juniper and single-leaf pinyon have the potential to eventually dominate the sagebrush-grass opening.

Perennial grass sum of nested frequency has stayed nearly the same over all years. There are some slight changes in bluebunch wheatgrass and Sandberg bluegrass frequency, but they are not significant. Nested frequency for bottlebrush squirreltail has significantly declined since 1989. Currently, the grasses show little evidence of utilization and vigor is good.

Forbs are moderately abundant with a decrease in sum of nested frequency for perennials since 1989. The current sum of nested frequency is similar to that of 1983. Forb utilization is light. The most abundant species provide only minute amounts of forage. They include peavine, Hoods phlox, and longleaf phlox. Hooker balsamroot, although sampled in 1983 and 1989, was not encountered in 1997.

1983 APPARENT TREND ASSESSMENT

Soil trend appears stable to declining. Dispersion of ground cover is irregular and large expanses of the soil surface are occupied by rock, erosion pavement, or bare soil. Runoff from these areas has resulted in limited gully formation. Vegetation trend appears stable for the short term but will probably decline over the long term due to encroachment by Utah juniper and single-leaf pinyon.

1989 TREND ASSESSMENT

Soil erosion is inconspicuous, with a decrease in percent bare ground and an increase in percent vegetation, litter, and pavement cover. The soil trend is stable. The black sagebrush and Wyoming big sagebrush populations have increased since 1983. There is an abundance of young black sagebrush plants, and use has declined. Although percent decadence and the percent of plants in poor vigor have increased in the populations of both sagebrush species, the browse trend is stable. The site has a healthy grass and forb understory with a slightly upward herbaceous understory trend. Sum of nested frequency of perennial grasses remained stable, while that of perennial forbs has slightly increased since 1983.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly upward (4)

1997 TREND ASSESSMENT

Vegetation and litter provide adequate soil protection to limit erosion. Some erosion is apparent under the pinyon and juniper trees, but in the sagebrush-grass dominated area, erosion is not as noticeable. Percent rock and pavement cover combined, as well as percent bare ground, are similar to that of 1989. This leads to a stable soil trend. Black sagebrush shows a continual decline in vigor and an increase in decadence. Wyoming big sagebrush also has a relatively high percent decadency and dead to live ratio. The browse trend is downward. Perennial grass sum of nested frequency has changed very little, while perennial forb sum of nested frequency has declined to below the level estimated in 1983. Therefore, herbaceous understory trend is slightly downward.

TREND ASSESSMENT

soil - stable (3)

browse - down (1)

herbaceous understory - slightly downward (2)

HERBACEOUS TRENDS --
Herd unit 19A, Study no: 3

| Type | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|-----------------------------|--------------------------|------------------|------------------|------------------|-------------------|-----|-----|-----------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | '97 |
| G | Agropyron cristatum | - | - | 3 | - | - | 1 | .03 |
| G | Agropyron spicatum | 119 | 153 | 141 | 48 | 66 | 49 | 6.04 |
| G | Bromus tectorum (a) | - | - | 57 | - | - | 19 | .75 |
| G | Oryzopsis hymenoides | 4 | - | 6 | 2 | - | 2 | .01 |
| G | Poa fendleriana | - | - | 8 | - | - | 3 | .04 |
| G | Poa secunda | 182 | 146 | 170 | 68 | 55 | 65 | 2.41 |
| G | Sitanion hystrix | _b 22 | _b 32 | _a 5 | 11 | 17 | 3 | .04 |
| Total for Annual Grasses | | 0 | 0 | 57 | 0 | 0 | 19 | 0.75 |
| Total for Perennial Grasses | | 327 | 331 | 333 | 129 | 138 | 123 | 8.57 |
| Total for Grasses | | 327 | 331 | 390 | 129 | 138 | 142 | 9.33 |
| F | Allium spp. | - | - | 1 | - | - | 1 | .00 |
| F | Arabis spp. | _a - | _b 17 | _b 14 | - | 9 | 7 | .06 |
| F | Arenaria fendleri | _a 5 | _a - | _b 34 | 3 | - | 16 | .27 |
| F | Aster spp. | _b 21 | _a - | _a - | 10 | - | - | - |
| F | Astragalus spp. | - | 7 | 2 | - | 5 | 2 | .01 |
| F | Balsamorhiza hookeri | _a 6 | _b 23 | _a - | 4 | 10 | - | - |
| F | Calochortus nuttallii | 3 | - | 3 | 3 | - | 1 | .00 |
| F | Castilleja spp. | - | - | 2 | - | - | 1 | .00 |
| F | Collinsia parviflora (a) | - | - | 24 | - | - | 13 | .06 |
| F | Crepis acuminata | _a - | _b 7 | _a 5 | - | 7 | 2 | .03 |
| F | Cryptantha spp. | _b 14 | _b 15 | _a - | 7 | 8 | - | - |
| F | Delphinium nuttallianum | - | - | 1 | - | - | 1 | .00 |
| F | Descurainia spp. (a) | - | - | 1 | - | - | 1 | .00 |
| F | Erigeron spp. | - | 4 | - | - | 2 | - | - |
| F | Lathyrus brachycalyx | _a 271 | _a 287 | _b 242 | 92 | 94 | 87 | 6.11 |
| F | Machaeranthera canescens | - | - | 1 | - | - | 1 | .00 |
| F | Microsteris gracilis (a) | - | - | 3 | - | - | 2 | .06 |
| F | Penstemon humilis | - | - | 5 | - | - | 3 | .04 |
| F | Phlox hoodii | _b 172 | _b 172 | _a 100 | 69 | 70 | 43 | 1.66 |
| F | Phlox longifolia | _a 18 | _c 109 | _b 58 | 11 | 53 | 27 | .31 |
| F | Senecio multilobatus | _a - | _a 3 | _b 17 | - | 2 | 10 | .07 |
| F | Streptanthus spp. | 1 | - | - | 1 | - | - | - |
| Total for Annual Forbs | | 0 | 0 | 28 | 0 | 0 | 16 | 0.12 |
| Total for Perennial Forbs | | 511 | 644 | 485 | 200 | 260 | 202 | 8.61 |
| Total for Forbs | | 511 | 644 | 513 | 200 | 260 | 218 | 8.74 |

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

BROWSE TRENDS --
Herd unit 19A, Study no: 3

| Type | Species | Strip Frequency | Average Cover % |
|------------------|------------------------------------------|-----------------|-----------------|
| | | '97 | '97 |
| B | Artemisia nova | 79 | 9.73 |
| B | Artemisia tridentata wyomingensis | 24 | 1.66 |
| B | Chrysothamnus viscidiflorus stenophyllus | 15 | .22 |
| B | Eriogonum microthecum | 16 | .62 |
| B | Gutierrezia sarothrae | 1 | - |
| B | Juniperus osteosperma | 10 | 6.08 |
| B | Pinus monophylla | 22 | 8.26 |
| Total for Browse | | 167 | 26.61 |

CANOPY COVER --
Herd unit 19A, Study no: 3

| Species | Percent Cover '97 |
|-----------------------|-------------------|
| Juniperus osteosperma | 4 |
| Pinus monophylla | 7 |

Point-Quarter Tree Data
Herd unit 19A, Study no: 3

| Species | Trees per Acre | Average diameter (in) |
|-----------------------|----------------|-----------------------|
| | '97 | '97 |
| Juniperus osteosperma | 69 | 4.5 |
| Pinus monophylla | 313 | 3.0 |

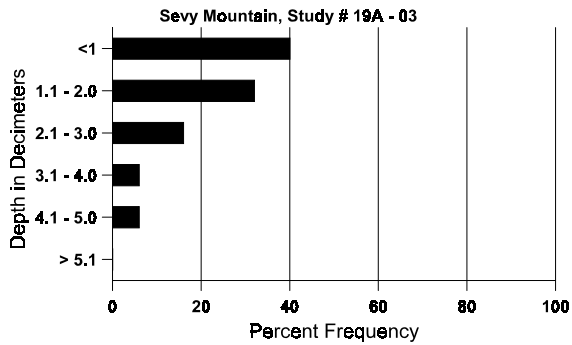
BASIC COVER --
Herd unit 19A, Study no: 3

| Cover Type | Nested Frequency | Average Cover % | | |
|-------------|------------------|-----------------|-------|-------|
| | | '83 | '89 | '97 |
| Vegetation | 332 | 4.00 | 9.75 | 46.04 |
| Rock | 194 | 6.00 | 3.75 | 6.25 |
| Pavement | 264 | 7.00 | 13.50 | 10.66 |
| Litter | 385 | 52.00 | 56.00 | 45.03 |
| Cryptogams | 170 | 9.25 | 5.75 | 3.87 |
| Bare Ground | 194 | 21.75 | 11.25 | 10.01 |

SOIL ANALYSIS DATA --
 Herd Unit 19A, Study no: 3, Sevy Mountain

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 15.0 | 53.6 (39.2) | 7.3 | 37.3 | 40.2 | 22.6 | 3.4 | 5.6 | 108.8 | 0.8 |

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 19A, Study no: 3

| Type | Quadrat Frequency '97 |
|--------|-----------------------|
| Rabbit | 3 |
| Elk | 3 |
| Deer | 2 |

BROWSE CHARACTERISTICS --
Herd unit 19A, Study no: 3

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|----|------------------|---|---|-------------------|---|---|----------------|-----|-------|------|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Artemisia nova | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | 1 | - | - | 1 | - | - | 2 | - | - | - | 133 | | 2 | |
| | 97 | 8 | - | - | 2 | - | - | - | - | - | 10 | - | - | - | 200 | | 10 | |
| Y | 83 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 200 | | 3 | |
| | 89 | 33 | - | - | 4 | - | - | - | - | - | 33 | 1 | 3 | - | 2466 | | 37 | |
| | 97 | 6 | - | - | - | - | - | 1 | - | - | 6 | - | - | 1 | 140 | | 7 | |
| M | 83 | - | 58 | 50 | - | - | - | - | - | - | 108 | - | - | - | 7200 | 15 25 | 108 | |
| | 89 | 90 | 11 | - | 10 | - | - | - | - | - | 84 | 12 | 14 | 1 | 7400 | 13 11 | 111 | |
| | 97 | 94 | 3 | - | 4 | - | - | 1 | - | - | 102 | - | - | - | 2040 | 12 18 | 102 | |
| D | 83 | - | 7 | 12 | - | - | - | - | - | - | 12 | - | 7 | - | 1266 | | 19 | |
| | 89 | 52 | 4 | - | 4 | - | - | - | - | - | 35 | 15 | 2 | 8 | 4000 | | 60 | |
| | 97 | 95 | 9 | - | 1 | 2 | - | - | - | - | 59 | - | 1 | 47 | 2140 | | 107 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | 1160 | | 58 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 50% | | | 48% | | | 05% | | | +38% | | | | | | | |
| '89 | | 07% | | | 00% | | | 13% | | | -69% | | | | | | | |
| '97 | | 06% | | | 00% | | | 23% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 8666 | Dec: | 15% | | | |
| | | | | | | | | | | | | '89 | 13866 | | 29% | | | |
| | | | | | | | | | | | | '97 | 4320 | | 50% | | | |
| Artemisia tridentata wyomingensis | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| M | 83 | - | 3 | - | - | - | - | - | - | - | 3 | - | - | - | 200 | 26 39 | 3 | |
| | 89 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 200 | 15 17 | 3 | |
| | 97 | 19 | - | - | - | - | - | - | - | - | 19 | - | - | - | 380 | 22 32 | 19 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 2 | 4 | - | - | - | - | - | - | - | 5 | - | - | 1 | 400 | | 6 | |
| | 97 | 12 | 2 | - | - | 2 | - | - | - | - | 14 | - | - | 2 | 320 | | 16 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 420 | | 21 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 100% | | | 00% | | | 00% | | | +70% | | | | | | | |
| '89 | | 40% | | | 00% | | | 10% | | | +10% | | | | | | | |
| '97 | | 11% | | | 00% | | | 05% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 200 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 666 | | 60% | | | |
| | | | | | | | | | | | | '97 | 740 | | 43% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|-------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Chrysothamnus viscidiflorus stenophyllus</i> | | | | | | | | | | | | | | | | | | |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | | 1 |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | | 1 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| M | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | 12 | 9 | 1 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 16 | - | - | 2 | - | - | - | - | - | 18 | - | - | - | 360 | 14 | 13 | 18 |
| D | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | | 1 |
| | 89 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 200 | | | 3 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +26% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +30% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 198 | Dec: | 33% | | | |
| | | | | | | | | | | | | '89 | 266 | | 75% | | | |
| | | | | | | | | | | | | '97 | 380 | | 0% | | | |
| <i>Eriogonum microthecum</i> | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 133 | | | 2 |
| | 97 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| M | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | 14 | 15 | 1 |
| | 89 | 6 | - | - | 2 | - | - | - | - | - | 8 | - | - | - | 533 | 8 | 6 | 8 |
| | 97 | 25 | - | - | 2 | - | - | - | - | - | 27 | - | - | - | 540 | 9 | 9 | 27 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 133 | | | 2 |
| | 97 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +92% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -27% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 66 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 799 | | 17% | | | |
| | | | | | | | | | | | | '97 | 580 | | 3% | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 10 | 7 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| S | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 89 | 1 | - | - | 1 | - | - | 1 | - | - | 3 | - | - | - | 200 | | 3 | |
| | 97 | 1 | - | - | - | - | - | 2 | - | - | 3 | - | - | - | 60 | | 3 | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 97 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | | 3 | |
| M | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | 43 | 45 | 1 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 6 | - | - | - | - | - | 1 | - | - | 7 | - | - | - | 140 | - | - | 7 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +67% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 66 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 66 | | - | | | |
| | | | | | | | | | | | | '97 | 200 | | - | | | |
| Pinus monophylla | | | | | | | | | | | | | | | | | | |
| S | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 89 | - | - | - | - | - | - | 2 | - | - | 2 | - | - | - | 133 | | 2 | |
| | 97 | 22 | - | - | 1 | - | - | 2 | - | - | 25 | - | - | - | 500 | | 25 | |
| Y | 83 | 6 | - | - | - | - | - | - | - | - | 6 | - | - | - | 400 | | 6 | |
| | 89 | 8 | - | - | - | - | - | 2 | - | - | 10 | - | - | - | 666 | | 10 | |
| | 97 | 16 | - | - | 3 | - | - | - | - | - | 19 | - | - | - | 380 | | 19 | |
| M | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | 59 | 39 | 1 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | 4 | - | 5 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | 20 | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +30% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -25% | | | | | | | |
| '97 | | 00% | | | 00% | | | 04% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 466 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 666 | | 0% | | | |
| | | | | | | | | | | | | '97 | 500 | | 4% | | | |

Trend Study 19A-5-97

Study site name: Chokecherry Springs.

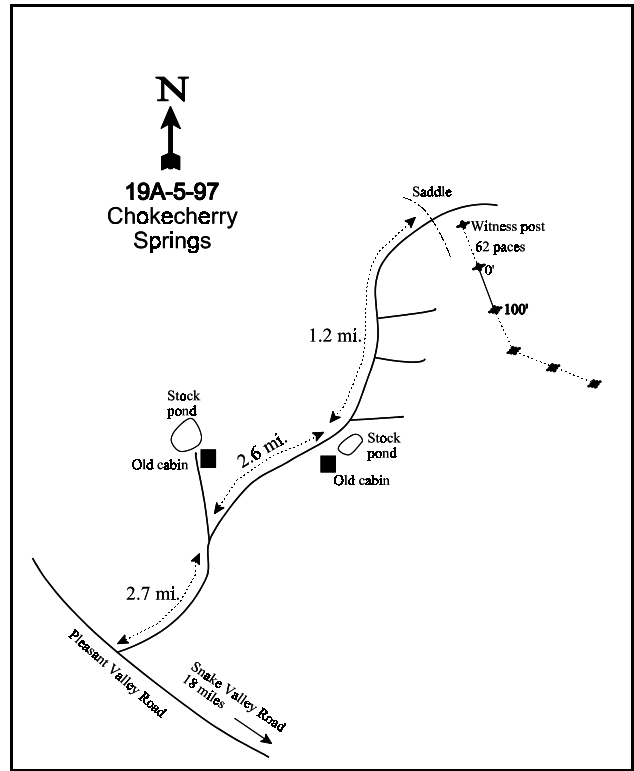
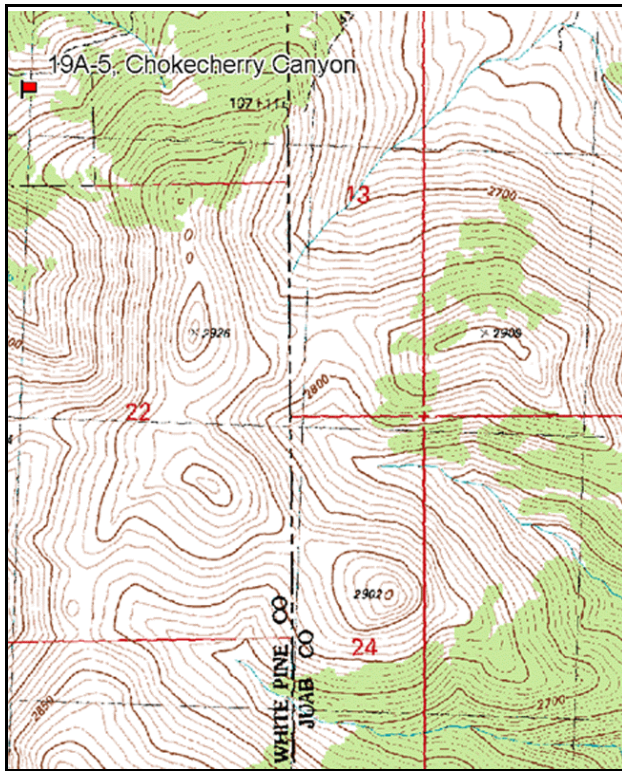
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 180 degrees magnetic (Lines 3-4 @ 120°M).

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

LOCATION DESCRIPTION

From the intersection of the Snake Valley Road and the Pleasant Valley Road south of Partoun, proceed northwest up the Pleasant Valley Road for approximately 18 miles into Nevada. Continue past the Blue Mass Scenic Area 1.15 miles and turn right (northeast) on a dirt road that goes to Rye Grass Canyon. Take this road 1.8 miles and turn right at the fork. Stay on the main road for 0.9 miles where you'll come to a cabin and stock ponds. Another 2.6 miles farther on you'll come to another cabin. Go another 1.2 miles to the east up a slight dugway on the south side of a drainage and into a small saddle. From the far side (east side) of the saddle, the 0-foot baseline stake is 80 paces to the south/southeast and slightly south of a scattering of curlleaf mountain mahogany. The baseline markers are green steel fenceposts approximately 12 to 18 inches high.



Map Name: Weaver Canyon

Diagrammatic Sketch

Township 22N, Range 70E, Section 15

GPS: NAD 27, UTM 12S 4407452 N 298106 E

DISCUSSION

Chokecherry Spring - Trend Study No. 19A-5

***SUSPENDED - This site was suspended in 2002 upon the request of the biologist. The site narrative and data tables are included from the 1997 report.

Due to unavailability of a suitable map at the time of study establishment in 1983, the Chokecherry Springs study was located slightly within the state of Nevada on the Goshute Indian Reservation. The study is on a 30% northwest facing slope at an elevation of 8,740 feet. The study samples a mountain big sagebrush-grass range type typical of medium altitude deer summer range on the south and central portions of the Deep Creek Mountains. This site appears to receive only light utilization by deer, cattle, and sheep. In 1989, cattle were grazing below the site and deer and elk were seen within the vicinity of the site. In 1997, cattle were observed on the site during the survey. Chokecherry Spring is located about three-fourths mile downslope and provides water year around. Other range types in close proximity include curlleaf mountain mahogany, mixed conifer-aspen, mountain brush, and pinyon-juniper. These varied range types provide ample escape cover.

Soils are rocky and well drained and derived from granite parent material. Soil textural analysis indicates a loam to sandy loam with a slightly acidic pH of 6.2. The effective rooting depth was estimated to be 14 inches. Average soil temperature was 49.2°F at a depth of 17 inches. Phosphorous levels in the soil profile measure 8.3 ppm, which may be limiting to vegetation growth because 10 ppm is thought to be the minimum necessary for normal plant growth and development. Erosion continues to be negligible as there is good vegetation and litter cover.

The key browse species, mountain big sagebrush, dominates the site with a moderately dense, mature stand. In 1997, the estimated density was 3,660 plants/acre. This is similar to past estimates of 3,465 plants/acre in 1983 and 3,999 plants/acre in 1989. Percent decadence has declined since 1989. However, 43% of the decadent plants were classified as dying. The dead to live ratio was 1:8 in 1997 (12% dead). This could indicate a slightly declining condition for the sagebrush. It was reported in 1983 that mountain big sagebrush was impacted by insect damage and underground girdling from pocket gophers. Other important forage species are mountain snowberry and Saskatoon serviceberry. Both species appear to be healthy with only light utilization. A curlleaf mountain mahogany stand is located adjacent to the study site and provides additional forage and excellent cover for big game. Other associated browse species include stickyleaf low rabbitbrush, slenderbush eriogonum, Oregon grape, currant, and an unidentified species. Undesirable invader or increaser shrubs are not a problem on this site.

The herbaceous understory is both diverse and productive. Grass composition is dominated by sheep fescue, a mildly palatable increaser. Sheep fescue nested frequency has significantly increased since 1989, although quadrat frequency has remained nearly the same. Perennial grass sum of nested frequency has declined since 1989, although it is still higher than that of the initial survey in 1983. Other important grasses include bluebunch wheatgrass, needle-and-thread grass, subalpine needlegrass, slender wheatgrass, and two species of bluegrass. All are lightly utilized and have good vigor. No annual grasses were encountered.

Forb sum of nested frequency has nearly doubled since 1983. The forbs produce as much total cover as do the grasses. Important species include low penstemon, fleabane daisy, Wyoming painted cup, tuber starwort, silky lupine, and longleaf phlox. Many other succulent and desirable species occur in addition to these. Vigor of forbs is excellent and utilization is currently light to non-existent.

1983 APPARENT TREND ASSESSMENT

Overall trend appears stable. Soil loss is minimal because of good vegetation and litter cover. No obvious vegetative change is apparent and current range condition is good. The abundance of increaser grasses (i.e., sheep fescue, needle grasses, etc.) suggests a long history of livestock use. However, the browse and forb components have suffered no apparent decline.

1989 TREND ASSESSMENT

The soil trend is stable with good vegetation and litter cover. The browse trend is stable. The mature mountain big sagebrush stand appears to be stable, although there is a deficiency of young and seedling shrubs. If the present trend continues, grasses may pose serious competition for the browse component of the community. The herbaceous understory is upward for the diversity and production of grasses and forbs, a key component of big game summer range.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - upward (5)

1997 TREND ASSESSMENT

The soil trend is stable with no erosion apparent. There is adequate vegetation and litter cover to provide protection to the soil. Browse populations show only light utilization. The browse trend appears to be stable. With the high diversity of browse and herbaceous understory species, it is not likely that there will be much change in densities in the future. The herbaceous understory trend is stable and provides abundant summer forage.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 19A, Study no: 5

| T y p e | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|-----------------------------|------------------------|------------------|------------------|------------------|-------------------|-----|-----|--------------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | |
| G | Agropyron spicatum | 45 | 61 | 39 | 19 | 32 | 18 | .13 |
| G | Agropyron trachycaulum | a ⁻ | a ⁻ | b ³⁷ | - | - | 19 | .31 |
| G | Carex spp. | 9 | 3 | - | 4 | 1 | - | - |
| G | Festuca ovina | a ²⁹⁷ | a ²⁹¹ | b ³³⁴ | 97 | 93 | 97 | 18.85 |
| G | Poa fendleriana | a ¹⁵ | b ⁸⁰ | a ³³ | 6 | 38 | 18 | .29 |
| G | Poa secunda | a ¹⁷ | b ⁶⁹ | a ⁸ | 8 | 35 | 4 | .04 |
| G | Stipa columbiana | a ⁶ | b ²⁹ | ab ¹⁴ | 4 | 12 | 8 | .12 |
| G | Stipa comata | ab ³ | a ⁻ | b ¹⁰ | 1 | - | 5 | .10 |
| G | Stipa lettermani | 7 | 4 | 4 | 3 | 3 | 3 | .01 |
| Total for Annual Grasses | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total for Perennial Grasses | | 399 | 537 | 479 | 142 | 214 | 172 | 19.88 |
| Total for Grasses | | 399 | 537 | 479 | 142 | 214 | 172 | 19.88 |

| Type | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|------|---------------------------------|------------------|------|------|-------------------|-----|-----|-----------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | '97 |
| F | <i>Achillea millefolium</i> | - | - | 2 | - | - | 2 | .03 |
| F | <i>Agoseris glauca</i> | a- | a- | b16 | - | - | 7 | .06 |
| F | <i>Allium</i> spp. | a38 | a10 | b102 | 19 | 6 | 47 | .31 |
| F | <i>Antennaria rosea</i> | 6 | 11 | 3 | 2 | 5 | 1 | .03 |
| F | <i>Arabis</i> spp. | 2 | 6 | 4 | 1 | 3 | 2 | .01 |
| F | <i>Arenaria fendleri</i> | a- | ab8 | b17 | - | 3 | 6 | .39 |
| F | <i>Astragalus convallarius</i> | a- | c119 | b28 | - | 54 | 15 | .25 |
| F | <i>Aster</i> spp. | - | - | 5 | - | - | 3 | .01 |
| F | <i>Astragalus</i> spp. | b107 | a2 | a16 | 50 | 1 | 8 | .23 |
| F | <i>Castilleja angustifolia</i> | - | 1 | - | - | 1 | - | - |
| F | <i>Castilleja chromosa</i> | a- | b14 | b17 | - | 8 | 8 | .55 |
| F | <i>Castilleja linariaefolia</i> | 9 | 11 | 22 | 4 | 5 | 11 | .59 |
| F | <i>Calochortus nuttallii</i> | 4 | 11 | 15 | 3 | 6 | 7 | .03 |
| F | <i>Comandra pallida</i> | a- | a- | b15 | - | - | 7 | .10 |
| F | <i>Collinsia parviflora</i> (a) | - | - | 5 | - | - | 2 | .03 |
| F | <i>Crepis acuminata</i> | a16 | b124 | a38 | 9 | 56 | 17 | .21 |
| F | <i>Delphinium nuttallianum</i> | b50 | a14 | a20 | 24 | 7 | 10 | .15 |
| F | <i>Delphinium occidentale</i> | 1 | - | - | 1 | - | - | - |
| F | <i>Erigeron</i> spp. | ab109 | b126 | a87 | 51 | 57 | 35 | .72 |
| F | <i>Eriogonum umbellatum</i> | - | 1 | - | - | 1 | - | - |
| F | <i>Haplopappus nuttallii</i> | 4 | - | - | 2 | - | - | - |
| F | <i>Heuchera parvifolia</i> | b15 | a- | a- | 6 | - | - | - |
| F | <i>Hymenoxys acaulis</i> | a- | b18 | a- | - | 9 | - | - |
| F | <i>Lomatium</i> spp. | a7 | b184 | a28 | 2 | 67 | 13 | .23 |
| F | <i>Lupinus</i> spp. | a73 | c190 | b181 | 34 | 74 | 68 | 8.41 |
| F | <i>Lygodesmia</i> spp. | - | - | 6 | - | - | 2 | .01 |
| F | <i>Mertensia</i> spp. | a- | a- | b14 | - | - | 6 | .13 |
| F | <i>Penstemon humilis</i> | b59 | a35 | ab54 | 32 | 18 | 22 | .56 |
| F | <i>Penstemon</i> spp. | a2 | ab20 | b27 | 2 | 9 | 11 | .74 |
| F | <i>Phlox longifolia</i> | ab72 | b119 | a56 | 32 | 51 | 19 | .24 |
| F | <i>Polygonum douglasii</i> (a) | - | - | 6 | - | - | 3 | .01 |
| F | <i>Ranunculus</i> spp. | - | b56 | a- | - | 28 | - | - |
| F | <i>Senecio integerrimus</i> | a- | c141 | b24 | - | 62 | 11 | .18 |
| F | <i>Sedum lanceolatum</i> | 3 | 7 | 18 | 3 | 5 | 9 | .07 |
| F | <i>Senecio</i> spp. | b14 | a- | a- | 6 | - | - | - |
| F | <i>Silene douglasii</i> | 9 | - | - | 4 | - | - | - |
| F | <i>Stellaria jamesiana</i> | a- | b100 | c241 | - | 41 | 78 | 4.55 |
| F | <i>Swertia</i> spp. | - | - | 4 | - | - | 2 | .18 |
| F | <i>Taraxacum officinale</i> | - | 6 | 3 | - | 2 | 1 | .00 |

| T y p e | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|---------------------------|------------------------|------------------|----------------|-----------------|-------------------|-----|-----|--------------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | '97 |
| F | Unknown forb-perennial | 21 | 13 | 9 | 9 | 8 | 5 | .05 |
| F | Viola spp. | _a - | _a 5 | _b 57 | - | 3 | 23 | .72 |
| F | Zigadenus paniculatus | - | 2 | 2 | - | 2 | 1 | .00 |
| Total for Annual Forbs | | 0 | 0 | 11 | 0 | 0 | 5 | 0.05 |
| Total for Perennial Forbs | | 621 | 1354 | 1131 | 296 | 592 | 457 | 19.83 |
| Total for Forbs | | 621 | 1354 | 1142 | 296 | 592 | 462 | 19.88 |

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

BROWSE TRENDS --

Herd unit 19A, Study no: 5

| T y p e | Species | Strip Frequency | Average Cover % |
|------------------|----------------------------------------------|--------------------|--------------------|
| | | '97 | '97 |
| B | Amelanchier alnifolia | 1 | .15 |
| B | Artemisia tridentata vaseyana | 90 | 17.29 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 2 | .15 |
| B | Eriogonum microthecum | 2 | - |
| B | Mahonia repens | 28 | .39 |
| B | Ribes spp. | 1 | .00 |
| B | Symphoricarpos oreophilus | 46 | 1.96 |
| B | Unknown browse | 2 | - |
| Total for Browse | | 172 | 19.95 |

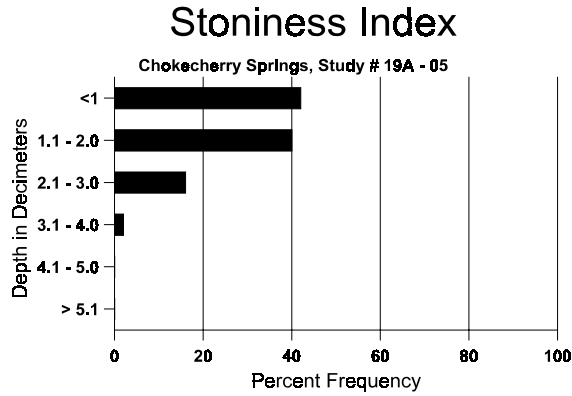
BASIC COVER --

Herd unit 19A, Study no: 5

| Cover Type | Nested Frequency | Average Cover % | | |
|-------------|---------------------|-----------------|-------|-------|
| | | '83 | '89 | '97 |
| Vegetation | 376 | 4.25 | 26.00 | 51.40 |
| Rock | 215 | 9.25 | 6.75 | 6.98 |
| Pavement | 267 | 22.75 | 17.25 | 9.78 |
| Litter | 395 | 54.75 | 38.75 | 43.25 |
| Cryptogams | 22 | .75 | 1.00 | .32 |
| Bare Ground | 231 | 8.25 | 10.25 | 7.69 |

SOIL ANALYSIS DATA --
 Herd Unit 19A, Study no: 5, Chokecherry Springs

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 13.8 | 49.2 (16.5) | 6.2 | 52.0 | 31.4 | 16.6 | 4.0 | 8.3 | 156.8 | 0.7 |



PELLET GROUP FREQUENCY --
 Herd unit 19A, Study no: 5

| Type | Quadrat Frequency '97 |
|--------|-----------------------|
| Sheep | 5 |
| Rabbit | 1 |
| Elk | 1 |
| Deer | 5 |
| Cattle | 4 |

BROWSE CHARACTERISTICS --
Herd unit 19A, Study no: 5

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | | | |
|------------------------------------------------|----------------------------|-------------|----|----|---|--------------------|--------------------------------|---|-------|---------------------|------------------|-------------------|----------------|------|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | | | | |
| <i>Amelanchier alnifolia</i> | | | | | | | | | | | | | | |
| Y | 83 | - | 2 | - | - | - | - | - | - | - | 133 | | 2 | |
| | 89 | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 97 | - | - | - | 2 | - | - | - | - | 2 | 40 | - | 2 | |
| D | 83 | - | 1 | - | - | - | - | - | - | - | 66 | | 1 | |
| | 89 | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | | | | | | | | | <u>Moderate Use</u> | <u>Heavy Use</u> | <u>Poor Vigor</u> | <u>%Change</u> | |
| | | | | | | | | | | '83 | 100% | 00% | 00% | |
| | | | | | | | | | | '89 | 00% | 00% | 00% | |
| | | | | | | | | | | '97 | 00% | 00% | 00% | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 199 | Dec: | 33% | |
| | | | | | | | | | | '89 | 0 | | 0% | |
| | | | | | | | | | | '97 | 40 | | 0% | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | 1 | 20 | | 1 | |
| Y | 83 | 1 | - | - | - | - | - | - | - | 1 | 66 | | 1 | |
| | 89 | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 10 | - | - | - | - | - | - | - | 10 | 200 | | 10 | |
| M | 83 | 17 | 10 | 11 | - | - | - | - | - | 13 | 20 | 30 | 38 | |
| | 89 | 43 | - | - | - | - | - | - | - | 43 | - | 36 | 43 | |
| | 97 | 110 | 30 | 3 | - | - | - | - | - | 143 | - | 36 | 143 | |
| D | 83 | 3 | 8 | 2 | - | - | - | - | - | 2 | 3 | 6 | 13 | |
| | 89 | 17 | - | - | - | - | - | - | - | 17 | - | - | 17 | |
| | 97 | 19 | 11 | - | - | - | - | - | - | 16 | 1 | 13 | 30 | |
| X | 83 | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | 480 | | 24 | |
| % Plants Showing | | | | | | | | | | <u>Moderate Use</u> | <u>Heavy Use</u> | <u>Poor Vigor</u> | <u>%Change</u> | |
| | | | | | | | | | | '83 | 35% | 25% | 25% | +13% |
| | | | | | | | | | | '89 | 00% | 00% | 00% | - 8% |
| | | | | | | | | | | '97 | 22% | 02% | 08% | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 3465 | Dec: | 25% | |
| | | | | | | | | | | '89 | 3999 | | 28% | |
| | | | | | | | | | | '97 | 3660 | | 16% | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Chrysothamnus viscidiflorus viscidiflorus | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 11 | - | - | - | - | - | - | - | - | 11 | - | - | - | 733 | | 11 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | 15 | 13 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -95% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 733 | | - | | | |
| | | | | | | | | | | | | '97 | 40 | | - | | | |
| Eriogonum microthecum | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 97 | 1 | - | - | 2 | - | - | - | - | - | 3 | - | - | - | 60 | - | 3 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 60 | | - | | | |
| Mahonia repens | | | | | | | | | | | | | | | | | | |
| S | 83 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 133 | | 2 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| Y | 83 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 466 | | 7 | |
| | 89 | 34 | - | - | - | - | - | 29 | - | - | 57 | - | - | 6 | 4200 | | 63 | |
| | 97 | 14 | - | - | - | - | - | - | - | - | 14 | - | - | - | 280 | | 14 | |
| M | 83 | 28 | - | - | - | - | - | - | - | - | 28 | - | - | - | 1866 | 4 | 4 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 97 | 91 | - | - | 9 | - | - | - | - | - | 94 | 6 | - | - | 2000 | 3 | 4 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +44% | | | | | | | |
| '89 | | 00% | | | 00% | | | 10% | | | -46% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 2332 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 4200 | | - | | | |
| | | | | | | | | | | | | '97 | 2280 | | - | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Ribes spp. | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | 16 | 27 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |
| Symphoricarpos oreophilus | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | | | 3 |
| Y | 83 | 14 | - | - | - | - | - | - | - | - | 8 | 4 | - | 2 | 933 | | | 14 |
| | 89 | 10 | - | - | 13 | - | - | 8 | - | - | 31 | - | - | - | 2066 | | | 31 |
| | 97 | 8 | - | - | 1 | - | - | - | - | - | 9 | - | - | - | 180 | | | 9 |
| M | 83 | 1 | - | 4 | - | - | - | - | - | - | - | 5 | - | - | 333 | 12 | 13 | 5 |
| | 89 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 200 | 11 | 23 | 3 |
| | 97 | 75 | 3 | - | 24 | - | - | 1 | - | - | 103 | - | - | - | 2060 | 12 | 25 | 103 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 21% | | | 11% | | | +44% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | - 1% | | | | | | | |
| '97 | | 03% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 1266 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 2266 | | - | | | |
| | | | | | | | | | | | | '97 | 2240 | | - | | | |
| Unknown browse | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | | | 3 |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 26 | 37 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 80 | | - | | | |

Trend Study 19A-6-97

Study site name: Granite Creek.

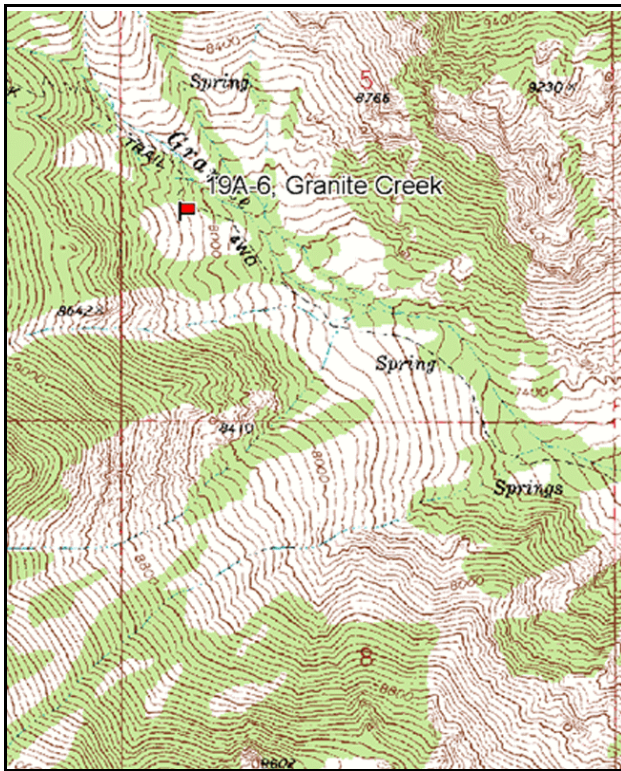
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 246 degrees magnetic.

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

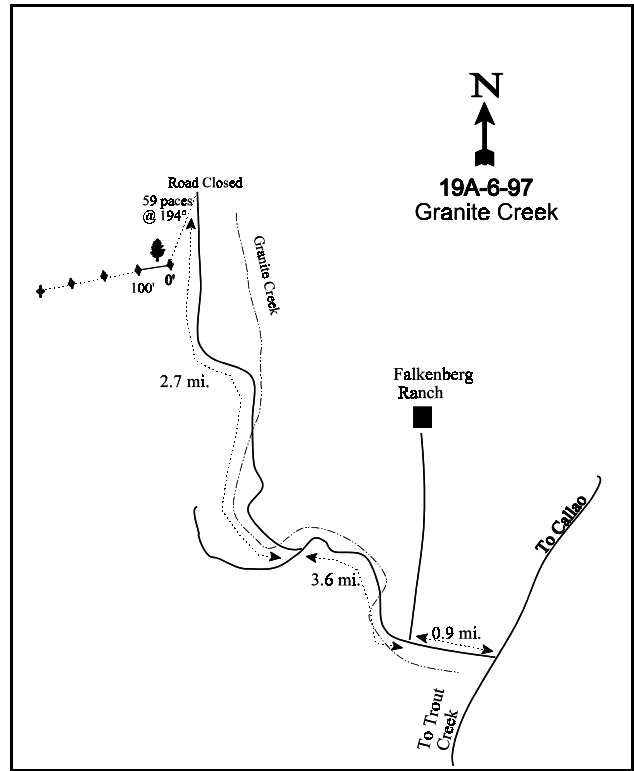
LOCATION DESCRIPTION

From the junction of the Snake Valley Road and the road which runs west towards Granite Creek, proceed west up Granite Creek Canyon for 4.50 miles to an intersection. Turn right, crossing Granite Creek and proceed 2.70 miles up the canyon to the end of the road (road has been closed). From the end of the road the 0-foot baseline stake is 59 paces away in a southwesterly direction (194 degrees M), near a single pine tree. The study is marked by green steel "T" fenceposts approximately 12 to 18 inches in height.



Map Name: Ibapah Peak

Township 12S, Range 18W, Section 5



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4409806 N 251042 E

DISCUSSION

Granite Creek - Trend Study No. 19A-6

***SUSPENDED - This site was not read in 2002 due to access problems. The site now lies within a BLM wilderness study area and access to the site has been restricted. The site narrative and data tables are included from the 1997 report.

This study samples deer summer range near the head of Granite Creek on a moderately steep (45%), northeast facing slope. The study site is in a mountain big sagebrush-grass range type, surrounded by mixed conifer and aspen at an elevation of 8,100 feet. Granite Creek, which runs within a few hundred yards of the site, provides a reliable water source for the area. In 1989, there was evidence of light summer and fall use by deer, but no sign of use by elk or bighorn sheep. Ants were found widespread on lupine and sagebrush in association with aphids which were impacting many plants. Evidence of past mining activity exists in the lower part of the canyon, but does not interfere with the study site. Elk and deer pellet groups were noted throughout the site in 1997, but only deer pellet groups were sampled within quadrats.

Soils are the Flygare (cobbly loam) and Cabollo (loam) variety with granitic parent material. Rock outcrops and steep slopes are characteristic of these soil types. Soils are relatively shallow with an effective rooting depth of about 10 inches. Soil temperature averaged about 52°F at a depth of 14 inches. Soil textural analysis indicates it to be a loam with a slightly acidic pH of 6.1. There was no erosion apparent in 1997.

The key browse species on the site is mountain big sagebrush. Density in 1983 was estimated to be 2,733 plants/acre with 33% of the population exhibiting poor vigor, and 40% of the population classified as decadent. In 1989, the estimated density was 3,465 plants/acre. The percent of the population exhibiting poor vigor declined to 7% with percent decadence remaining similar at 42%. In 1997, the estimated density dropped to 2,440 plants/acre, the lowest estimate from all surveys. Almost all the loss in density can be explained by the number of dead plants in the population (820 dead plants/acre). The percent of the population classified with poor vigor increased to 24%, while percent decadency declined to 28%. Also, 38% of the decadent plants were classified as dying. The 1997 dead to live ratio was 1:3 (25% of the plants were dead). In 1997, the Oregon grape density was estimated to be 31,480 plants/acre. These plants average only about 4 inches in height and provide little forage. Subdominant shrubs include mountain snowberry, stickyleaf low rabbitbrush, grey horsebrush, and slenderbush eriogonum. Utilization of these species is uniformly light and none show evidence of any significant change in numbers or dominance.

Herbaceous composition and density is one of the key habitat factors at this site for forage and ground cover. Both grass and forb composition include a variety of species that together provides satisfactory ground cover and a source of succulent summer forage. Ten species of grasses were encountered in 1997. Sheep fescue was the most abundant and significantly increased in nested frequency since 1989. Muttongrass was the only other grass to show a significant increase in nested frequency in 1997. Several grass species have significantly decreased in nested frequency including slender wheatgrass, fringed brome, and Nelson's needlegrass. As reported in 1983, several grass species are increasers which reflects past livestock use, but currently none are especially abundant or indicative of poor range condition. Overall, grass sum of nested frequency appears to be stable with only slight change from year to year.

Forb composition consists of a wide variety of perennials and a few annuals and biennials. Palatability and preference vary greatly, with little evidence of utilization in 1997. It was reported in 1983 that some of the forbs showed utilization when the site was surveyed. In 1989, it was noted that utilization was light on forbs and undetectable on grasses. The more abundant forbs include wild onion, paint brush, sego lily, common stickseed, lupine, penstemon, lambstongue groundsel, and tuber starwort. Sum of nested frequency for perennial forbs has declined since 1989, but only slightly.

1983 APPARENT TREND ASSESSMENT

Both the soil and vegetation trends appear stable. However, this is a sensitive site that could easily decline if subjected to heavy livestock use. Ground cover is adequate but not outstanding. Forage diversity is good but includes a number of increaser species of low to medium value. More intensive livestock use would probably provide a competitive advantage to these species. Deer use is currently insignificant.

1989 TREND ASSESSMENT

The soil trend is slightly improved with abundant vegetation cover to keep erosion in check. The browse trend is stable. The mountain big sagebrush population has changed very little since 1983. In an area where summer range is the limiting factor for big game species, this site displays exceptional forage diversity and production with a limited amount of use. The herbaceous understory trend is upward as a variety of grasses and forbs thrive in the understory. This upward trend will most likely continue if livestock grazing is eliminated in the area.

TREND ASSESSMENT

soil - slightly up (4)

browse - stable (3)

herbaceous understory - up (5)

1997 TREND ASSESSMENT

The soil trend is stable. Percent bare soil decreased to 6% and no erosion is apparent at this time. Fifty percent of the vegetation cover is contributed by the herbaceous understory, giving excellent protection from soil erosion. It appears that the mountain big sagebrush population has been thinning itself since the previous survey of 1989. There is a trend showing the plants are increasing in height and crown. Percent decadence has declined from 42% to 28%, but the percentage of decadent plants classified as dying has now increased to 38%. With the decline in density and increase in decadent plants classified as dying, the trend would be slightly down. The herbaceous understory trend is also slightly down. The perennial herbaceous understory sum of nested frequency has gone down for both grasses and forbs since 1989. Diversity remains high with no one species dominating the site.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --
Herd unit 19A, Study no: 6

| Type | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|-----------------------------|--------------------------|------------------|------|------|-------------------|-----|-----|-----------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | '97 |
| G | Agropyron spicatum | 1 | - | 5 | 1 | - | 3 | .16 |
| G | Agropyron trachycaulum | c149 | b109 | a40 | 65 | 48 | 18 | .22 |
| G | Bromus ciliatus | a21 | b46 | a20 | 10 | 20 | 9 | .26 |
| G | Festuca ovina | a36 | a52 | b207 | 17 | 21 | 69 | 9.96 |
| G | Hilaria jamesii | - | - | 9 | - | - | 3 | .04 |
| G | Poa fendleriana | a11 | a16 | b47 | 5 | 8 | 22 | .65 |
| G | Poa pratensis | 115 | 129 | 97 | 41 | 44 | 35 | 1.67 |
| G | Poa secunda | a3 | b18 | ab11 | 1 | 10 | 5 | .05 |
| G | Stipa columbiana | b89 | c155 | a18 | 41 | 57 | 8 | .19 |
| G | Stipa comata | - | - | 5 | - | - | 3 | .01 |
| G | Stipa lettermani | 32 | 15 | 44 | 14 | 7 | 17 | .67 |
| Total for Annual Grasses | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total for Perennial Grasses | | 457 | 540 | 503 | 195 | 215 | 192 | 13.92 |
| Total for Grasses | | 457 | 540 | 503 | 195 | 215 | 192 | 13.92 |
| F | Achillea millefolium | ab7 | b12 | a- | 2 | 6 | - | - |
| F | Agoseris glauca | a6 | b21 | a6 | 2 | 10 | 3 | .01 |
| F | Alyssum alyssoides (a) | - | - | 3 | - | - | 1 | .00 |
| F | Allium spp. | a47 | a45 | b77 | 23 | 26 | 41 | .24 |
| F | Arabis spp. | - | 2 | 1 | - | 1 | 1 | .00 |
| F | Astragalus tegetarius | 2 | - | - | 1 | - | - | - |
| F | Aster spp. | - | - | - | - | - | - | - |
| F | Astragalus spp. | a3 | a3 | b13 | 1 | 1 | 9 | .10 |
| F | Castilleja angustifolia | a3 | a- | b15 | 2 | - | 7 | .27 |
| F | Castilleja linariaefolia | a- | a- | b60 | - | - | 28 | 1.37 |
| F | Calochortus nuttallii | a- | b18 | b32 | - | 9 | 14 | .07 |
| F | Castilleja spp. | a- | a- | b27 | - | - | 12 | .33 |
| F | Collomia linearis (a) | - | - | 61 | - | - | 32 | .16 |
| F | Comandra pallida | a2 | a- | b25 | 1 | - | 12 | .33 |
| F | Collinsia parviflora (a) | - | - | 81 | - | - | 32 | .21 |
| F | Crepis acuminata | - | - | 1 | - | - | 1 | .01 |
| F | Cruciferae | - | 2 | - | - | 1 | - | - |
| F | Cynoglossum officinale | 5 | - | - | 3 | - | - | - |
| F | Delphinium andersonii | a- | b13 | ab5 | - | 7 | 4 | .13 |
| F | Delphinium occidentale | ab3 | a- | b9 | 2 | - | 5 | .22 |
| F | Erigeron spp. | 4 | - | - | 2 | - | - | - |
| F | Erigeron jonesii | a- | b14 | a3 | - | 7 | 2 | .01 |
| F | Hackelia patens | b121 | b145 | a58 | 53 | 62 | 29 | .40 |

| T y p e | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|---------------------------|---------------------------------|------------------|------------------|------------------|-------------------|-----|-----|--------------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | '97 |
| F | <i>Heuchera parvifolia</i> | _b 31 | _a - | _a 1 | 14 | - | 1 | .03 |
| F | <i>Hydrophyllum</i> spp. | - | 6 | - | - | 4 | - | - |
| F | <i>Lappula occidentalis</i> (a) | - | - | 17 | - | - | 7 | .03 |
| F | <i>Linum lewisii</i> | - | - | 3 | - | - | 1 | .00 |
| F | <i>Lomatium</i> spp. | - | - | 3 | - | - | 1 | .00 |
| F | <i>Lupinus caudatus</i> | _a 46 | _b 96 | _b 114 | 21 | 48 | 53 | 4.15 |
| F | <i>Machaeranthera canescens</i> | _b 17 | _{ab} 12 | _a 2 | 10 | 7 | 1 | .03 |
| F | <i>Mertensia</i> spp. | - | - | 6 | - | - | 4 | .16 |
| F | <i>Microsteris gracilis</i> (a) | - | - | 10 | - | - | 5 | .02 |
| F | <i>Penstemon</i> spp. | _a 25 | _a 11 | _b 47 | 10 | 7 | 21 | .91 |
| F | <i>Plantago</i> spp. | - | 1 | - | - | 1 | - | - |
| F | <i>Polygonum douglasii</i> (a) | - | - | 75 | - | - | 31 | .15 |
| F | <i>Potentilla</i> spp. | - | 2 | 4 | - | 1 | 2 | .01 |
| F | <i>Senecio integerrimus</i> | _a 8 | _b 79 | _a 18 | 6 | 41 | 8 | .11 |
| F | <i>Sedum lanceolatum</i> | - | - | 6 | - | - | 2 | .02 |
| F | <i>Silene</i> spp. | - | - | 1 | - | - | 1 | .00 |
| F | <i>Solidago</i> spp. | 2 | 3 | - | 1 | 1 | - | - |
| F | <i>Stellaria jamesiana</i> | _a - | _b 180 | _b 183 | - | 68 | 63 | 2.87 |
| F | <i>Taraxacum officinale</i> | _a 5 | _b 36 | _c 17 | 3 | 21 | 9 | .15 |
| F | <i>Tragopogon dubius</i> | - | 5 | - | - | 3 | - | - |
| F | Unknown forb-annual (a) | - | - | 4 | - | - | 3 | .01 |
| F | <i>Viola</i> spp. | _a - | _c 78 | _b 16 | - | 43 | 9 | .07 |
| F | <i>Zigadenus paniculatus</i> | - | 2 | - | - | 2 | - | - |
| Total for Annual Forbs | | 0 | 0 | 251 | 0 | 0 | 111 | 0.60 |
| Total for Perennial Forbs | | 337 | 786 | 753 | 157 | 377 | 344 | 12.07 |
| Total for Forbs | | 337 | 786 | 1004 | 157 | 377 | 455 | 12.67 |

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

BROWSE TRENDS --
Herd unit 19A, Study no: 6

| Type | Species | Strip Frequency | Average Cover % |
|------------------|-------------------------------------------|-----------------|-----------------|
| | | '97 | '97 |
| B | Artemisia tridentata vaseyana | 74 | 12.98 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 7 | .06 |
| B | Eriogonum microthecum | 6 | .01 |
| B | Mahonia repens | 78 | 7.68 |
| B | Opuntia spp. | 1 | - |
| B | Pinus monophylla | 0 | 3.15 |
| B | Symphoricarpos oreophilus | 4 | 1.48 |
| B | Tetradymia canescens | 3 | .18 |
| Total for Browse | | 173 | 25.54 |

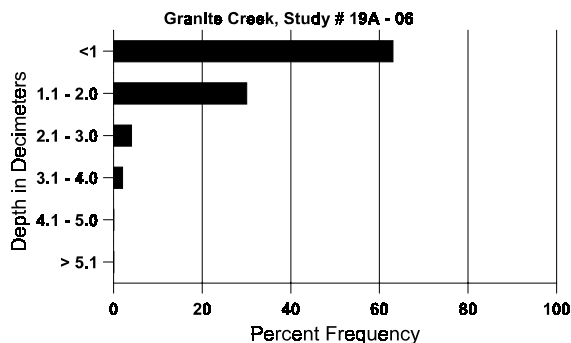
BASIC COVER --
Herd unit 19A, Study no: 6

| Cover Type | Nested Frequency | Average Cover % | | |
|-------------|------------------|-----------------|-------|-------|
| | | '97 | '83 | '89 |
| Vegetation | 357 | 1.00 | 21.75 | 50.95 |
| Rock | 228 | 5.75 | 7.50 | 10.67 |
| Pavement | 235 | 9.50 | 3.25 | 3.26 |
| Litter | 397 | 67.75 | 58.25 | 52.04 |
| Cryptogams | 96 | .75 | 0 | 1.71 |
| Bare Ground | 179 | 15.25 | 9.25 | 5.78 |

SOIL ANALYSIS DATA --
Herd Unit 19A, Study no: 6, Granite Creek

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %0M | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 10.4 | 52.2 (14.1) | 6.1 | 39.6 | 45.8 | 14.6 | 4.3 | 13.1 | 230.4 | 0.9 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19A, Study no: 6

| | |
|------|--------------------------|
| Type | Quadrat Frequency '97 |
| Deer | 21 |

BROWSE CHARACTERISTICS --

Herd unit 19A, Study no: 6

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|--------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 9 | - | - | 1 | - | - | 1 | - | - | 11 | - | - | - | 366 | | 11 | |
| | 97 | 4 | 1 | - | - | - | - | - | - | - | 5 | - | - | - | 100 | | 5 | |
| Y | 83 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 100 | | 3 | |
| | 89 | 14 | - | - | - | - | - | - | - | - | 14 | - | - | - | 466 | | 14 | |
| | 97 | 7 | 1 | - | - | - | - | - | - | - | 8 | - | - | - | 160 | | 8 | |
| M | 83 | 28 | 18 | - | - | - | - | - | - | - | 41 | 1 | 4 | - | 1533 | 21 | 28 | 46 |
| | 89 | 34 | 9 | 1 | 2 | - | - | - | - | - | 39 | 5 | 2 | - | 1533 | 23 | 28 | 46 |
| | 97 | 65 | 13 | 1 | - | - | 1 | - | - | - | 66 | - | 14 | - | 1600 | 29 | 42 | 80 |
| D | 83 | 9 | 24 | - | - | - | - | - | - | - | 9 | 1 | 18 | 5 | 1100 | | 33 | |
| | 89 | 34 | 10 | - | - | - | - | - | - | - | 39 | - | 3 | 2 | 1466 | | 44 | |
| | 97 | 27 | 3 | 3 | 1 | - | - | - | - | - | 19 | - | 2 | 13 | 680 | | 34 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 820 | | 41 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 51% | | | 00% | | | 33% | | | +21% | | | | | | | |
| '89 | | 18% | | | .96% | | | 07% | | | -30% | | | | | | | |
| '97 | | 14% | | | 04% | | | 24% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 2733 | Dec: | 40% | | | |
| | | | | | | | | | | | | '89 | 3465 | | 42% | | | |
| | | | | | | | | | | | | '97 | 2440 | | 28% | | | |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 133 | | 4 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 14 | 14 | 1 |
| | 89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | 11 | 12 | 2 |
| | 97 | 9 | - | - | - | - | - | - | - | - | 9 | - | - | - | 180 | 17 | 19 | 9 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +83% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -10% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 33 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 199 | | - | | | |
| | | | | | | | | | | | | '97 | 180 | | - | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|----|--------------------|--------------------------------|----------------|-------|-----|------|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | |
| <i>Eriogonum microthecum</i> | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 1 | - | - | - | - | - | - | 33 | | 1 |
| | 97 | - | - | - | - | - | - | - | 0 | | 0 |
| Y | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 10 | - | - | - | - | - | - | 333 | | 10 |
| | 97 | 1 | - | - | - | - | - | - | 20 | | 1 |
| M | 83 | 17 | - | - | - | - | - | - | 566 | 7 8 | 17 |
| | 89 | 16 | - | - | 4 | - | - | - | 666 | 6 5 | 20 |
| | 97 | 6 | - | - | 2 | - | - | - | 160 | 9 9 | 8 |
| D | 83 | 1 | - | - | - | - | - | - | 33 | | 1 |
| | 89 | 1 | - | - | - | - | - | - | 33 | | 1 |
| | 97 | - | - | - | - | - | - | - | 0 | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 00% | | 00% | | 00% | | +42% | | | |
| '89 | | 00% | | 00% | | 00% | | -83% | | | |
| '97 | | 00% | | 00% | | 00% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 599 | Dec: | 6% | | |
| | | | | | | '89 | 1032 | | 3% | | |
| | | | | | | '97 | 180 | | 0% | | |
| <i>Mahonia repens</i> | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 6 | - | - | - | - | - | - | 120 | | 6 |
| Y | 83 | 281 | - | - | - | - | - | - | 9366 | | 281 |
| | 89 | 557 | - | - | 4 | - | - | - | 18700 | | 561 |
| | 97 | 134 | - | - | - | - | - | - | 2680 | | 134 |
| M | 83 | 454 | - | - | - | - | - | - | 15133 | 5 6 | 454 |
| | 89 | 609 | - | - | 26 | - | 78 | - | 23766 | 5 7 | 713 |
| | 97 | 1399 | - | - | 26 | - | 15 | - | 28800 | 4 5 | 1440 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 00% | | 00% | | 00% | | +42% | | | |
| '89 | | 00% | | 00% | | 00% | | -26% | | | |
| '97 | | 00% | | 00% | | 00% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 24499 | Dec: | - | | |
| | | | | | | '89 | 42466 | | - | | |
| | | | | | | '97 | 31480 | | - | | |
| <i>Opuntia spp.</i> | | | | | | | | | | | |
| M | 83 | 1 | - | - | - | - | - | - | 33 | 5 4 | 1 |
| | 89 | 1 | - | - | - | - | - | - | 33 | 7 9 | 1 |
| | 97 | 2 | - | - | - | - | - | - | 40 | - | 2 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 00% | | 00% | | 00% | | + 0% | | | |
| '89 | | 00% | | 00% | | 00% | | +18% | | | |
| '97 | | 00% | | 00% | | 00% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 33 | Dec: | - | | |
| | | | | | | '89 | 33 | | - | | |
| | | | | | | '97 | 40 | | - | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Pinus monophylla | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 33 | 67 | 98 | 1 |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 71 | 79 | 1 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 33 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 33 | | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |
| Symphoricarpos oreophilus | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | 1 | - | - | 1 | - | - | - | 33 | 10 | 9 | 1 |
| | 97 | 1 | - | - | 2 | - | - | - | - | - | 3 | - | - | - | 60 | 30 | 40 | 3 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +59% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 33 | | - | | | |
| | | | | | | | | | | | | '97 | 80 | | - | | | |
| Tetradymia canescens | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | | 1 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | 18 | 12 | 2 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 13 | 24 | 1 |
| D | 83 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | | 2 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | | 2 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +33% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -39% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 66 | Dec: | 100% | | | |
| | | | | | | | | | | | | '89 | 99 | | 0% | | | |
| | | | | | | | | | | | | '97 | 60 | | 67% | | | |

Trend Study 19A-8-97

Study site name: The Basin.

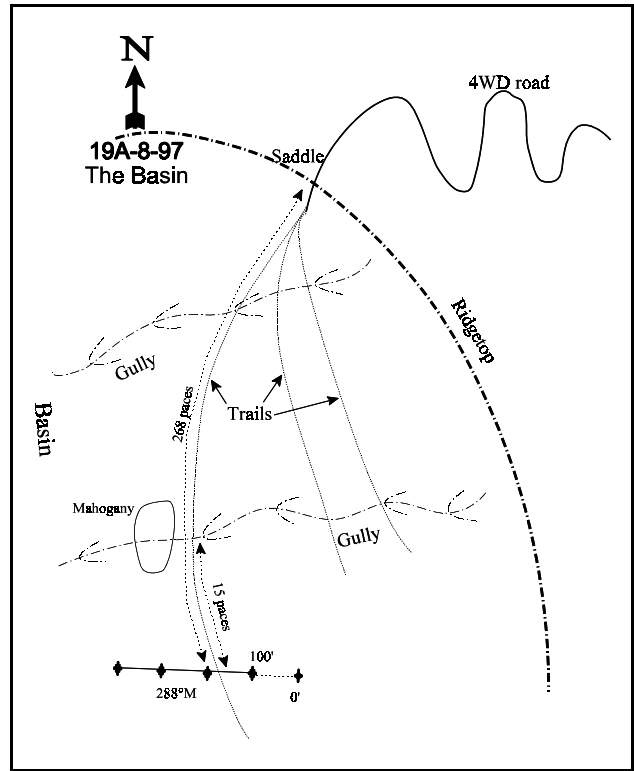
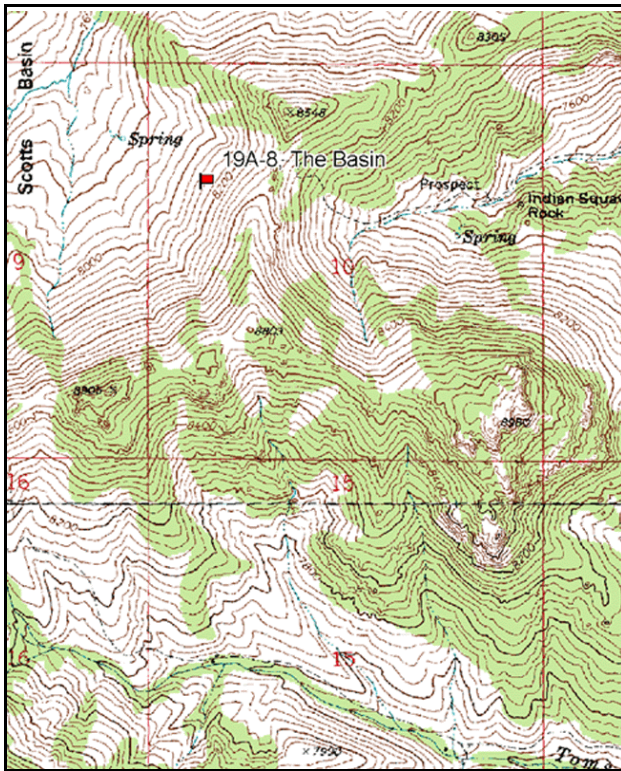
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 288 degrees magnetic.

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

LOCATION DESCRIPTION

From the bridge outside the CCC camp near Callao, take the fork off the main Snake Valley Road going north-west for 0.85 miles to a fork, keep right and go 0.8 miles to an intersection. Turn left toward the mountains, then keep right at the fork after 0.1 miles. Continue up 1.65 miles, keep right at the fork to Tom's Canyon. Continue up Middle Canyon 3.35 miles to the top. Stop where the road ends in a saddle overlooking The Basin. From here, there are 3 unmaintained trails down the hill into The Basin. Take the lowest trail and hike southwest for 268 paces to a spot just past a small gully and the last clump of mahogany. The baseline is above the trail 7 paces to the red fencepost marking the 100 foot baseline stake.



Map Name: Goshute Canyon

Diagrammatic Sketch

Township 11S, Range 18W, Section 10

GPS: NAD 27, UTM 12S 4418879 N 255009 E

DISCUSSION

The Basin - Trend Study No. 19A-8

*** SUSPENDED - This site was suspended in 2002 upon request of the biologist. The site narrative and data tables are included from the 1997 report.

The Basin study is located midway up the Deep Creek Mountain range in a large open basin surrounded by steep slopes and rugged cliffs. Historically private property, land in this unique area was purchased by The Nature Conservancy and traded to the BLM. The study is located at approximately 8,200 feet in elevation on the eastern side of the basin. It has a westerly aspect with a slope of 41%. This sagebrush-grass habitat type is in deer and elk summer range. In 1989, 5 elk were seen on the ridge to the south with fresh deer sign on the site. Also in 1989, livestock sign was evident, but not fresh. In 1997, a mule deer antler drop was found above the site and some blue grouse were seen on the road to the site. Red ants were extremely common during both surveys. Nearby mahogany and pinyon stands provide good cover. Springs in the bottom of the basin provide a perennial water source about one-quarter mile away.

Soils are the Podmor/Onaqui type, a very cobbly soil highly susceptible to water erosion. Soil textural analysis indicates a sandy loam with a slightly acidic pH (6.4). Effective rooting depth was estimated to be 10 inches and the soil temperature measured at 12 inches averaged 55°F. Soil on the site is relatively shallow, with a gravelly surface character. Some soil movement is apparent, but it appears that vegetation is holding soil movement to a minimum.

Mountain big sagebrush is the key species with an estimated density of 8,820 plants/acre in 1997 and providing 84% of the browse cover. The decrease from the estimated 19,066 in 1989 is due to the much larger sample size now used to estimate browse density which gives more accurate browse population estimates. The sagebrush on this site are low growing, averaging only 15 inches in height. Even though the sagebrush are relatively short in stature, the uniform stand of mature plants contributes 14% average canopy cover. Age structure of the population in 1997 is nearly that recorded in 1989 with 71% of the plants classified as mature. In 1989, the mountain big sagebrush showed moderate to heavy use and good vigor. In 1997, utilization was mostly light to moderate with the plants still showing good vigor. Slenderbush eriogonum had an estimated density of 480 plants/acre in 1997. This plant was misidentified as corymbed eriogonum in the previous survey. Stickyleaf low rabbitbrush, broom snakeweed and mountain snowberry were encountered in low numbers. Clumps of curlleaf mountain mahogany occur on the surrounding slopes and rocky ridges. Scattered single-leaf pinyon and Utah juniper dot the site and surrounding hillsides, but pose no threat of encroachment.

Perennial grass sum of nested frequency has declined, mostly due to significant decreases in muttongrass and Sandberg bluegrass. Sheep fescue is currently the dominant grass. Bluebunch wheatgrass abundance has changed very little since 1989. One additional species was encountered in 1997, subalpine needlegrass. Overall, the grasses show little or no use and exhibit litter build up from the previous season.

Perennial forb sum of nested frequency has decreased since 1989. Many of the plants encountered on the site are low growing sprawling species. Some of the more abundant species include Fendler sandwort, blue-eyed Mary, lupine, longleaf phlox, and tapertip hawksbeard.

1989 APPARENT TREND ASSESSMENT

Signs of soil erosion were observed, as there appears to be excessive pavement. Contingent upon vegetation trends, soil conditions are expected to improve. The dense mountain big sagebrush stand provides adequate forage and ground cover. The herbaceous understory is also in good condition and appears to be improving. Annual production on most plants exceeds wildlife demands. While the current trend is assessed as stable to possibly improving, vegetative conditions will depend on future livestock grazing management.

1997 TREND ASSESSMENT

Erosion does not appear to be serious at this time. There is still adequate vegetation and litter cover to reduce erosion, although sum of nested frequency for the herbaceous understory has declined since 1989. Soil trend is stable and will continue to depend upon the herbaceous understory cover. The browse trend is stable although there is an apparent decrease in mountain big sagebrush density since 1989. This decrease is due to the increased sample size now used for the number of dead plants in the population cannot explain this decrease. Currently, mountain big sagebrush age structure and vigor are similar to that reported in 1989, while the amount of utilization has declined. The herbaceous understory trend is downward due to a great decline in perennial species sum of nested frequency.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - downward (1)

HERBACEOUS TRENDS --

Herd unit 19A, Study no: 8

| T y p e | Species | Nested Frequency | | Quadrat Frequency | | Average Cover % |
|-----------------------------|--------------------------|---------------------|------------------|----------------------|-----|-----------------------|
| | | '89 | '97 | '89 | '97 | |
| G | Agropyron spicatum | 53 | 59 | 22 | 25 | .74 |
| G | Festuca ovina | 187 | 208 | 74 | 70 | 9.50 |
| G | Poa fendleriana | _b 172 | _a 80 | 68 | 34 | 1.41 |
| G | Poa secunda | _b 200 | _a 112 | 82 | 51 | 2.47 |
| G | Sitanion hystrix | 9 | 2 | 5 | 2 | .01 |
| G | Stipa columbiana | _a - | _b 16 | - | 7 | .28 |
| Total for Annual Grasses | | 0 | 0 | 0 | 0 | 0 |
| Total for Perennial Grasses | | 621 | 477 | 251 | 189 | 14.42 |
| Total for Grasses | | 621 | 477 | 251 | 189 | 14.42 |
| F | Arabis spp. | _b 57 | _a 16 | 31 | 6 | .03 |
| F | Arenaria fendleri | _b 244 | _a 128 | 90 | 51 | 1.66 |
| F | Aster spp. | - | 4 | - | 2 | .03 |
| F | Astragalus spp. | 14 | 8 | 7 | 4 | .07 |
| F | Castilleja angustifolia | 17 | 19 | 9 | 10 | .10 |
| F | Castilleja chromosa | 2 | - | 1 | - | - |
| F | Calochortus nuttallii | 12 | 11 | 8 | 6 | .03 |
| F | Collomia linearis (a) | - | 7 | - | 4 | .04 |
| F | Comandra pallida | 1 | - | 1 | - | - |
| F | Collinsia parviflora (a) | - | 105 | - | 38 | .31 |
| F | Crepis acuminata | 82 | 68 | 36 | 29 | .86 |
| F | Delphinium nuttallianum | _a - | _b 63 | - | 31 | .40 |
| F | Erigeron spp. | _a - | _b 44 | - | 20 | .28 |
| F | Eriogonum jamesii | _b 114 | _a - | 49 | - | - |
| F | Hackelia patens | _a - | _b 16 | - | 7 | .11 |

| T y p e | Species | Nested Frequency | | Quadrat Frequency | | Average Cover % |
|---------------------------|-----------------------------|---------------------|-----------------|----------------------|-----|-----------------------|
| | | '89 | '97 | '89 | '97 | '97 |
| F | Linum lewisii | _b 38 | _a 8 | 15 | 5 | .06 |
| F | Lomatium spp. | 6 | 2 | 3 | 1 | .00 |
| F | Lupinus arbustus calcaratus | 114 | 102 | 50 | 42 | 4.23 |
| F | Microsteris gracilis (a) | - | 32 | - | 13 | .19 |
| F | Penstemon humilis | _b 78 | _a 59 | 37 | 27 | .61 |
| F | Penstemon spp. | - | 2 | - | 1 | .15 |
| F | Phlox hoodii | - | 3 | - | 1 | .00 |
| F | Phlox longifolia | _b 131 | _a 95 | 57 | 44 | .32 |
| F | Polygonum douglasii (a) | - | 13 | - | 8 | .04 |
| F | Ranunculus spp. | _b 142 | _a - | 65 | - | - |
| F | Senecio integerrimus | - | 1 | - | 1 | .03 |
| F | Sedum lanceolatum | _a 6 | _b 15 | 2 | 6 | .10 |
| F | Sphaeralcea coccinea | - | 3 | - | 1 | .03 |
| F | Taraxacum officinale | _a 2 | _b 22 | 1 | 12 | .19 |
| F | Townsendia spp. | 6 | - | 4 | - | - |
| Total for Annual Forbs | | 0 | 157 | 0 | 63 | 0.59 |
| Total for Perennial Forbs | | 1066 | 689 | 466 | 307 | 9.31 |
| Total for Forbs | | 1066 | 846 | 466 | 370 | 9.90 |

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

BROWSE TRENDS --

Herd unit 19A, Study no: 8

| T y p e | Species | Strip Frequency | Average Cover % |
|------------------|----------------------------------------------|--------------------|--------------------|
| | | '97 | '97 |
| B | Artemisia tridentata vaseyana | 96 | 13.99 |
| B | Cercocarpus ledifolius | 0 | .00 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 11 | .25 |
| B | Eriogonum microthecum | 16 | .52 |
| B | Gutierrezia sarothrae | 1 | - |
| B | Pinus monophylla | 1 | 1.73 |
| B | Symphoricarpos oreophilus | 3 | .06 |
| Total for Browse | | 128 | 16.56 |

CANOPY COVER --

Herd unit 19A, Study no: 8

| Species | Percent Cover '97 |
|------------------|-------------------|
| Pinus monophylla | 2 |

BASIC COVER --

Herd unit 19A, Study no: 8

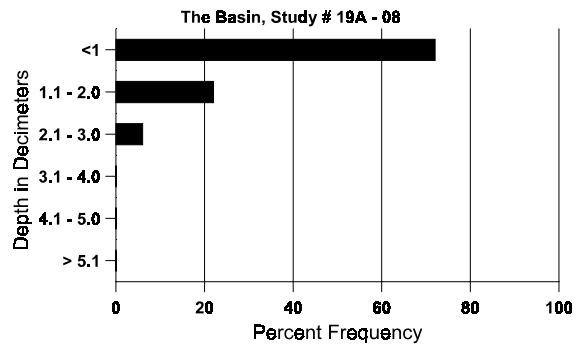
| Cover Type | Nested Frequency | Average Cover % | |
|-------------|------------------|-----------------|-------|
| | '97 | '89 | '97 |
| Vegetation | 345 | 16.50 | 42.42 |
| Rock | 89 | 2.00 | 1.91 |
| Pavement | 323 | 52.50 | 39.23 |
| Litter | 361 | 22.00 | 29.03 |
| Cryptogams | 10 | 0 | .05 |
| Bare Ground | 193 | 7.00 | 3.95 |

SOIL ANALYSIS DATA --

Herd Unit 19A, Study no: 8, The Basin

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 9.8 | 55.0 (12.2) | 6.4 | 61.3 | 22.2 | 16.6 | 3.2 | 10.1 | 176.0 | 0.7 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19A, Study no: 8

| Type | Quadrat Frequency '97 |
|--------|-----------------------|
| Deer | 13 |
| Cattle | 4 |

BROWSE CHARACTERISTICS --

Herd unit 19A, Study no: 8

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | | | |
|--------------------------------------------------|----------------------------|---------------------|-----|------------------|---|--------------------|--------------------------------|----------------|-------|-------|-----|
| | | 1 | 2 | 3 | 4 | | | | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | |
| S | 89 | 13 | - | - | - | - | - | 13 | 866 | | 13 |
| | 97 | 23 | - | - | - | - | - | 23 | 460 | | 23 |
| Y | 89 | 32 | 10 | - | - | - | - | 41 | 2800 | | 42 |
| | 97 | 38 | 11 | 2 | - | - | - | 51 | 1020 | | 51 |
| M | 89 | 2 | 101 | 109 | - | - | - | 206 | 14133 | 7 13 | 212 |
| | 97 | 219 | 94 | 2 | - | - | 2 | 308 | 6340 | 15 25 | 317 |
| D | 89 | 21 | 7 | 4 | - | - | - | 31 | 2133 | | 32 |
| | 97 | 56 | 9 | 5 | 3 | - | - | 57 | 1460 | | 73 |
| X | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | - | - | - | - | - | - | - | 600 | | 30 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '89 | | 41% | | 40% | | 02% | | -54% | | | |
| '97 | | 26% | | 02% | | 04% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | '89 | 19066 | Dec: | 11% |
| | | | | | | | | '97 | 8820 | | 17% |
| <i>Cercocarpus ledifolius</i> | | | | | | | | | | | |
| S | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 1 | - | - | - | - | - | 1 | 20 | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '89 | | 00% | | 00% | | 00% | | | | | |
| '97 | | 00% | | 00% | | 00% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | '89 | 0 | Dec: | - |
| | | | | | | | | '97 | 0 | | - |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | | | | |
| Y | 89 | 1 | - | - | - | - | - | 1 | 66 | | 1 |
| | 97 | - | - | - | - | - | - | - | 0 | | 0 |
| M | 89 | 2 | - | - | - | - | - | 2 | 133 | 7 12 | 2 |
| | 97 | 16 | - | - | 1 | - | - | 17 | 340 | 15 20 | 17 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '89 | | 00% | | 00% | | 00% | | +41% | | | |
| '97 | | 00% | | 00% | | 00% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | '89 | 199 | Dec: | - |
| | | | | | | | | '97 | 340 | | - |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Eriogonum microthecum</i> | | | | | | | | | | | | | | | | | | |
| S | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| Y | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 3 | - | - | 1 | - | - | - | - | - | 4 | - | - | - | 80 | | 4 | |
| M | 89 | 16 | 9 | 1 | - | - | - | - | - | - | 26 | - | - | - | 1733 | 7 | 7 | 26 |
| | 97 | 20 | - | - | - | - | - | - | - | - | 20 | - | - | - | 400 | 7 | 9 | 20 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 35% | | | 04% | | | 00% | | | -72% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 1733 | Dec: | - | | | |
| | | | | | | | | | | | | '97 | 480 | | - | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | | |
| M | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | - | - | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |
| <i>Pinus monophylla</i> | | | | | | | | | | | | | | | | | | |
| S | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | - | - | 1 | - | - | - | 1 | - | - | - | 20 | - | - | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |
| <i>Symphoricarpos oreophilus</i> | | | | | | | | | | | | | | | | | | |
| M | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 1 | - | - | 2 | - | - | - | - | - | 3 | - | - | - | 60 | 26 | 68 | 3 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '97 | 60 | | - | | | |

SUMMARY

WILDLIFE MANAGEMENT UNIT 19A - WEST DESERT, DESERT MOUNTAIN RANGES

Of the eight existing range trend studies in this management unit, four were reread in 2002 and four were suspended. In addition, two new studies were established. The studies in Sevy Canyon, Granite Creek, and The Basin were suspended because of access problems as these studies now lie within BLM wilderness study areas. The Sevy Canyon study was surveyed by the project leader and was noted as being poor representative site in 2002. The study at Chokecherry Spring was also suspended as it does not represent critical range for big game and lies outside state boundaries on Indian lands.

Precipitation data for this management unit was summarized using weather station data from Ibabah and Callao. Total annual precipitation and seasonal distribution of precipitation were both analyzed. During the past two decades, total annual precipitation has been normal or above normal for most years with the exception of scattered years during the late 1980's and early 1990's. Spring precipitation (March-May), which is particularly important for cool season species, was below normal for three straight seasons from 2000-2002 at Ibabah, and only 41% of normal in the spring of 2002 at Callao. Fall precipitation (September-November) was also below normal at both stations in 2001, especially at Callao (40%). Many of the vegetation changes reported in 2002 can be explained by the current drought, primarily low fall and spring precipitation preceding the 2002 sampling.

There were no upward trends reported for soils, browse, or the herbaceous component on any studies that were reread in this unit in 2002. Soil trend was downward on two sites, and stable on two others. Downward soil trends are typical during periods of drought, which result from increased bare soil and declines in vegetation and litter cover. Decreases in cover and nested frequency of herbaceous species also have additive effects on soil trend and condition. These changes in ground cover result in less protective cover on the soil surface, increasing the erosion potential on a site.

Two studies had downward browse trends in 2002, with two others remaining stable. Downward browse trends are the result of key browse populations showing increased decadence, reduced vigor, and a decline in reproduction. Stansbury cliffrose, basin big sagebrush, and shadscale represent the key browse on the studies that were resampled in 2002. The key browse showed increased decadence on three sites, decreased reproduction on three sites, and reduced vigor on all four sites that were resampled in 2002.

Herbaceous trends were slightly down on two sites, and stable on two others. The herbaceous component is often most effected by dry conditions, especially perennial forbs. Sum of nested frequency values for perennial grasses and forbs declined on three of the four sites that were reread in 2002. Average cover and nested frequency values of cheatgrass decreased on all four sites in 2002 as well. The forb component at the Trail Gulch and Wood Canyon studies is virtually non-existent, while the forb component at the Ochre Mountain and Durse Canyon studies is limited.

A trend summary table of each study follows.

Trend Summary

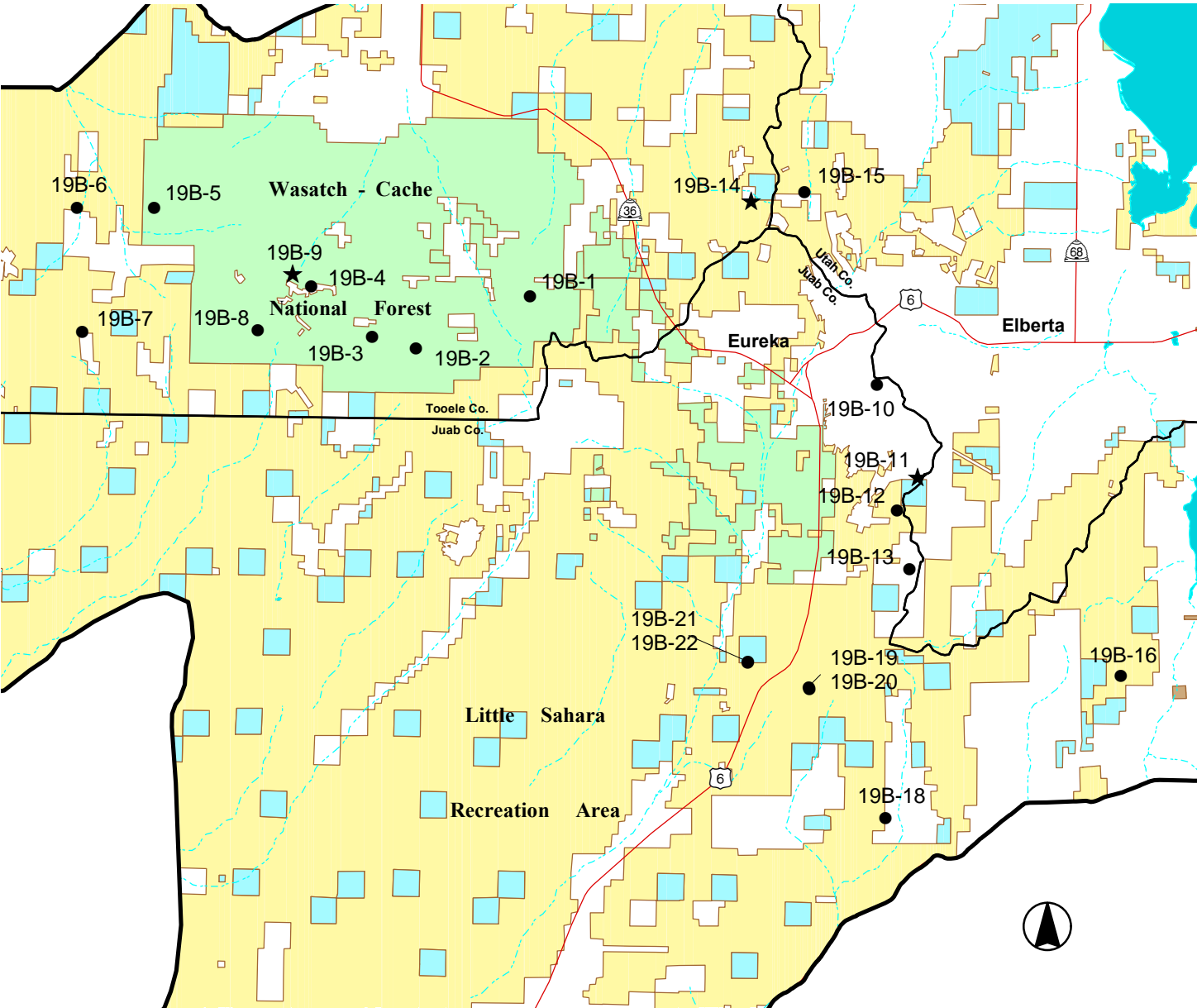
| | Category | 1983 | 1989 | 1997 | 2002 |
|-------------------------|-----------------------|------|------|------|------|
| 19A-1 Trail Gulch | soil | est | 3 | 3 | 2 |
| | browse | est | 3 | 3 | 3 |
| | herbaceous understory | est | 3 | 3 | 3 |
| 19A-2 Ochre Mountain | soil | est | 3 | 3 | 3 |
| | browse | est | 2 | 2 | 1 |
| | herbaceous understory | est | 3 | 4 | 3 |
| 19A-4 Durse Canyon | soil | est | 4 | 3 | 3 |
| | browse | est | 3 | 3 | 3 |
| | herbaceous understory | est | 4 | 4 | 2 |
| 19A-7 Wood Canyon | soil | | est | 3 | 2 |
| | browse | | est | 3 | 1 |
| | herbaceous understory | | est | 4 | 2 |
| 19A-9 Rocky Canyon | soil | | | | est |
| | browse | | | | est |
| | herbaceous understory | | | | est |
| 19A-10 Rocky Spring | soil | | | | est |
| | browse | | | | est |
| | herbaceous understory | | | | est |

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up
 (est) = established, (n/a) = no trend, (susp) = suspended, (NR) = not read











| SUSPENDED STUDIES | | | | | |
|-----------------------------|-----------------------|------|------|------|------|
| | Category | 1983 | 1989 | 1997 | 2002 |
| 19A-3 Sevy Canyon | soil | est | 3 | 3 | susp |
| | browse | est | 3 | 1 | susp |
| | herbaceous understory | est | 4 | 2 | susp |
| 19A-5 Chokecherry Canyon | soil | est | 3 | 3 | susp |
| | browse | est | 3 | 3 | susp |
| | herbaceous understory | est | 5 | 3 | susp |
| 19A-6 Granite Creek | soil | est | 4 | 3 | susp |
| | browse | est | 3 | 2 | susp |
| | herbaceous understory | est | 5 | 2 | susp |
| 19A-8 The Basin | soil | | est | 3 | susp |
| | browse | | est | 3 | susp |
| | herbaceous understory | | est | 1 | susp |

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up
(est) = established, (n/a) = no trend, (susp) = suspended, (NR) = not read

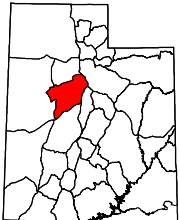
Management Unit 19B



Map Scale 1:425,000 (1 inch = 6.7 miles)

- | | |
|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
|  Forest Service |  County Boundary |
|  BLM |  Road |
|  State of Utah |  Water Course (Ephemeral) |
|  Private Land |  Transect Location |
|  Water Body |  Suspended Site |

Unit Location



WILDLIFE MANAGEMENT UNIT 19 - WEST DESERT

SUBUNIT 19B - WEST DESERT, VERNON

Boundary Description

Tooele and Juab counties - Boundary begins at SR-36 and the Pony Express Road; north on SR-36 to SR-73; east on SR-73 to I-15; south on I-15 to SR-132 at Nephi; west on SR-132 to US-6; west on US-6 to SR-174; northwest on SR-174 to the Dugway Valley Road; north on this road to the Pony Express Road; northeast on the road to SR-36 and beginning point.

Management Unit Description

The 19B Vernon sub unit encompasses the Simpson Mountains, Sheeprock Mountains, East & West Tintic Mountains, and the Gilson Mountains. Trend studies are concentrated primarily in the East Tintic and the Sheeprock Mountains sampling the limited summer ranges of these areas. Due to the relative low elevation of these desert mountain ranges, quality summer range is limited. The Sheep Rock Mountains are administered by the Wasatch National Forest while the East Tintic Mountains are primarily privately owned.

Predation on fawns has been a major problem on the Vernon subunit. In 1996, a predator management plan was implemented and several coyote dens were destroyed in the immediate vicinity of prime deer fawning areas. The Tintic mountains have other problems, including a lack of quality summer range. Large wildfires during the last 6 years have burned large acreages of this unit. Much of the burned areas have been seeded and may offer better forage quality in the future. The Vernon subunit was closed to all hunting in 1997, and reopened as a limited entry hunting unit in 2000. In 2002, 149 limited entry deer tags were permitted which included archery, muzzleloader, and rifle tags.

Range Trend Studies

Eighteen studies were established in the Vernon sub unit in 1983. Eight studies are located on winter range and the other 10 studies are located on summer range. All studies were reread in the summer of 1989. In 1997, all studies were read again with the exception of South Pine Canyon (19B-8) and Old Canyon (19B-17). South Pine Canyon, a trend study established to monitor winter range, was not reread because a fire removed all browse species from the site. Old Canyon was not reread due to a lack of wildlife use. In 2002, most of the studies were resampled with the exception of North Oak Brush Canyon (#9), Water Canyon (#11), and Black Rock Canyon (#14). After consulting with the regional biologist, these studies were suspended in 2002 as they no longer represent key areas or are not representative of critical deer range. Old Canyon (#17), which was not sampled in 1997, was also suspended in 2002. Maps, a site narrative with trend assessments, and data tables for each study follow.

Trend Study 19B-1-02

Study site name: Sabie Mountain.

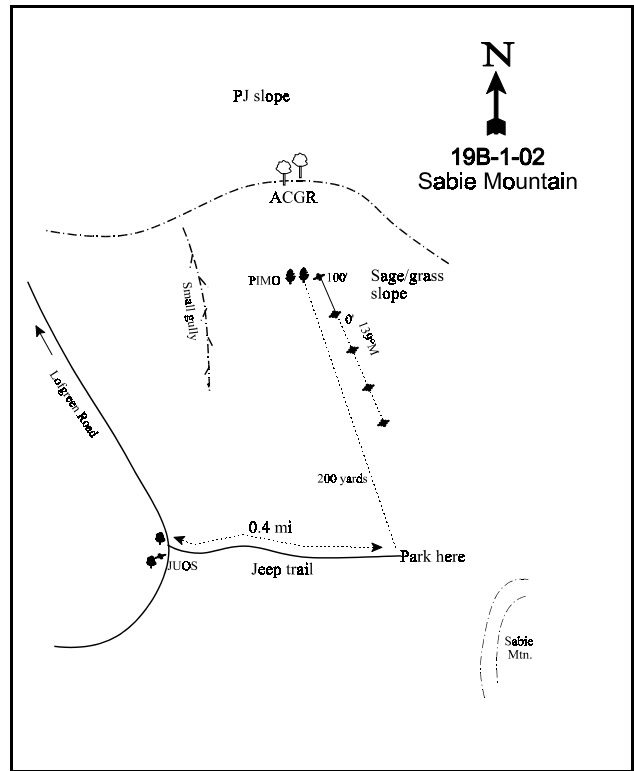
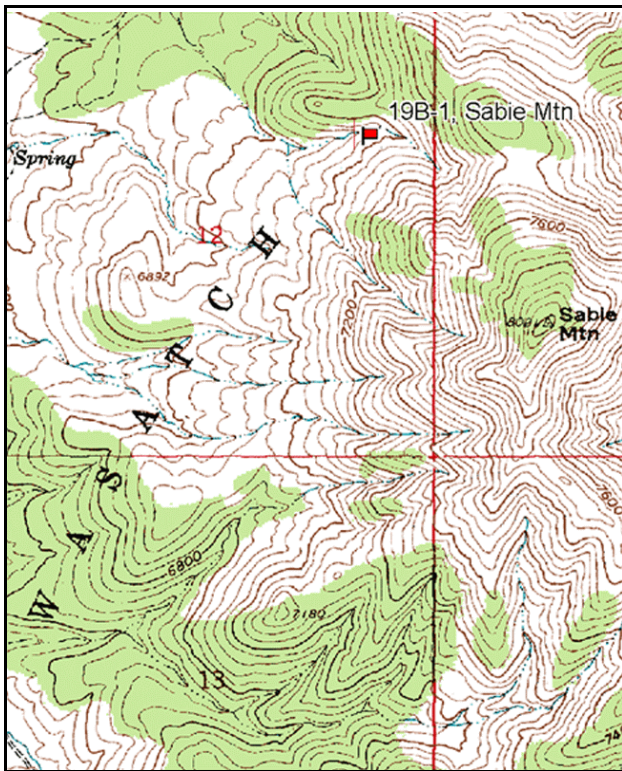
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 319 degrees magnetic. (Lines 2-4 @ 139°M)

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

LOCATION DESCRIPTION

(Alternate route on road #577). Just north of Vernon Reservoir, turn east on Forest Service road # 038 towards Lofgreen. Go just over 1 mile and turn right onto a dirt road into a chaining. Proceed 1.4 miles to a gate. Continue 0.5 miles to an intersection. Turn left (east) and follow this road 0.4 miles across a seeding to where the road bends sharply to the right. There is an old jeep trail on the left and two junipers with a short green fencepost between them on the right. The study site can be reached from here by hiking about 0.5 miles northeast up the small drainage to a clump of maples in the wash bottom. From the largest maple tree, walk up the hill 30 paces bearing 136 degrees to the end of the baseline. The 0-foot stake is marked by browse tag #418.



Map Name: Sabie Mountain

Diagrammatic Sketch

Township 10S, Range 5W, Section 12

GPS: NAD 27, UTM 12S 4425367 N 384835 E

DISCUSSION

Sabie Mountain - Trend Study No. 19B-1

This trend study is located on the northwest slope of Sabie Mountain on land administered by the Uinta National Forest. It is within deer summer range at an elevation of 7,000 feet. Aspect is northwest with a 35% slope. The range type is mountain big sagebrush-grass, with strong elements of mountain snowberry, stickyleaf low rabbitbrush, and Oregon grape. The area had a diverse and productive herbaceous understory in the past, but much less so in 2002 due to the drought. A pellet group transect read on site in 1997 estimated 7 deer days use/acre (17 ddu/ha) and 14 cow days use/acre (35 cdu/ha) in the area. Pellet group transect data taken in 2002 estimated 19 deer days use/acre (46 ddu/ha) and 5 cow days use/acre (13 cdu/ha). Most of the deer pellets in 2002 appeared to be from late spring and early summer, while all of the cow pats were from the previous summer.

Soil is weathered in place from igneous parent material with many angular granite or feldspar rocks on the surface. Color is medium dark with an estimated organic matter content of 4.7%. Soil textural and chemical analysis indicates a loam to clay loam that is slightly acidic in reactivity (pH of 6.3). Effective rooting depth was estimated at 13 inches. Average soil temperature was 52.8°F at 15 inches in 1997. As reported in 1983, some past erosion is apparent, evidenced by a few gullies in the vicinity. Percent bare ground declined from a high of 27% in 1983 to 5% in 1997. With drought conditions in 2002, bare ground increased to 16%. The distribution of vegetation and litter cover continues to prevent accelerated erosion in most places. Pocket gophers were reportedly active throughout the area and were a source of significant soil disturbance in 1983. This has not been reported in any other year. The erosion condition class was determined as stable in 2002.

In 1997, a greatly increased sample size was used to more accurately represent the browse populations in the area. The baseline was extended to estimate browse density, whereas the previous surveys sampled browse about 150-200 feet to the west, in an area with a thinner and less representative stand of mountain big sagebrush. Mountain big sagebrush density was estimated to be 4,220 plants/acre in 1997, slightly increasing to 4,580 plants/acre in 2002. The latter two estimates are more than double those of 1983 and 1989. The age structure is relatively similar between 1989 and 2002 with about 70% of the population being mature. The remainder being composed mostly of decadent individuals. In 1997, it was reported that an indicator of possible losses to the population was that 55% of the decadent plants were classified as dying. The population remained stable and only 8% of the decadent plants were classified as dying in 2002. The number of seedling and young sagebrush have been low in all years. Utilization on mountain big sagebrush has been mostly light to moderate in all samples. Vigor has returned to normal since the 1989 reading when about one-third of the population showed poor vigor. Mountain big sagebrush had an estimated total canopy cover value of 23% in 2002. Crickets were abundant on the site in 2002 and had noticeably eaten many sagebrush leaves. Annual leader growth averaged 1.2 inches in 2002.

Saskatoon serviceberry had an estimated density of just under 300 plants/acre on the site in 1997 and 2002. This species has shown moderate to heavy utilization in all readings, but mostly normal vigor since 1983 when the entire population displayed poor vigor. Serviceberry plants have a stunted growth form due to heavy use. Mountain snowberry is the most abundant browse by density with an estimated 8,360 plants/acre in 2002. This species has a mostly mature population with few young in 1997 and 2002. Snowberry plants are also small averaging only one foot in height by 1½ feet in width in 1997 and 2002. Use has been mostly light on snowberry in all readings. Crickets were also observed to be feeding on snowberry in 2002. Other browse sampled on the site include stickyleaf low rabbitbrush, Oregon grape, and Wood's rose. Single-needle pinyon and Utah juniper are scattered throughout the area at an estimated density of 22 juniper and 51 pinyon trees/acre.

The herbaceous understory was moderately abundant in the past and provided 40% of the vegetation cover on the site in 1997. However, herbaceous plants, especially forbs, drastically declined in 2002 with drought. Mutton bluegrass has been the most abundant grass on the site during all readings. It provided 68% of the total grass cover in 1997, increasing to 81% in 2002. It significantly declined in nested frequency in 2002, but

remains at a the same level as 1983 estimates. Other important perennial grasses that occur on the site in low frequencies are bluebunch wheatgrass and Sandberg bluegrass. Both of these species declined in nested frequency between 1997 and 2002, although neither decrease was significant. A variety of other grasses are found scattered throughout the site including oniongrass, spike fescue, bottlebrush squirreltail, basin wildrye, and bulbous bluegrass. Average cover of grasses declined from 11% in 1997 to 5% in 2002.

Forbs are important to wildlife on this summer/transitional range. Composition was diverse and productive between 1983 and 1997. The drought conditions in 2002 had a drastic impact on the forb component. Sum of nested frequency for perennial forbs declined by 75%, and cover decreased from 13% to 3% between 1997 and 2002. Crickets had also heavily utilized many of the forbs on site in 2002. The most abundant species include bastard toadflax, one-flower helianthella, and mulesears wyethia.

1983 APPARENT TREND ASSESSMENT

Some soil movement is apparent as evidenced by sheet erosion, relatively high amounts of erosion pavement, and small gullies in the area. Large scale sheet erosion, however, is not a problem because of the abundant vegetation and litter cover. The three principal browse species, mountain big sagebrush, mountain snowberry, and Saskatoon serviceberry, are each healthy and productive. The herbaceous understory appears stable.

1989 TREND ASSESSMENT

Percent bare ground decreased from 27% in 1983 to 11% in 1989. Localized erosion continues, but most of the gullies in the area show signs of healing with vegetated sides and bottoms. The soil trend is upward. Except for a slight decline in Saskatoon serviceberry density, the browse trend remains stable with a variety of browse available. The herbaceous understory trend is stable with a slight increase in herbaceous understory sum of nested frequency.

TREND ASSESSMENT

soil - up (5)

browse - stable (3)

herbaceous understory - stable (3)

1997 TREND ASSESSMENT

The soil trend continues to improve with a decrease in percent bare ground. There is ample vegetation and litter to keep erosion to a minimum. The soil trend is slightly up. The data indicates that serviceberry and snowberry have stable populations. The key browse species, mountain big sagebrush, provides 62% of the total browse cover on the site. Realizing that the population estimate is much larger in 1997, this increase is due almost entirely to the larger sampling design. The trend for mountain big sagebrush is slightly down. To better understand the sagebrush trend for this site, it is much better to look at the distribution of the different classes of plants within the population. For example, the dead to live ratio is 1:6, or about 15% are dead (720 plants/acre). This may continue as 55% of the decadent plants were classified as dying, meaning that 583 plants/acre could be added to the dead population very soon. Also, it should be noted that percent decadence has steadily increased through the years, 15%, 21% and 25% in 1997. Mountain big sagebrush canopy cover is relatively high (23%) and is likely affecting herbaceous understory production. Perennial grass sum of nested frequency has not varied much through the years. The grass trend would be considered stable. Perennial forbs have shown much more variation in their sum of nested frequency values between years, declining by 45% in 1997. The forb trend is downward. Because forbs make up 54% of the herbaceous understory cover, the overall trend for the herbaceous understory would be slightly downward.

TREND ASSESSMENT

soil - slightly up (4)

browse - slightly down (2)

herbaceous understory - slightly down (2)

2002 TREND ASSESSMENT

Trend for soil is down due to drought conditions. Bare ground increased from 5% to 16%, litter cover declined from 57% to 45%, sum of nested frequency for perennial grasses and forbs declined by 55%, and herbaceous cover declined from 24% to 8%. Trend for browse is stable. Mountain big sagebrush slightly increased in density and shows improved vigor. Recruitment remains low, but the proportion of the decadent age class classified as dying declined from 55% in 1997 to only 8% in 2002. The herbaceous understory has a downward trend. Drought conditions in 2002 caused a drastic decline in the abundance of perennial herbaceous plants, especially forbs. The nested frequency of all perennial forbs declined by 75%. What was once a diverse and productive forb component, is currently sparse and heavily utilized by crickets. Better precipitation in the future should reverse these trends.

TREND ASSESSMENT

soil - down (1)

browse - stable (3)

herbaceous understory - down (1)

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 1

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|--------------------------|------------------|------------------|------------------|------------------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | Agropyron spicatum | a ⁵⁹ | b ⁹³ | ab ⁵³ | a ³⁸ | 20 | 34 | 21 | 16 | 1.65 | .47 |
| G | Agropyron trachycaulum | 9 | 5 | - | - | 4 | 3 | - | - | - | - |
| G | Bromus marginatus | 4 | - | - | - | 1 | - | - | - | - | - |
| G | Elymus cinereus | - | - | 3 | - | - | - | 2 | - | .41 | .03 |
| G | Leucopoa kingii | - | 3 | 7 | 4 | - | 1 | 3 | 2 | .18 | .15 |
| G | Melica bulbosa | ab ¹¹ | b ¹⁸ | b ⁹ | a ⁻ | 4 | 7 | 5 | - | .08 | - |
| G | Poa bulbosa | - | - | 3 | - | - | - | 1 | - | .03 | - |
| G | Poa fendleriana | a ²⁰⁰ | b ²⁴¹ | b ²⁴⁰ | a ¹⁹⁶ | 77 | 87 | 80 | 78 | 7.65 | 4.25 |
| G | Poa secunda | b ⁵⁸ | a ²³ | ab ⁵³ | ab ⁴⁷ | 24 | 12 | 19 | 20 | 1.13 | .37 |
| G | Sitanion hystrix | b ¹⁹ | ab ⁶ | a ⁵ | a ⁻ | 10 | 4 | 3 | - | .01 | - |
| Total for Annual Grasses | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total for Perennial Grasses | | 360 | 389 | 373 | 285 | 140 | 148 | 134 | 116 | 11.17 | 5.27 |
| Total for Grasses | | 360 | 389 | 373 | 285 | 140 | 148 | 134 | 116 | 11.17 | 5.27 |
| F | Agoseris glauca | c ²⁹ | a ⁻ | b ¹¹ | a ⁻ | 16 | - | 6 | - | .08 | - |
| F | Allium spp. | c ³² | b ¹⁰ | ab ⁵ | a ⁻ | 15 | 5 | 3 | - | .01 | - |
| F | Arabis spp. | 2 | 9 | 6 | - | 1 | 5 | 3 | - | .01 | - |
| F | Astragalus cibarius | bc ²⁰ | c ²⁸ | ab ² | a ⁻ | 8 | 17 | 2 | - | .01 | - |
| F | Astragalus convallarius | b ⁵⁸ | b ⁷⁰ | b ⁷⁰ | a ⁻ | 28 | 37 | 34 | - | 2.25 | - |
| F | Balsamorhiza hookeri | a ³ | a ² | b ¹⁹ | ab ¹⁶ | 1 | 2 | 10 | 7 | .66 | .42 |
| F | Balsamorhiza sagittata | bc ³⁰ | c ⁴⁴ | a ¹² | ab ¹³ | 15 | 24 | 6 | 7 | .66 | .45 |
| F | Castilleja linariaefolia | 1 | 4 | - | - | 1 | 2 | - | - | - | - |
| F | Calochortus nuttallii | 1 | 3 | - | - | 1 | 2 | - | - | - | - |
| F | Cirsium neomexicanum | ab ¹⁴ | b ¹⁴ | a ² | a ⁻ | 6 | 11 | 2 | - | .03 | - |

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|---------------------------|---------------------------------|------------------|------------------|------------------|------------------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| F | <i>Comandra pallida</i> | _{ab} 46 | _a 42 | _b 66 | _{ab} 51 | 19 | 21 | 34 | 25 | .90 | 1.02 |
| F | <i>Collinsia parviflora</i> (a) | - | - | _b 22 | _a - | - | - | 10 | - | .07 | - |
| F | <i>Crepis acuminata</i> | _c 155 | _d 222 | _b 59 | _a - | 67 | 83 | 34 | - | .74 | - |
| F | <i>Delphinium nuttallianum</i> | - | 3 | 9 | - | - | 1 | 4 | - | .02 | - |
| F | <i>Erigeron eatonii</i> | _a - | _b 29 | _a 4 | _a - | - | 14 | 2 | - | .01 | - |
| F | <i>Eriogonum racemosum</i> | _{ab} 20 | _b 27 | _{ab} 21 | _a 6 | 10 | 12 | 11 | 2 | .28 | .03 |
| F | <i>Eriogonum umbellatum</i> | 4 | 3 | 10 | 4 | 4 | 2 | 6 | 2 | .29 | .03 |
| F | <i>Fritillaria atropurpurea</i> | - | 3 | 1 | - | - | 1 | 1 | - | .00 | - |
| F | <i>Helianthella uniflora</i> | _b 92 | _b 114 | _a 63 | _a 37 | 46 | 47 | 31 | 20 | 2.52 | .59 |
| F | <i>Hydrophyllum capitatum</i> | - | 4 | - | - | - | 2 | - | - | - | - |
| F | <i>Lithospermum ruderales</i> | 4 | 2 | 4 | 10 | 2 | 1 | 2 | 4 | .03 | .21 |
| F | <i>Lomatium grayi</i> | _{ab} 8 | _b 17 | _a 4 | _a - | 3 | 8 | 2 | - | .04 | - |
| F | <i>Lupinus argenteus</i> | _a 5 | _a 2 | _b 69 | _a - | 2 | 1 | 32 | - | 2.37 | - |
| F | <i>Machaeranthera canescens</i> | _c 26 | _c 33 | _b 7 | _a - | 13 | 15 | 5 | - | .02 | - |
| F | <i>Mertensia oblongifolia</i> | _a - | _b 15 | _a - | _a - | - | 8 | - | - | - | - |
| F | <i>Microsteris gracilis</i> (a) | - | - | 3 | - | - | - | 1 | - | .00 | - |
| F | <i>Orobanche fasciculata</i> | - | 1 | - | - | - | 1 | - | - | - | - |
| F | <i>Penstemon subglaber</i> | 10 | 5 | 5 | - | 4 | 2 | 3 | - | .01 | - |
| F | <i>Phlox longifolia</i> | _b 80 | _c 124 | _b 72 | _a 2 | 35 | 54 | 36 | 1 | .37 | .00 |
| F | <i>Polygonum douglasii</i> (a) | - | - | 6 | - | - | - | 2 | - | .01 | - |
| F | <i>Senecio integerrimus</i> | _a - | _{ab} 3 | _b 14 | _a - | - | 2 | 6 | - | .22 | - |
| F | <i>Senecio multilobatus</i> | - | - | 6 | - | - | - | 5 | - | .06 | - |
| F | <i>Taraxacum officinale</i> | - | - | 1 | 1 | - | - | 1 | 1 | .00 | .03 |
| F | <i>Tragopogon dubius</i> | 4 | - | - | - | 3 | - | - | - | - | - |
| F | <i>Vicia americana</i> | _c 199 | _c 191 | _b 17 | _a - | 75 | 76 | 7 | - | .13 | - |
| F | <i>Wyethia amplexicaulis</i> | _b 28 | _b 28 | _b 23 | _a 5 | 12 | 13 | 12 | 3 | 1.06 | .21 |
| F | <i>Zigadenus paniculatus</i> | _b 10 | _a 1 | _a - | _a - | 6 | 1 | - | - | - | - |
| Total for Annual Forbs | | 0 | 0 | 31 | 0 | 0 | 0 | 13 | 0 | 0.09 | 0 |
| Total for Perennial Forbs | | 881 | 1053 | 582 | 145 | 393 | 470 | 300 | 72 | 12.88 | 3.02 |
| Total for Forbs | | 881 | 1053 | 613 | 145 | 393 | 470 | 313 | 72 | 12.97 | 3.02 |

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

BROWSE TRENDS --
Herd unit 19B, Study no: 1

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|----------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | Amelanchier alnifolia | 11 | 11 | .15 | .06 |
| B | Artemisia tridentata vaseyana | 91 | 93 | 22.50 | 25.46 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 55 | 25 | 1.48 | .37 |
| B | Juniperus osteosperma | 3 | 3 | .53 | .63 |
| B | Mahonia repens | 22 | 8 | 1.11 | .06 |
| B | Pinus monophylla | 1 | 1 | - | 1.48 |
| B | Rosa woodsii | 22 | 26 | .98 | 1.35 |
| B | Symphoricarpos oreophilus | 82 | 75 | 9.67 | 11.79 |
| Total for Browse | | 287 | 242 | 36.43 | 41.22 |

CANOPY COVER -- LINE INTERCEPT
Herd unit 19B, Study no: 1

| Species | Percent Cover | |
|----------------------------------------------|---------------|-------|
| | '97 | '02 |
| Amelanchier alnifolia | - | .25 |
| Artemisia tridentata vaseyana | - | 23.08 |
| Chrysothamnus viscidiflorus viscidiflorus | - | .33 |
| Juniperus osteosperma | - | .58 |
| Mahonia repens | - | .07 |
| Pinus monophylla | - | 1.00 |
| Rosa woodsii | - | .33 |
| Symphoricarpos oreophilus | - | 11.33 |

Key Browse Annual Leader Growth
Herd unit 19B, Study no: 1

| Species | Average leader growth (in) |
|-------------------------------|----------------------------|
| | '02 |
| Artemisia tridentata vaseyana | 1.2 |

Point-Quarter Tree Data
Herd unit 19B, Study no: 1

| Species | Trees per Acre | | Average diameter (in) | |
|-----------------------|----------------|-----|-----------------------|-----|
| | '97 | '02 | '97 | '02 |
| Juniperus osteosperma | 9 | 22 | 2.1 | 1.4 |
| Pinus monophylla | 26 | 51 | 1.9 | 1.6 |

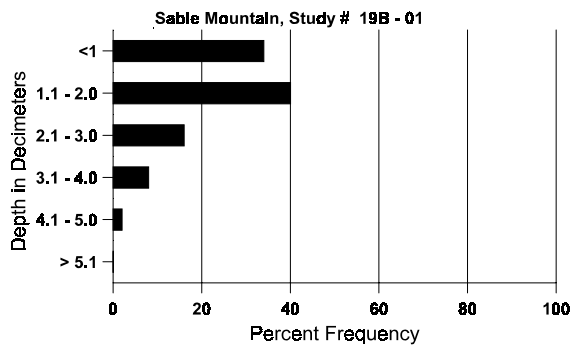
BASIC COVER --
Herd unit 19B, Study no: 1

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 344 | 299 | 3.50 | 9.75 | 52.32 | 47.79 |
| Rock | 176 | 240 | 12.50 | 8.75 | 5.75 | 7.86 |
| Pavement | 219 | 292 | 5.00 | 11.50 | 5.65 | 6.34 |
| Litter | 396 | 385 | 51.75 | 58.50 | 57.13 | 44.81 |
| Cryptogams | 8 | 7 | .25 | .25 | .04 | .10 |
| Bare Ground | 199 | 233 | 27.00 | 11.25 | 5.33 | 16.31 |

SOIL ANALYSIS DATA --
Herd Unit 19B, Study no: 1, Sabie Mountain

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 13.0 | 52.8 (15.3) | 6.3 | 30.6 | 41.8 | 27.6 | 4.7 | 10.1 | 275.2 | 1.0 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 19B, Study no: 1

| Type | Quadrat Frequency | | Pellet Transect | | | |
|--------|-------------------|-----|------------------------|-----|------------------------|---------|
| | '97 | '02 | Pellet Groups per Acre | | Days Use per Acre (ha) | |
| | | | '97 | '02 | '97 | '02 |
| Rabbit | 6 | 1 | - | - | - | - |
| Elk | 1 | - | - | - | - | - |
| Deer | 8 | 8 | 87 | 244 | 7 (17) | 19 (46) |
| Cattle | - | 1 | 165 | 61 | 14 (34) | 5 (13) |

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 1

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Amelanchier alnifolia | | | | | | | | | | | | | | | | | | |
| Y | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '89 | - | - | 2 | - | - | - | - | - | - | 2 | - | - | - | 133 | | | 2 |
| | '97 | 5 | 1 | - | - | - | - | - | - | - | 6 | - | - | - | 120 | | | 6 |
| | '02 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| M | '83 | - | 1 | 1 | - | - | - | - | - | - | - | - | 2 | - | 133 | 20 | 3 | 2 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '97 | 1 | 1 | - | 3 | - | 1 | - | - | - | 5 | - | 1 | - | 120 | 19 | 18 | 6 |
| | '02 | - | 2 | 2 | - | - | - | - | - | - | 4 | - | - | - | 80 | 14 | 22 | 4 |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '89 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | | 1 |
| | '97 | - | 2 | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | | 2 |
| | '02 | 1 | 1 | 5 | - | - | - | - | - | - | 7 | - | - | - | 140 | | | 7 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 50% | | | 50% | | | 100% | | | +33% | | | | | | | |
| '89 | | 33% | | | 67% | | | 00% | | | +29% | | | | | | | |
| '97 | | 29% | | | 07% | | | 07% | | | -14% | | | | | | | |
| '02 | | 33% | | | 58% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 133 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 199 | | 33% | | | |
| | | | | | | | | | | | | '97 | 280 | | 14% | | | |
| | | | | | | | | | | | | '02 | 240 | | 58% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|----|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Artemisia tridentata vaseyana | | | | | | | | | | | | | | | | | | |
| S | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '97 | 3 | - | - | - | - | - | 1 | - | - | 4 | - | - | - | 80 | | | 4 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| Y | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 133 | | | 2 |
| | '97 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | | | 3 |
| | '02 | 1 | - | 1 | - | - | - | - | - | - | 2 | - | - | - | 40 | | | 2 |
| M | '83 | 17 | 6 | - | - | - | - | - | - | - | 18 | 5 | - | - | 1533 | 22 | 20 | 23 |
| | '89 | 15 | 5 | - | - | - | - | - | - | - | 10 | 3 | 7 | - | 1333 | 26 | 30 | 20 |
| | '97 | 118 | 33 | 2 | 2 | - | - | - | - | - | 154 | - | 1 | - | 3100 | 26 | 32 | 155 |
| | '02 | 109 | 8 | 50 | - | - | - | - | - | - | 165 | 2 | - | - | 3340 | 25 | 35 | 167 |
| D | '83 | 2 | 2 | - | - | - | - | - | - | - | 3 | 1 | - | - | 266 | | | 4 |
| | '89 | 5 | 1 | - | - | - | - | - | - | - | 3 | 1 | 2 | - | 400 | | | 6 |
| | '97 | 44 | 9 | - | - | - | - | - | - | - | 24 | - | - | 29 | 1060 | | | 53 |
| | '02 | 50 | 2 | 5 | - | - | - | 3 | - | - | 55 | - | - | 5 | 1200 | | | 60 |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 720 | | | 36 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 660 | | | 33 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 30% | | | 00% | | | 00% | | | + 4% | | | | | | | |
| '89 | | 21% | | | 00% | | | 32% | | | +56% | | | | | | | |
| '97 | | 20% | | | .94% | | | 14% | | | + 8% | | | | | | | |
| '02 | | 04% | | | 24% | | | 02% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 1799 | Dec: | 15% | | | |
| | | | | | | | | | | | | '89 | 1866 | | 21% | | | |
| | | | | | | | | | | | | '97 | 4220 | | 25% | | | |
| | | | | | | | | | | | | '02 | 4580 | | 26% | | | |

| A G R E | Y R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|-------------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Chrysothamnus viscidiflorus viscidiflorus | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 23 | - | - | - | - | - | - | - | - | - | - | - | 23 | 1533 | | 23 | |
| | 97 | 10 | - | - | - | - | - | - | - | - | - | - | - | 10 | 200 | | 10 | |
| | 02 | - | - | - | 1 | - | - | - | - | - | - | - | - | 1 | 20 | | 1 | |
| M | 83 | 55 | - | - | - | - | - | - | - | - | - | - | 55 | 3666 | 8 | 8 | 55 | |
| | 89 | 30 | - | - | 2 | - | - | - | - | - | - | - | 28 | 2133 | 18 | 18 | 32 | |
| | 97 | 82 | - | - | 25 | - | - | 8 | - | - | - | - | 113 | 2300 | 13 | 12 | 115 | |
| | 02 | 10 | - | - | - | - | - | - | - | - | - | - | 10 | 200 | 5 | 7 | 10 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | |
| | 89 | 8 | 2 | - | - | - | - | - | - | - | - | - | 10 | 666 | | 10 | | |
| | 97 | 7 | - | - | - | - | - | - | - | - | - | - | 2 | 140 | | 7 | | |
| | 02 | 13 | 2 | 5 | 4 | - | - | 5 | - | - | - | - | 19 | 580 | | 29 | | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 80 | | 4 | | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +15% | | | | | | | |
| '89 | | 03% | | | 00% | | | 05% | | | -39% | | | | | | | |
| '97 | | 00% | | | 00% | | | 04% | | | -70% | | | | | | | |
| '02 | | 05% | | | 13% | | | 25% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 3666 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 4332 | | 15% | | | |
| | | | | | | | | | | | | '97 | 2640 | | 5% | | | |
| | | | | | | | | | | | | '02 | 800 | | 73% | | | |
| Eriogonum microthecum | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 2 | 1 | - | - | - | - | - | - | - | - | - | 1 | 200 | | 3 | | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 33% | | | 00% | | | 67% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 200 | | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |

| A G R E | Y R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|-------------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | 3 | - | - | - | - | - | - | - | - | - | - | - | 60 | | | 3 | |
| | 02 | 2 | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 02 | 2 | - | - | - | - | - | - | - | - | - | - | - | 40 | - | - | 2 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +25% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 60 | | - | | | |
| | | | | | | | | | | | | '02 | 80 | | - | | | |
| Mahonia repens | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | 8 | - | - | 3 | - | - | - | - | - | - | - | - | 220 | | | 11 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 97 | 110 | - | - | 20 | - | - | - | - | - | - | - | - | 2600 | 3 | 5 | 130 | |
| | 02 | 18 | - | - | 1 | - | - | - | - | - | - | - | - | 380 | 4 | 5 | 19 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | 2 | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | -85% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 0 | | 0% | | | |
| | | | | | | | | | | | | '97 | 2820 | | 0% | | | |
| | | | | | | | | | | | | '02 | 420 | | 10% | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | | | | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|----|--------------------|--------------------------------|----------------|---|------|------|------|-----|
| | | 1 | 2 | 3 | 4 | | | | | | | | |
| Pinus monophylla | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | 1 | - | - | - | - | 20 | | 1 | |
| Y | 83 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 89 | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 97 | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 02 | - | - | - | 1 | - | - | - | - | 20 | - | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | |
| '83 | | 00% | | 00% | | 00% | | | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | | | |
| '97 | | 00% | | 00% | | 00% | | + 0% | | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 0 | Dec: | - |
| | | | | | | | | | | '89 | 0 | | - |
| | | | | | | | | | | '97 | 20 | | - |
| | | | | | | | | | | '02 | 20 | | - |
| Rosa woodsii | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 37 | - | - | 5 | - | - | - | - | 840 | | 42 | |
| | 02 | 16 | - | - | - | - | - | - | - | 320 | | 16 | |
| M | 83 | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 89 | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 97 | 36 | - | - | 13 | - | - | - | - | 980 | 8 10 | 49 | |
| | 02 | 46 | - | - | 7 | - | - | - | - | 1060 | 9 9 | 53 | |
| D | 83 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | 7 | - | - | 1 | - | - | - | - | 160 | | 8 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | |
| '83 | | 00% | | 00% | | 00% | | | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | | | |
| '97 | | 00% | | 00% | | 00% | | -15% | | | | | |
| '02 | | 00% | | 00% | | 01% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 0 | Dec: | 0% |
| | | | | | | | | | | '89 | 0 | | 0% |
| | | | | | | | | | | '97 | 1820 | | 0% |
| | | | | | | | | | | '02 | 1540 | | 10% |

| A Y G R E | Form Class (No. of Plants) | 1 | | | | 2 | | | | 3 | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total |
|------------------------------------------------|----------------------------|---------------------|----|---|----|------------------|---|---|---|-------------------|---|-----|------|--------------------|--------------------------------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | | | |
| Symphoricarpos oreophilus | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 2 | - | - | - | - | - | 1 | - | - | - | - | - | 200 | | 3 |
| | 97 | - | - | - | 2 | - | - | - | - | - | - | - | - | 40 | | 2 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 27 | 14 | - | 6 | 3 | - | 2 | - | - | - | - | - | 3466 | | 52 |
| | 97 | 9 | - | - | 4 | - | - | - | - | - | - | - | - | 260 | | 13 |
| | 02 | - | - | - | 2 | - | - | - | - | - | - | - | - | 40 | | 2 |
| M | 83 | 99 | - | - | - | - | - | - | - | - | - | - | - | 6600 | 22 14 | 99 |
| | 89 | 45 | 22 | 2 | 6 | - | - | - | - | - | - | - | - | 5000 | 18 17 | 75 |
| | 97 | 140 | - | - | 96 | - | - | - | - | - | - | - | - | 4720 | 13 20 | 236 |
| | 02 | 281 | - | 5 | 81 | - | - | - | - | - | - | - | - | 7340 | 12 17 | 367 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 2 | 3 | - | 1 | - | - | - | - | - | - | - | - | 400 | | 6 |
| | 97 | 4 | - | - | - | - | - | - | - | - | - | - | - | 80 | | 4 |
| | 02 | 48 | - | - | 1 | - | - | - | - | - | - | 1 | - | 980 | | 49 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | 2 |
| % Plants Showing | | <u>Moderate Use</u> | | | | <u>Heavy Use</u> | | | | <u>Poor Vigor</u> | | | | <u>%Change</u> | | |
| '83 | | 00% | | | | 00% | | | | 00% | | | | +26% | | |
| '89 | | 32% | | | | 02% | | | | 02% | | | | -43% | | |
| '97 | | 00% | | | | 00% | | | | 00% | | | | +39% | | |
| '02 | | 00% | | | | 01% | | | | .23% | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 6600 | Dec: | 0% | |
| | | | | | | | | | | | | '89 | 8866 | | 5% | |
| | | | | | | | | | | | | '97 | 5060 | | 2% | |
| | | | | | | | | | | | | '02 | 8360 | | 12% | |

Trend Study 19B-2-02

Study site name: Upper Little Valley.

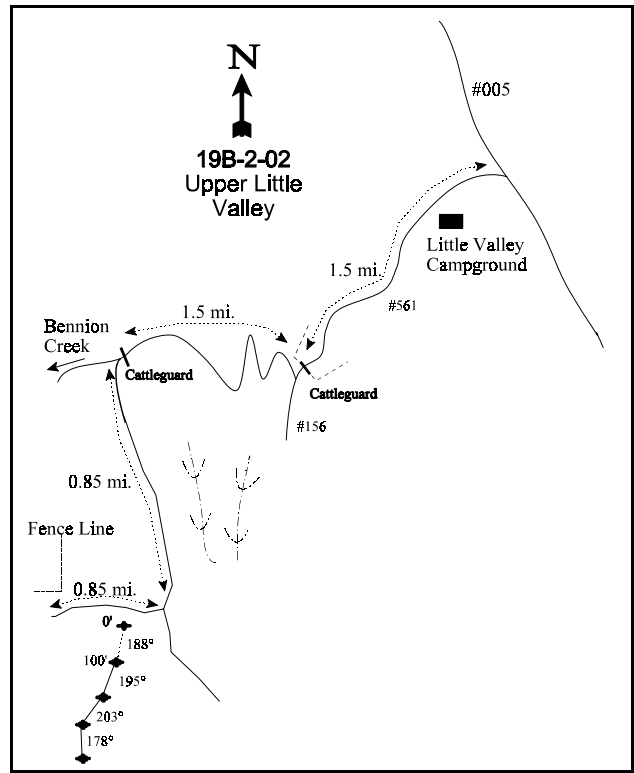
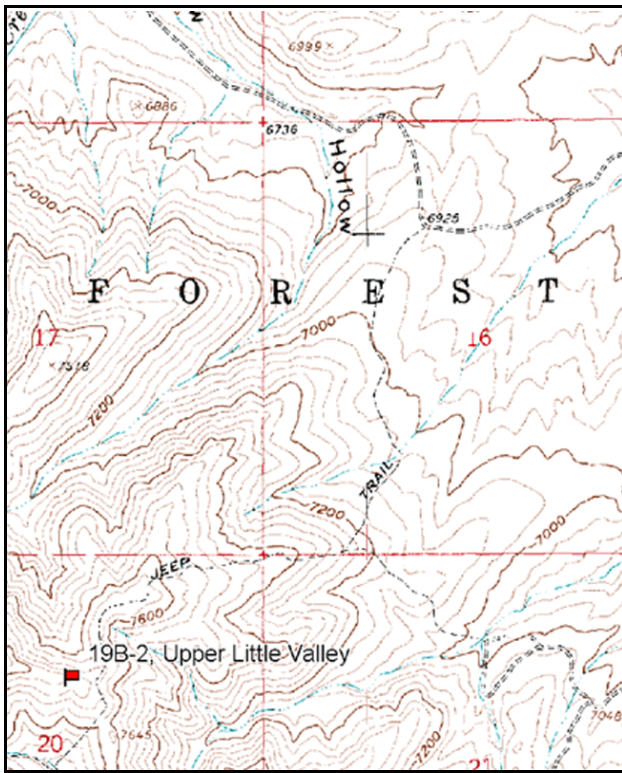
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 188 degrees magnetic (Line 2 @ 195°M, line 3 @ 203°M, line 4 178°M).

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

LOCATION DESCRIPTION

The steep, rocky road leading to this study site can be reached on the Little Valley road either by traveling east 2.5 miles from Bennion Creek or west 2.6 miles from the Little Valley Campground. Turn south, and go 0.85 to an intersection. Bear right and continue southerly up the ridge for 0.85 miles to a fence corner on the ridge line. Continue up along the fence to the 19th fencepost. From this fencepost, the 0-foot baseline stake is 33 paces away at an azimuth of 169 degrees. This stake is marked by a red tag, #3928.



Map Name: Dutch Peak

Diagrammatic Sketch

Township 10S, Range 5W, Section 20

GPS: NAD 27, UTM 12S 4422211 N 377844 E

DISCUSSION

Upper Little Valley - Trend Study No. 19B-2

The Upper Little Valley study samples deer summer range near the head of Little Valley. Located on land administered by the U.S. Forest Service, the study is on a moderately steep (25% to 30%), south facing slope at an elevation of 7,300 feet. Numerous intermittent and perennial streams in the area provide good distribution of water. However, thermal and escape cover is inadequate as most of the surrounding area is occupied by low growing shrubs. Only in the canyon bottoms, does vegetation exceed 5 feet in height, an indication of poor site potential on the upper slopes. The site is moderately used by deer, with elk and cattle use being light. A pellet group transect read on site in 2002 estimated 42 deer days use/acre (104 ddu/ha), 8 cow days use/acre (21 cdu/ha), and 2 elk days use/acre (5 edu/ha). Most of the deer pellets appeared to be from winter use. Thirteen deer were observed near the site during the 2002 reading.

The soil is relatively shallow and rocky with numerous basalt rocks and outcrops noticeable in the immediate area. Texture is coarse and well drained. Textural and chemical analysis indicates soils to be a sandy clay loam with a slightly acidic reactivity (pH of 6.2). Effective rooting depth was estimated at 12 inches and soil temperature was 60°F measured at 14 inches in depth. There was little exposed bare soil and ample vegetation and litter cover to protect against erosion during the first three readings. In 2002 however, bare ground increased to 32%, while vegetation and litter cover have both declined considerably due to drought conditions. The erosion condition class was determined as slight in 2002. A moderate level of surface rock movement and soil pedestalling provide the most evidence of erosion on the site.

Mountain snowberry provided 28% of the total vegetation cover on the site in 1997, increasing to 46% in 2002. The increase is due to the greatly reduced herbaceous component in 2002. Snowberry density was estimated at 3,000 plants/acre in 1997, and 2,880 plants/acre in 2002. Age structure changed very little between 1983 and 1997 with about 60% of the population being mature. Decadence peaked in 1989 at 33% (a drought year), but has leveled off to around 15% in 1997 and 2002. Young plants were abundant in both 1983 and 1997, but low in 1989 and 2002, which were both drought years. The proportion of the population displaying poor vigor increased from 11% in 1997 to 35% in 2002. Sixty-one percent of the decadent plants were classified as dying in 1997, decreasing to 25% in 2002. Utilization has been consistently light to moderate through the years.

The most abundant palatable browse on the site is Saskatoon serviceberry which had an estimated density of 640 plants/acre in 1997 and 700 in 2002. These plants were moderate to heavily hedged and exhibited a stable population in 2002. Decadence has been low in most years, with no decadent plants being sampled in 2002. Although young plants were very abundant in 1989, the population has not increased. Vigor was mostly normal from 1983-1997, but poor vigor increased to 49% in 2002. It was reported in 2002 that serviceberry plants were not producing flowers or annual leader growth, and were losing a lot of leaves due to the extremely dry conditions. Tent caterpillars were present on most serviceberry plants in 1983.

Mountain big sagebrush provides additional palatable browse, having an estimated density of 340 plants/acre in 1997 and 520 in 2002. The population consists of mostly mature plants that have been light to moderately hedged. Vigor has been normal for the most part, except during the drought year of 1989, when 56% of the population was classified as having poor vigor. Percent decadence has stabilized at about 20% of the population over the past three readings. In 1983, it was noted that shrub mortality was confined primarily to mountain big sagebrush and could possibly be the result of below-ground feeding by pocket gophers rather than browsing. Sagebrush annual leader growth averaged 1.6 inches in 2002. Other browse sampled on the site include Oregon grape, Martin ceanothus, stickyleaf low rabbitbrush, and prickly pear cactus.

As with the previous study, the herbaceous understory was abundant and diverse prior to the 2002 reading. With drought in 2002, understory species declined in both cover and frequency. The only grass to increase in 2002 was bluebunch wheatgrass. It provided 20% of the grass cover in 1997, increasing to 79% in 2002.

Nearly all other perennial grass species decreased in both cover and nested frequency between 1997 and 2002. This includes mutton bluegrass, Sandberg bluegrass, bottlebrush squirreltail, and mountain brome. Cheatgrass was fairly abundant in 1997, but was rarely sampled in 2002. It appears from photographic comparisons that cheatgrass was much more abundant prior to 1997, but since annuals were not sampled in 1983 or 1989, no comparisons can be made.

The forb component was abundant and diverse in 1983-1997. In 2002 with drought, most forbs were dried up and unrecognizable, and the sum of nested frequency value for perennial forbs declined by 85%. Annual species also drastically declined in 2002. Prior to the drought in 2002, the most abundant perennial forbs included wild onion, longleaf phlox, tapertip hawksbeard, gray lomatium, and tailcup lupine. The most common annual forb species were pale alyssum, slenderleaf collomia, and blue-eyed Mary.

1983 APPARENT TREND ASSESSMENT

Soil trend appears stable to slightly down. Although the current level of soil erosion is not serious, the potential for rapid soil loss is present. Increaser and invader browse species are present but not an imminent threat. Browse trend appears stable. Herbaceous understory trend also appears stable. Forbs, the principal plant species, are doing well with little evidence of change. Grass density is somewhat low, but forb cover tends to make up the difference.

1989 TREND ASSESSMENT

The erosion hazard is high on this site due to a 30% slope and the shallow, rocky soil. There is currently adequate protective ground cover from vegetation and litter to protect the soil. The soil trend is stable. The browse trend is stable as the important species have stable to increasing populations, mostly light to moderate use, and acceptable decadence levels. The herbaceous understory trend is slightly downward with a 39% decline in the sum of nested frequency for perennial forbs, but a slight increase in perennial grasses.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly down (2)

1997 TREND ASSESSMENT

Soil trend is slightly upward with a decline in percent bare ground cover and ample vegetation and litter cover to protect the soil from downslope movement. The overall browse trend is stable. Most of the browse species show stable populations. However, mountain big sagebrush is an exception with more dead plants encountered than living plants, but it only contributes 9% of the total browse cover. This population could be on the way out with no young or seedling plants encountered in 1997. The snowberry population could experience a slight decline in density as 61% of the decadent plants are classified as dying. For now, snowberry has good recruitment by young plants and decadency is low at only 15%. The herbaceous understory trend is stable as sum of nested frequency values for the herbaceous perennials slightly increased.

TREND ASSESSMENT

soil - slightly up (4)

browse - stable (3)

herbaceous understory - stable (3)

2002 TREND ASSESSMENT

Trend for soil is down. With drought in 2002, most of the key soil parameters show negative trends. Bare soil increased to 32%, litter and herbaceous vegetative cover decreased, and the abundance of perennial grasses and forbs declined. Trend for browse is slightly down. Mountain big sagebrush, serviceberry, and mountain snowberry all have stable densities, but reproduction and recruitment is non-existent for all three species, serviceberry and snowberry have increased poor vigor, and serviceberry shows heavy use. The herbaceous understory has a downward trend as sum of nested frequency values for perennial grasses and forbs decreased in 2002. The only important herbaceous species that did not decline on the site is bluebunch wheatgrass which significantly increased. The downward trends on this site are undoubtedly heavily influenced by drought. This will likely improve with normal precipitation patterns in the future.

TREND ASSESSMENT

soil - down (1)

browse - slightly down (2)

herbaceous understory - down (1)

HERBACEOUS TRENDS --
Herd unit 19B, Study no: 2

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|-------------------------|------------------|-----|------|------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | Agropyron spicatum | a31 | a49 | a60 | b144 | 12 | 22 | 22 | 58 | 1.86 | 4.98 |
| G | Agropyron trachycaulum | 3 | 9 | - | - | 1 | 4 | - | - | - | - |
| G | Bromus carinatus | ab41 | b72 | ab49 | a32 | 20 | 30 | 19 | 14 | 1.17 | .66 |
| G | Bromus tectorum (a) | - | - | b187 | a5 | - | - | 70 | 3 | 1.71 | .01 |
| G | Melica bulbosa | 3 | - | 8 | - | 1 | - | 4 | - | .26 | - |
| G | Poa fendleriana | b78 | b78 | b50 | a17 | 33 | 37 | 24 | 8 | 2.99 | .53 |
| G | Poa secunda | a- | b9 | c28 | ab5 | - | 5 | 14 | 2 | .66 | .03 |
| G | Sitanion hystrix | b58 | b27 | b25 | a7 | 28 | 13 | 10 | 3 | .65 | .04 |
| G | Stipa lettermani | 3 | - | 3 | - | 1 | - | 1 | - | .03 | .00 |
| Total for Annual Grasses | | 0 | 0 | 187 | 5 | 0 | 0 | 70 | 3 | 1.71 | 0.01 |
| Total for Perennial Grasses | | 217 | 244 | 223 | 205 | 96 | 111 | 94 | 85 | 7.62 | 6.26 |
| Total for Grasses | | 217 | 244 | 410 | 210 | 96 | 111 | 164 | 88 | 9.33 | 6.28 |
| F | Achillea millefolium | 1 | - | - | - | 1 | - | - | - | - | - |
| F | Agoseris glauca | b12 | a- | b26 | ab5 | 7 | - | 13 | 2 | .47 | .03 |
| F | Alyssum alyssoides (a) | - | a21 | b249 | a3 | - | 10 | 77 | 3 | 4.31 | .01 |
| F | Allium spp. | d182 | b70 | c100 | a- | 84 | 33 | 47 | - | .45 | - |
| F | Aster spp. | - | 1 | 4 | - | - | 1 | 2 | - | .36 | - |
| F | Astragalus spp. | - | - | 7 | - | - | - | 3 | - | .06 | - |
| F | Astragalus utahensis | 3 | - | - | - | 1 | - | - | - | - | - |
| F | Balsamorhiza sagittata | 10 | 17 | 10 | 11 | 6 | 8 | 3 | 5 | .82 | .54 |
| F | Camelina microcarpa (a) | - | - | 11 | - | - | - | 4 | - | .02 | - |
| F | Chaenactis douglasii | 3 | - | - | - | 2 | - | - | - | - | - |
| F | Cirsium neomexicanum | 9 | 8 | 3 | 2 | 4 | 4 | 2 | 1 | .21 | .03 |

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|---------------------------|-----------------------------------|------------------|------------------|-----------------|-----------------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| F | <i>Collomia linearis</i> (a) | - | - | _b 88 | _a - | - | - | 35 | - | .38 | - |
| F | <i>Comandra pallida</i> | _b 81 | _a 43 | _a 29 | _a 24 | 36 | 21 | 14 | 11 | .35 | .18 |
| F | <i>Collinsia parviflora</i> (a) | - | - | _b 32 | _a 1 | - | - | 12 | 1 | .06 | .00 |
| F | <i>Crepis acuminata</i> | _b 63 | _b 59 | _b 50 | _a 3 | 33 | 31 | 23 | 1 | 1.20 | .03 |
| F | <i>Cryptantha</i> spp. | 4 | - | - | - | 1 | - | - | - | - | - |
| F | <i>Delphinium nuttallianum</i> | _b 12 | _a - | _b 21 | _a - | 7 | - | 14 | - | .15 | - |
| F | <i>Epilobium brachycarpum</i> (a) | - | - | 15 | 22 | - | - | 7 | 13 | .06 | .12 |
| F | <i>Eriogonum racemosum</i> | _b 17 | _{ab} 9 | _a 3 | _a - | 7 | 5 | 1 | - | .15 | - |
| F | <i>Hackelia patens</i> | 11 | 10 | - | - | 4 | 4 | - | - | - | - |
| F | <i>Heuchera parvifolia</i> | 1 | - | - | - | 1 | - | - | - | - | - |
| F | <i>Helianthella uniflora</i> | 3 | - | - | - | 1 | - | - | - | - | - |
| F | <i>Hymenoxys acaulis</i> | _a - | _a - | _b 45 | _a - | - | - | 18 | - | 4.65 | - |
| F | <i>Hydrophyllum capitatum</i> | _b 87 | _a - | _a - | _a - | 33 | - | - | - | - | - |
| F | <i>Lathyrus brachycalyx</i> | 8 | - | - | 3 | 4 | - | - | 1 | - | .00 |
| F | <i>Lithospermum ruderales</i> | _b 9 | _a 1 | _a 3 | _a 4 | 5 | 1 | 1 | 2 | .15 | .18 |
| F | <i>Lomatium grayi</i> | _b 52 | _b 30 | _b 49 | _a - | 25 | 16 | 22 | - | 1.50 | - |
| F | <i>Lupinus caudatus</i> | _c 78 | _{bc} 72 | _b 44 | _a - | 35 | 34 | 23 | - | 1.74 | - |
| F | <i>Machaeranthera canescens</i> | 1 | - | 1 | - | 1 | - | 1 | - | .03 | - |
| F | <i>Microsteris gracilis</i> (a) | - | - | _b 24 | _a - | - | - | 9 | - | .14 | - |
| F | <i>Penstemon</i> spp. | - | - | 5 | - | - | - | 3 | - | .01 | - |
| F | <i>Phlox longifolia</i> | _b 29 | _b 43 | _b 56 | _a - | 15 | 24 | 23 | - | .63 | - |
| F | <i>Polygonum douglasii</i> (a) | - | - | _b 21 | _a - | - | - | 10 | - | .10 | - |
| F | <i>Senecio integerrimus</i> | - | 9 | 5 | - | - | 4 | 2 | - | .18 | - |
| F | <i>Taraxacum officinale</i> | _a - | _b 21 | _a 5 | _a - | - | 12 | 3 | - | .12 | - |
| F | <i>Tragopogon dubius</i> | _b 20 | _b 30 | _b 17 | _a - | 10 | 17 | 8 | - | .07 | - |
| F | Unknown forb-perennial | - | - | - | 1 | - | - | - | 1 | - | .00 |
| F | <i>Wyethia amplexicaulis</i> | - | - | 5 | - | - | - | 2 | - | .15 | - |
| F | <i>Zigadenus paniculatus</i> | - | - | 8 | - | - | - | 4 | - | .02 | - |
| Total for Annual Forbs | | 0 | 21 | 440 | 26 | 0 | 10 | 154 | 17 | 5.08 | 0.14 |
| Total for Perennial Forbs | | 696 | 423 | 496 | 53 | 323 | 215 | 232 | 24 | 13.54 | 1.01 |
| Total for Forbs | | 696 | 444 | 936 | 79 | 323 | 225 | 386 | 41 | 18.62 | 1.15 |

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

BROWSE TRENDS --
Herd unit 19B, Study no: 2

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|-------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | Amelanchier alnifolia | 22 | 24 | 5.56 | 4.55 |
| B | Artemisia tridentata vaseyana | 13 | 19 | 2.57 | 3.16 |
| B | Ceanothus martinii | 7 | 10 | .33 | .56 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 5 | 5 | .93 | .33 |
| B | Mahonia repens | 1 | 0 | 2.66 | .51 |
| B | Juniperus osteosperma | 25 | 18 | - | - |
| B | Opuntia spp. | 6 | 5 | .15 | .15 |
| B | Symphoricarpos oreophilus | 66 | 66 | 15.70 | 14.43 |
| Total for Browse | | 145 | 147 | 27.91 | 23.71 |

CANOPY COVER -- LINE INTERCEPT
Herd unit 19B, Study no: 2

| Species | Percent Cover | |
|-------------------------------------------|---------------|-------|
| | '97 | '02 |
| Amelanchier alnifolia | - | 8.00 |
| Artemisia tridentata vaseyana | - | 3.33 |
| Ceanothus martinii | - | .42 |
| Chrysothamnus viscidiflorus viscidiflorus | - | .33 |
| Mahonia repens | - | .67 |
| Symphoricarpos oreophilus | - | 18.42 |

Key Browse Annual Leader Growth
Herd unit 19B, Study no: 2

| Species | Average leader growth (in) '02 |
|-------------------------------|-----------------------------------|
| Artemisia tridentata vaseyana | 1.6 |

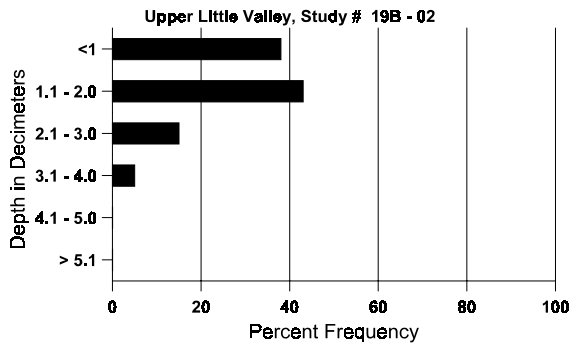
BASIC COVER --
Herd unit 19B, Study no: 2

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 356 | 260 | 4.75 | 10.25 | 50.93 | 27.84 |
| Rock | 190 | 216 | 5.50 | 9.25 | 6.74 | 10.16 |
| Pavement | 171 | 286 | 3.25 | 3.25 | 1.85 | 10.75 |
| Litter | 383 | 365 | 71.50 | 63.50 | 53.03 | 38.76 |
| Cryptogams | 2 | - | 0 | 0 | .03 | 0 |
| Bare Ground | 199 | 316 | 15.00 | 13.75 | 8.91 | 32.10 |

SOIL ANALYSIS DATA --
 Herd Unit 19B, Study no: 2, Upper Little Valley

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 11.8 | 59.5 (13.8) | 6.2 | 49.3 | 27.2 | 23.6 | 4.6 | 13.7 | 211.2 | 0.6 |

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 19B, Study no: 2

| Type | Quadrat Frequency | |
|--------|-------------------|-----|
| | '97 | '02 |
| Rabbit | 3 | - |
| Elk | 2 | - |
| Deer | 26 | 21 |
| Cattle | - | 1 |

| Pellet Transect | |
|------------------------|------------------------|
| Pellet Groups per Acre | Days Use per Acre (ha) |
| '02 | '02 |
| - | - |
| 26 | 2 (5) |
| 548 | 42 (104) |
| 104 | 9 (21) |

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 2

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | | | | | |
|------------------------------------------------|----------------------------|---------------------|----|------------------|---|--------------------|--------------------------------|----------------|---|-----|------|------|-----|
| | | 1 | 2 | 3 | 4 | | | | | | | | |
| Amelanchier alnifolia | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | 0 | | 0 | | |
| | 89 | 3 | - | 1 | 4 | - | - | - | - | 533 | 8 | | |
| | 97 | 2 | - | - | - | - | - | - | - | 40 | 2 | | |
| | 02 | - | - | - | - | - | - | - | - | 0 | 0 | | |
| M | 83 | - | 6 | 3 | - | - | - | - | - | 600 | 27 | 27 | 9 |
| | 89 | - | 3 | 2 | - | 1 | - | - | - | 400 | 32 | 30 | 6 |
| | 97 | 5 | 10 | 3 | 2 | 5 | 1 | 3 | - | 580 | 53 | 55 | 29 |
| | 02 | - | - | 23 | - | - | 11 | 1 | - | 700 | 42 | 42 | 35 |
| D | 83 | - | 1 | 1 | - | - | - | - | - | 133 | | | 2 |
| | 89 | 2 | 1 | 1 | - | - | - | - | - | 266 | | | 4 |
| | 97 | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| | 02 | - | - | - | - | - | - | - | - | 0 | | | 0 |
| X | 83 | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | 20 | | | 1 |
| | 02 | - | - | - | - | - | - | - | - | 40 | | | 2 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | |
| '83 | | 64% | | 36% | | 09% | | +39% | | | | | |
| '89 | | 28% | | 22% | | 06% | | -47% | | | | | |
| '97 | | 50% | | 13% | | 03% | | + 9% | | | | | |
| '02 | | 00% | | 97% | | 49% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 733 | Dec: | 18% |
| | | | | | | | | | | '89 | 1199 | | 22% |
| | | | | | | | | | | '97 | 640 | | 3% |
| | | | | | | | | | | '02 | 700 | | 0% |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Artemisia tridentata vaseyana | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 6 | 5 | 1 | - | - | - | - | - | - | 11 | 1 | - | - | 800 | 21 | 31 | 12 |
| | 89 | 10 | 3 | - | - | - | - | - | - | - | 7 | - | 6 | - | 866 | 20 | 25 | 13 |
| | 97 | 15 | - | - | - | - | - | - | - | - | 15 | - | - | - | 300 | 26 | 43 | 15 |
| | 02 | 15 | 3 | 2 | 1 | - | - | - | - | - | 21 | - | - | - | 420 | 22 | 40 | 21 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 3 | 1 | - | - | - | - | - | - | - | - | - | 4 | - | 266 | | 4 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | 40 | | 2 | |
| | 02 | 4 | 1 | - | - | - | - | - | - | - | 4 | - | - | 1 | 100 | | 5 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 380 | | 19 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 220 | | 11 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 42% | | | 08% | | | 00% | | | +33% | | | | | | | |
| '89 | | 22% | | | 00% | | | 56% | | | -72% | | | | | | | |
| '97 | | 00% | | | 00% | | | 06% | | | +35% | | | | | | | |
| '02 | | 15% | | | 08% | | | 04% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 800 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 1198 | | 22% | | | |
| | | | | | | | | | | | | '97 | 340 | | 12% | | | |
| | | | | | | | | | | | | '02 | 520 | | 19% | | | |

| A Y G R E | Form Class (No. of Plants) | 1 | | | | 2 | | | | 3 | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|----------------------------|---------------------|---|----|---|------------------|---|---|---|-------------------|---|-----|-----|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | | 4 | | |
| <i>Ceanothus martinii</i> | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 2 | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| Y | 83 | - | 7 | - | - | - | - | - | - | - | - | - | - | 466 | | | 7 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 4 | - | - | - | - | - | - | - | - | - | - | - | 80 | | | 4 |
| | 02 | 1 | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| M | 83 | - | 4 | - | - | - | - | - | - | - | - | - | - | 266 | 7 | 11 | 4 |
| | 89 | 5 | 3 | - | 2 | - | - | 1 | - | - | - | - | - | 733 | 8 | 11 | 11 |
| | 97 | 5 | - | - | 1 | 5 | - | - | - | - | - | - | - | 220 | 8 | 27 | 11 |
| | 02 | 1 | - | 14 | - | - | 1 | - | - | - | - | - | - | 320 | 4 | 11 | 16 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 |
| % Plants Showing | | <u>Moderate Use</u> | | | | <u>Heavy Use</u> | | | | <u>Poor Vigor</u> | | | | <u>%Change</u> | | | |
| '83 | | 100% | | | | 00% | | | | 00% | | | | + 0% | | | |
| '89 | | 27% | | | | 00% | | | | 00% | | | | -59% | | | |
| '97 | | 33% | | | | 00% | | | | 00% | | | | +12% | | | |
| '02 | | 00% | | | | 88% | | | | 00% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 732 | Dec: | - | | |
| | | | | | | | | | | | | '89 | 733 | | - | | |
| | | | | | | | | | | | | '97 | 300 | | - | | |
| | | | | | | | | | | | | '02 | 340 | | - | | |
| <i>Chrysothamnus nauseosus albicaulis</i> | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 24 | 39 | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | | <u>Heavy Use</u> | | | | <u>Poor Vigor</u> | | | | <u>%Change</u> | | | |
| '83 | | 00% | | | | 00% | | | | 00% | | | | | | | |
| '89 | | 00% | | | | 00% | | | | 00% | | | | | | | |
| '97 | | 00% | | | | 00% | | | | 00% | | | | | | | |
| '02 | | 00% | | | | 00% | | | | 00% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | |
| | | | | | | | | | | | | '89 | 0 | | - | | |
| | | | | | | | | | | | | '97 | 0 | | - | | |
| | | | | | | | | | | | | '02 | 0 | | - | | |

| A G R E | Y R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|-------------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|-----|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Chrysothamnus viscidiflorus viscidiflorus | | | | | | | | | | | | | | | | | | |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | | 1 |
| | 89 | 1 | - | - | 1 | - | - | - | - | - | 1 | 1 | - | - | 133 | | | 2 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| M | 83 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 133 | 11 | 13 | 2 |
| | 89 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 200 | 13 | 19 | 3 |
| | 97 | 9 | - | - | - | - | - | - | - | - | 9 | - | - | - | 180 | 15 | 32 | 9 |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 9 | 18 | 1 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | 7 | - | 1 | - | - | - | - | - | - | 4 | - | - | 4 | 160 | | | 8 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +40% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -46% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '02 | | 00% | | | 11% | | | 44% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 199 | Dec: | 0% | | | | |
| | | | | | | | | | | | '89 | 333 | | 0% | | | | |
| | | | | | | | | | | | '97 | 180 | | 0% | | | | |
| | | | | | | | | | | | '02 | 180 | | 89% | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | - | - | 2 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 0 | Dec: | - | | | | |
| | | | | | | | | | | | '89 | 0 | | - | | | | |
| | | | | | | | | | | | '97 | 40 | | - | | | | |
| | | | | | | | | | | | '02 | 0 | | - | | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Mahonia repens | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | 2 | - | - | 2 | - | - | - | 133 | | 2 | |
| | 97 | 62 | - | - | 20 | - | - | - | - | - | 82 | - | - | - | 1640 | | 82 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 8 | - | - | - | - | - | - | - | - | 8 | - | - | - | 533 | 5 | 7 | 8 |
| | 89 | 13 | - | - | 3 | - | - | - | - | - | 16 | - | - | - | 1066 | 2 | 5 | 16 |
| | 97 | 248 | - | - | 28 | - | - | 20 | - | - | 296 | - | - | - | 5920 | 5 | 7 | 296 |
| | 02 | 33 | - | - | - | - | - | 9 | - | - | 42 | - | - | - | 840 | 4 | 5 | 42 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | 36 | - | - | - | - | - | - | - | - | - | - | - | 36 | 720 | | 36 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 160 | | 8 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +58% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +83% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | -79% | | | | | | | |
| '02 | | 00% | | | 00% | | | 46% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 533 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 1265 | | 5% | | | |
| | | | | | | | | | | | | '97 | 7560 | | 0% | | | |
| | | | | | | | | | | | | '02 | 1560 | | 46% | | | |

| A G R E | Y R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|-------------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | 2 | - | - | 2 | - | - | - | 133 | | 2 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 9 | - | - | - | - | - | - | - | - | 9 | - | - | - | 600 | 6 | 13 | 9 |
| | 89 | 8 | - | - | - | - | - | - | - | - | 7 | 1 | - | - | 533 | 8 | 22 | 8 |
| | 97 | 7 | - | - | - | - | - | - | - | - | 5 | - | - | 2 | 140 | 6 | 11 | 7 |
| | 02 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | 5 | 13 | 5 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | - | 66 | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +18% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -75% | | | | | | | |
| '97 | | 00% | | | 00% | | | 22% | | | -44% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 600 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 732 | | 9% | | | |
| | | | | | | | | | | | | '97 | 180 | | 0% | | | |
| | | | | | | | | | | | | '02 | 100 | | 0% | | | |
| Pachistima myrsinites | | | | | | | | | | | | | | | | | | |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 89 | 2 | - | - | 3 | - | - | - | - | - | 5 | - | - | - | 333 | | 5 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 466 | 5 | 4 | 7 |
| | 89 | - | - | - | 1 | - | 3 | 3 | - | - | 7 | - | - | - | 466 | 2 | 2 | 7 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +33% | | | | | | | |
| '89 | | 00% | | | 25% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 532 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 799 | | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |

| A Y G R E | Form Class (No. of Plants) | 1 | | | | 2 | | | | 3 | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|----------------------------|---------------------|----|---|----|------------------|---|---|---|-------------------|---|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | | 4 | | |
| Symphoricarpos oreophilus | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 2 | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| Y | 83 | 7 | - | - | - | - | - | - | - | - | - | - | - | 466 | | | 7 |
| | 89 | 1 | - | - | 1 | - | - | - | - | - | - | - | - | 133 | | | 2 |
| | 97 | 19 | 7 | 1 | 6 | - | - | 2 | - | - | - | - | 1 | 700 | | | 35 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| M | 83 | 8 | 2 | - | - | - | - | - | - | - | - | - | - | 666 | 19 | 15 | 10 |
| | 89 | 7 | 4 | - | 3 | - | - | - | - | - | - | - | - | 933 | 19 | 22 | 14 |
| | 97 | 30 | 20 | 9 | 26 | 4 | - | 3 | - | - | - | - | - | 1840 | 25 | 45 | 92 |
| | 02 | 92 | - | 1 | 25 | - | - | 6 | - | - | - | - | - | 2480 | 21 | 36 | 124 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | 5 | 3 | - | - | - | - | - | - | - | - | - | - | 533 | | | 8 |
| | 97 | 16 | 4 | 1 | - | 2 | - | - | - | - | - | - | 14 | 460 | | | 23 |
| | 02 | 19 | - | - | 1 | - | - | - | - | - | - | - | - | 400 | | | 20 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 100 | | | 5 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 |
| % Plants Showing | | <u>Moderate Use</u> | | | | <u>Heavy Use</u> | | | | <u>Poor Vigor</u> | | | | <u>%Change</u> | | | |
| '83 | | 12% | | | | 00% | | | | 00% | | | | +29% | | | |
| '89 | | 29% | | | | 00% | | | | 13% | | | | +47% | | | |
| '97 | | 25% | | | | 07% | | | | 11% | | | | - 4% | | | |
| '02 | | 00% | | | | .69% | | | | 35% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 1132 | Dec: | 0% | | |
| | | | | | | | | | | | | '89 | 1599 | | 33% | | |
| | | | | | | | | | | | | '97 | 3000 | | 15% | | |
| | | | | | | | | | | | | '02 | 2880 | | 14% | | |
| Tetradymia canescens | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 19 | 38 | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | | <u>Heavy Use</u> | | | | <u>Poor Vigor</u> | | | | <u>%Change</u> | | | |
| '83 | | 00% | | | | 00% | | | | 00% | | | | | | | |
| '89 | | 00% | | | | 00% | | | | 00% | | | | | | | |
| '97 | | 00% | | | | 00% | | | | 00% | | | | | | | |
| '02 | | 00% | | | | 00% | | | | 00% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | |
| | | | | | | | | | | | | '89 | 0 | | - | | |
| | | | | | | | | | | | | '97 | 0 | | - | | |
| | | | | | | | | | | | | '02 | 0 | | - | | |

Trend Study 19B-3-02

Study site name: Bennion Creek.

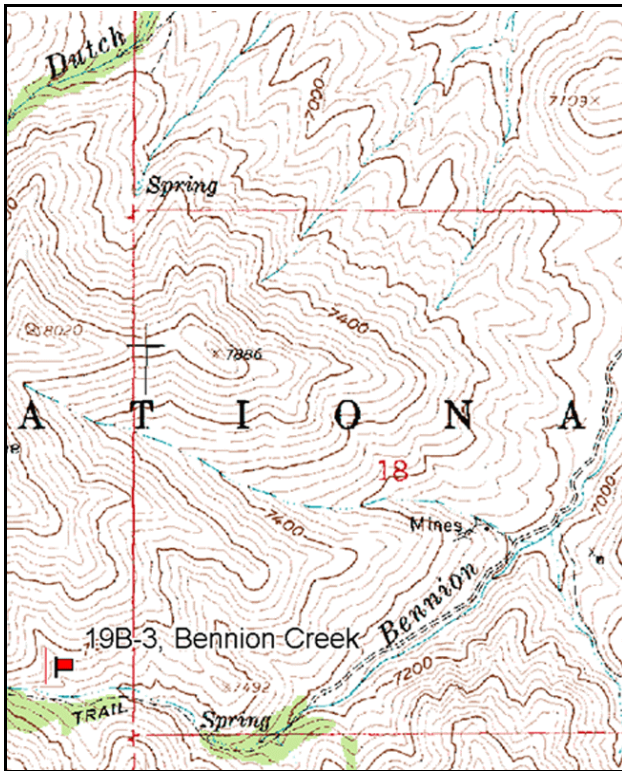
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 302 degrees magnetic (Lines 2-4 @ 312°M).

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

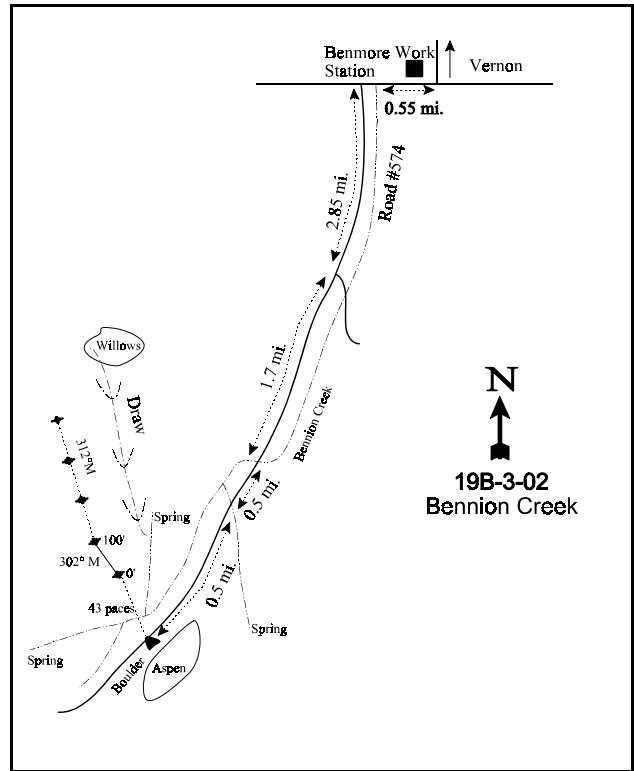
LOCATION DESCRIPTION

From the Benmore Work Station south of Vernon, travel west 0.55 miles to the intersection with the Forest Service road #574. Turn left and go south 2.85 miles to a fork. Bear right and go 1.7 miles to where Bennion Creek crosses the road. Proceed 0.5 miles to where a small drainage from a spring crosses the road. Continue up Bennion Creek 0.5 miles to the study site. Vehicle travel may be restricted in this last 0.5 mile. The site is located on a ridge above the point where two springs come together. From the road, the 0-foot baseline stake is 43 paces northwest. A red browse tag, number 3979, is attached to the 0-foot baseline stake.



Map Name: Dutch Peak

Township 10S, Range 6W, Section 13



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4422914 N 375147 E

DISCUSSION

Bennion Creek - Trend Study No. 19B-3

The Bennion Creek study is typical of deer summer range found on the Sheeprock Mountains. The study samples a low growing, mountain brush community at an elevation of 7,600 feet. The site has an easterly aspect and a 15-25% percent slope. The transect was placed close to the bottom of the slope just above Bennion Creek. A moderately large aspen stand and some relatively dense thickets of chokecherry and serviceberry provide cover nearby. At the time of study establishment in 1983, several deer were observed in the immediate area. In 1997, several cows were observed just east of the site grazing along the creek. On the immediate site, wildlife use has been light. Pellet group transect data collected on site in 2002 estimated 11 deer days use/acre (28 ddu/ha) and less than one elk day use/acre (2 edu/ha). Cattle use was estimated at 21 days use/acre (52 cdu/ha). The deer and elk sign appeared to be mostly from spring and early summer.

Soils are loam in texture and have a slightly acidic reactivity (pH of 6.5). Soil is relatively shallow with angular shaped granite or other igneous rocks on the surface. The effective rooting depth was estimated at 12 inches and average soil temperature was 57°F in 1997. Some soil movement is apparent, but appears minimal. Abundant vegetation and litter cover have prevented excessive runoff and soil loss on this study in the past. Due to drought in 2002 however, vegetation and litter both declined leaving a moderately high proportion of the soil surface bare (27%). Rock and pavement are abundant and armor the surface, which also helps minimize erosive events. The erosion condition class was determined as stable to slight in 2002.

Saskatoon serviceberry and mountain big sagebrush are the key browse species on this site providing nearly 40% of the browse cover in 1997 and 2002. Estimated density for serviceberry was 700 plants/acre in 1997 and 620 in 2002. Age structure has shifted from largely a young population in 1983 and 1989, to more mature and decadent in 1997 and 2002. Percent decadence peaked at 37% in 1997, decreasing to 23% in 2002. Vigor was normal throughout the entire population in 1983 and 1989. In 1997 and 2002, 17% and 14% of the population respectively displayed poor vigor. Average height measurements are similar over all years at about three feet. Utilization was light to moderate in 1983 and 1989, increasing to moderate to heavy in 1997 and 2002. Very few leaders could be found on serviceberry plants in 2002. Mountain big sagebrush density was estimated to be 940 plants/acre in 1997 and 860 in 2002. This is largely a mature and decadent population with few seedling and young plants. Decadence has ranged from 25-30%, except in 1989, when no decadent plants were sampled. The percentage of the population in poor vigor peaked in 1997 at 21%, slightly decreasing to 16% in 2002. Crickets were abundant on the site in 2002 and were noted as having defoliated many of the sagebrush and low rabbitbrush on the site. Annual sagebrush leaders averaged just over one inch in 2002.

Mountain snowberry, although having a lower wildlife preference, is the most abundant browse on the site. Snowberry density was estimated at 3,620 plants/acre in 1997, decreasing to just under 3,000 plants/acre in 2002. The decline in density is largely the result of the loss of the young age class in 2002. The snowberry population on this site is best categorized as small statured, mature plants that have been lightly utilized. There is also a fairly abundant population of mountain lover on the site. Density was estimated at 1,560 plants/acre in 1997, increasing to 1,740 plants/acre in 2002. This mostly mature population is very small statured averaging only four inches in height in 2002. Other shrubs sampled include black sagebrush, stickyleaf low rabbitbrush, whorled buckwheat, Oregon grape, and prickly pear cactus.

Grasses are dominated by a variety of perennial species including spike fescue, mutton bluegrass, oniongrass, and bluebunch wheatgrass. Sum of nested frequency for grasses increased in 1997, but declined in 2002 with drought conditions. Most of the perennial grass species declined in nested frequency in 2002, with oniongrass showing the largest decline. Bluebunch wheatgrass was the only species to significantly increase in 2002, although spike fescue provides one-half of the total grass cover. Grasses had been heavily utilized when the site was read in 2002, probably more by crickets than anything else.

Forbs were very diverse and abundant in 1983. Since then, the forb component has steadily declined in abundance, especially between 1997 and 2002, when perennial forb sum of nested frequency declined by 84% due to drought conditions. Prior to 2002, the most abundant perennial forb species included wild onion, tapertip hawksbeard, aster, and lomatium. Annual forbs were in relatively low abundance and included blue-eyed Mary, slenderleaf collomia, and pale alyssum.

1983 APPARENT TREND ASSESSMENT

Soil trend appears stable. However, this soil would rapidly erode if vegetation or litter cover were to be depleted. Both the browse and herbaceous understory trends appear stable with healthy, perhaps even expanding, populations of shrubs, grasses, and forbs.

1989 TREND ASSESSMENT

An increase in pavement cover has led to a decrease in percent bare ground from 27% in 1983 to 15% in 1989. Soil movement appears to be occurring, but is not severe due to adequate amounts of vegetation and litter. The soil trend is stable. The browse populations have increased in density since 1983. Serviceberry and mountain big sagebrush show slight increases in density, while mountain big sagebrush decadence improved from 25% to 0% with lighter use. The population of snowberry increased significantly due to the abundance of young plants in 1989. Trend for browse is slightly up. Sum of nested frequency for grasses and forbs is nearly identical to that of 1983. The herbaceous understory is diverse and vigorous which leads to a stable trend.

TREND ASSESSMENT

soil - stable (3)

browse - slightly up (4)

herbaceous understory - stable (3)

1997 TREND ASSESSMENT

Bare ground declined to 7%, as vegetation and litter cover are abundant. Soil erosion is minimal as a result. Soil trend is slightly up. Saskatoon serviceberry density appears stable but the percentage of plants with poor vigor increased, and nearly one-half of the population was heavily browsed. The mountain big sagebrush population could be declining with one-third of the population classified as decadent. This leads to a slightly downward browse trend. Perennial grass sum of nested frequency has increased since 1989 with several species including spike fescue and oniongrass showing significant increases. Perennial forb sum of nested frequency has declined since 1989 accounting for most of the decrease in perennial herbaceous understory sum of nested frequency. Herbaceous understory trend is stable.

TREND ASSESSMENT

soil - slightly up (4)

browse - slightly downward (2)

herbaceous understory - stable overall, slightly up for grasses and slightly down for forbs (3)

2002 TREND ASSESSMENT

Trend for soil is down. Drought conditions in 2002 resulted in a large decline in herbaceous vegetation and litter cover and a subsequent increase in bare ground. With less protective cover on the soil surface, litter and surface rock movement was apparent. The erosion condition classification was stable to slight. Trend for browse is stable. The key forage species, serviceberry and mountain big sagebrush, have nearly stable densities, improved vigor, and lower decadence. These are very positive signs considering the drought conditions in 2002. Snowberry declined in density with the loss of the young age class in 2002, but this is not unexpected due to the drought conditions. The number of mature snowberry slightly increased in association with light use. Trend for the herbaceous understory is down. Herbaceous perennials, especially forbs, were much less abundant in 2002 with drought. Bluebunch wheatgrass was the only important herbaceous species to increase in nested frequency in 2002.

TREND ASSESSMENT

soil - down (1)

browse - stable (3)

herbaceous understory - down (1)

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 3

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|------------------------|------------------|------|-------|-------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | Agropyron spicatum | a49 | a48 | a70 | b147 | 23 | 24 | 32 | 59 | 1.90 | 2.64 |
| G | Agropyron trachycaulum | ab13 | b14 | a1 | a- | 7 | 8 | 1 | - | .00 | - |
| G | Bromus carinatus | c57 | c53 | b33 | a3 | 26 | 28 | 14 | 1 | .36 | .03 |
| G | Bromus tectorum (a) | - | - | 4 | - | - | - | 2 | - | .03 | - |
| G | Carex spp. | ab11 | b26 | a- | a6 | 4 | 8 | - | 2 | - | .18 |
| G | Leucopoa kingii | a87 | a84 | b137 | ab124 | 33 | 37 | 54 | 52 | 6.78 | 4.69 |
| G | Melica bulbosa | a26 | a26 | b109 | a22 | 12 | 16 | 46 | 11 | 2.29 | .27 |
| G | Phleum pratense | - | - | 3 | - | - | - | 1 | - | .03 | - |
| G | Poa fendleriana | b147 | b140 | ab120 | a106 | 58 | 61 | 47 | 43 | 3.48 | 1.40 |
| G | Poa pratensis | 14 | 13 | 13 | - | 6 | 5 | 4 | - | .36 | - |
| G | Poa secunda | ab13 | b29 | b31 | a6 | 6 | 14 | 13 | 3 | .57 | .01 |
| G | Stipa lettermani | 5 | 7 | 5 | 1 | 2 | 4 | 2 | 1 | .06 | .00 |
| Total for Annual Grasses | | 0 | 0 | 4 | 0 | 0 | 0 | 2 | 0 | 0.03 | 0 |
| Total for Perennial Grasses | | 422 | 440 | 522 | 415 | 177 | 205 | 214 | 172 | 15.86 | 9.25 |
| Total for Grasses | | 422 | 440 | 526 | 415 | 177 | 205 | 216 | 172 | 15.90 | 9.25 |
| F | Achillea millefolium | 3 | - | 3 | - | 1 | - | 1 | - | .03 | - |
| F | Agoseris glauca | a5 | c69 | b23 | ab8 | 3 | 38 | 13 | 4 | .07 | .04 |
| F | Alyssum alyssoides (a) | - | - | b79 | a- | - | - | 30 | - | .15 | - |
| F | Allium spp. | d202 | b121 | c160 | a- | 78 | 59 | 62 | - | .79 | - |
| F | Arabis spp. | - | 6 | 1 | - | - | 3 | 1 | - | .01 | - |
| F | Artemisia ludoviciana | 4 | 1 | 10 | 9 | 2 | 1 | 4 | 3 | .60 | .21 |
| F | Astragalus cibaricus | c60 | c59 | b17 | a- | 28 | 27 | 8 | - | .26 | - |
| F | Aster spp. | ab91 | c115 | b72 | a38 | 33 | 45 | 24 | 16 | 1.04 | .43 |

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|---------------------------|----------------------------|------------------|------------------|-----------------|-----------------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| F | Balsamorhiza sagittata | _{ab} 18 | _b 26 | _a 5 | _a 3 | 7 | 15 | 2 | 3 | .66 | .28 |
| F | Castilleja linariaefolia | _{ab} 7 | _{ab} 3 | _b 10 | _a - | 4 | 2 | 6 | - | .05 | - |
| F | Calochortus nuttallii | 2 | 3 | 8 | - | 1 | 2 | 4 | - | .02 | - |
| F | Chaenactis douglasii | 1 | - | 1 | - | 1 | - | 1 | - | .00 | - |
| F | Cirsium spp. | _c 29 | _{ab} 5 | _b 7 | _a - | 18 | 4 | 5 | - | .34 | - |
| F | Collomia linearis (a) | - | - | _b 79 | _a - | - | - | 33 | - | .24 | - |
| F | Comandra pallida | _b 35 | _b 35 | _a - | _b 18 | 13 | 15 | - | 7 | - | .16 |
| F | Collinsia parviflora (a) | - | - | _b 83 | _a - | - | - | 32 | - | .16 | - |
| F | Crepis acuminata | _c 138 | _c 140 | _b 86 | _a 1 | 61 | 70 | 40 | 1 | 2.53 | .00 |
| F | Cynoglossum officinale | - | - | - | 3 | - | - | - | 1 | - | .00 |
| F | Delphinium nuttallianum | _c 31 | _a - | _b 13 | _a - | 18 | - | 9 | - | .04 | - |
| F | Epilobium brachycarpum (a) | - | - | _b 25 | _a 8 | - | - | 10 | 3 | .07 | .04 |
| F | Erysimum asperum | _b 15 | _a - | _a - | _a - | 8 | - | - | - | - | - |
| F | Erigeron divergens | 4 | 1 | 8 | - | 2 | 1 | 3 | - | .09 | - |
| F | Eriogonum racemosum | _b 49 | _b 42 | _a 6 | _a 12 | 27 | 21 | 2 | 6 | .04 | .25 |
| F | Eriogonum umbellatum | _b 40 | _b 38 | _a 13 | _a 3 | 16 | 19 | 6 | 1 | .17 | .00 |
| F | Fritillaria pudica | 2 | - | - | - | 1 | - | - | - | - | - |
| F | Hackelia patens | 2 | - | 2 | - | 1 | - | 1 | - | .00 | - |
| F | Holosteum umbellatum (a) | - | - | 5 | - | - | - | 2 | - | .01 | - |
| F | Hydrophyllum capitatum | _b 28 | _a - | _a - | _a - | 14 | - | - | - | - | - |
| F | Lactuca serriola | - | - | 2 | - | - | - | 1 | - | .00 | - |
| F | Lithospermum spp. | - | - | - | 2 | - | - | - | 1 | .00 | .03 |
| F | Lomatium spp. | _c 149 | _c 163 | _b 59 | _a - | 66 | 67 | 29 | - | .91 | - |
| F | Lupinus caudatus | _c 59 | _b 23 | _a - | _a - | 29 | 12 | - | - | - | - |
| F | Lupinus sericeus | _b 29 | _{ab} 19 | _a 11 | _a 2 | 14 | 9 | 5 | 1 | .33 | .15 |
| F | Machaeranthera canescens | 6 | 1 | 11 | - | 3 | 1 | 4 | - | .03 | - |
| F | Microsteris gracilis (a) | - | - | _b 20 | _a - | - | - | 10 | - | .05 | - |
| F | Orobanche uniflora | 2 | - | - | - | 1 | - | - | - | - | - |
| F | Phlox longifolia | _b 17 | _b 32 | _b 18 | _a - | 11 | 14 | 8 | - | .21 | - |
| F | Polygonum douglasii (a) | - | - | _b 67 | _a - | - | - | 26 | - | .22 | - |
| F | Senecio integerrimus | _a 7 | _b 43 | _b 44 | _a 3 | 4 | 22 | 21 | 1 | .54 | .03 |
| F | Tragopogon dubius | - | 1 | 1 | - | - | 1 | 1 | - | .03 | - |
| F | Veronica biloba (a) | - | - | 8 | - | - | - | 3 | - | .01 | - |
| F | Wyethia amplexicaulis | _a - | _{ab} 3 | _b 21 | _a 1 | - | 2 | 7 | 1 | .91 | .15 |
| Total for Annual Forbs | | 0 | 0 | 366 | 8 | 0 | 0 | 146 | 3 | 0.92 | 0.04 |
| Total for Perennial Forbs | | 1035 | 949 | 612 | 100 | 465 | 450 | 268 | 45 | 9.78 | 1.72 |
| Total for Forbs | | 1035 | 949 | 978 | 108 | 465 | 450 | 414 | 48 | 10.72 | 1.76 |

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

BROWSE TRENDS --
Herd unit 19B, Study no: 3

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|-------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | Amelanchier alnifolia | 32 | 28 | 3.65 | 3.19 |
| B | Artemisia nova | 8 | 1 | .44 | - |
| B | Artemisia tridentata vaseyana | 40 | 34 | 4.48 | 3.56 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 4 | 3 | .38 | .03 |
| B | Eriogonum heracleoides | 18 | 27 | .27 | 1.31 |
| B | Juniperus osteosperma | 1 | 0 | - | - |
| B | Mahonia repens | 16 | 3 | .75 | .04 |
| B | Opuntia spp. | 3 | 5 | .15 | .54 |
| B | Pachistima myrsinites | 21 | 26 | .70 | .87 |
| B | Pseudotsuga menziesii | 0 | 1 | - | - |
| B | Rosa woodsii | 21 | 7 | 1.88 | .21 |
| B | Symphoricarpos oreophilus | 68 | 61 | 9.90 | 6.23 |
| B | Tetradymia canescens | 0 | 1 | - | - |
| Total for Browse | | 232 | 197 | 22.63 | 16.04 |

CANOPY COVER -- LINE INTERCEPT
Herd unit 19B, Study no: 3

| Species | Percent Cover | |
|-------------------------------------------|---------------|------|
| | '97 | '02 |
| Amelanchier alnifolia | - | 5.17 |
| Artemisia tridentata vaseyana | - | 5.08 |
| Chrysothamnus viscidiflorus viscidiflorus | - | .17 |
| Eriogonum heracleoides | - | 1.00 |
| Mahonia repens | - | .02 |
| Opuntia spp. | - | .15 |
| Pachistima myrsinites | - | .25 |
| Rosa woodsii | - | .25 |
| Symphoricarpos oreophilus | - | 8.00 |

Key Browse Annual Leader Growth
Herd unit 19B , Study no: 3

| Species | Average leader growth (in) |
|-------------------------------|----------------------------|
| | '02 |
| Artemisia tridentata vaseyana | 1.1 |

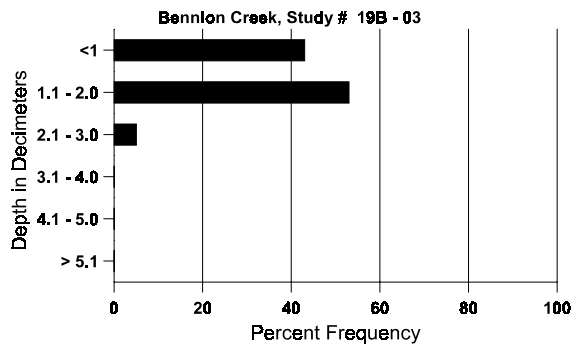
BASIC COVER --
Herd unit 19B, Study no: 3

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 354 | 299 | 3.50 | 8.50 | 49.18 | 26.78 |
| Rock | 265 | 281 | 12.00 | 10.25 | 12.07 | 15.73 |
| Pavement | 266 | 328 | 2.50 | 13.75 | 5.51 | 15.27 |
| Litter | 386 | 360 | 55.50 | 52.75 | 50.44 | 32.01 |
| Cryptogams | 31 | - | 0 | 0 | .17 | 0 |
| Bare Ground | 200 | 313 | 26.50 | 14.75 | 7.03 | 27.78 |

SOIL ANALYSIS DATA --
Herd Unit 19B, Study no: 3, Bennion Creek

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 12.2 | 56.8 (13.2) | 6.5 | 43.3 | 30.7 | 26.0 | 4.5 | 12.3 | 307.2 | 0.6 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 19B, Study no: 3

| Type | Quadrat Frequency | | Pellet Transect | |
|--------|-------------------|-----|------------------------|------------------------|
| | '97 | '02 | Pellet Groups per Acre | Days Use per Acre (ha) |
| Rabbit | 1 | - | 02 | 02 |
| Elk | 1 | - | - | - |
| Deer | 8 | 5 | 9 | 1 (2) |
| Cattle | 5 | 10 | 148 | 11 (28) |
| | | | 252 | 21 (52) |

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 3

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|----|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Amelanchier alnifolia | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | 5 | 1 | - | - | - | - | - | - | - | 6 | - | - | - | 400 | | 6 | |
| | 89 | 4 | 1 | - | 1 | - | - | - | - | - | 6 | - | - | - | 400 | | 6 | |
| | 97 | - | 1 | - | 2 | - | - | - | - | - | 2 | 1 | - | - | 60 | | 3 | |
| | 02 | 1 | 1 | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| M | 83 | 1 | 3 | - | - | - | - | - | - | - | 4 | - | - | - | 266 | 33 21 | 4 | |
| | 89 | 1 | 4 | - | - | - | - | - | - | - | 5 | - | - | - | 333 | 34 19 | 5 | |
| | 97 | - | 1 | 5 | 1 | 7 | 5 | - | - | - | 15 | 4 | - | - | 380 | 33 35 | 19 | |
| | 02 | - | 6 | 15 | - | - | 3 | - | - | - | 24 | - | - | - | 480 | 34 35 | 24 | |
| D | 83 | - | 1 | - | - | - | - | - | - | - | - | 1 | - | - | 66 | | 1 | |
| | 89 | 1 | 1 | - | - | - | - | - | - | - | 2 | - | - | - | 133 | | 2 | |
| | 97 | - | 7 | 3 | - | 1 | 2 | - | - | - | 6 | 1 | - | 6 | 260 | | 13 | |
| | 02 | - | 3 | 1 | - | - | 1 | - | - | - | 2 | - | - | 3 | 100 | | 5 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 80 | | 4 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 45% | | | 00% | | | 00% | | | +15% | | | | | | | |
| '89 | | 46% | | | 00% | | | 00% | | | -19% | | | | | | | |
| '97 | | 49% | | | 43% | | | 17% | | | -11% | | | | | | | |
| '02 | | 32% | | | 65% | | | 10% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 732 | Dec: | 9% | | | |
| | | | | | | | | | | | | '89 | 866 | | 15% | | | |
| | | | | | | | | | | | | '97 | 700 | | 37% | | | |
| | | | | | | | | | | | | '02 | 620 | | 16% | | | |

| A G R E | Y R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|-------------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|-----|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Artemisia nova</i> | | | | | | | | | | | | | | | | | | |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | 14 | 23 | 1 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 9 | - | - | - | - | - | - | - | - | 8 | - | 1 | - | 180 | 12 | 22 | 9 |
| | 02 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | 8 | 26 | 3 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | 2 | - | - | - | - | - | - | - | 1 | - | - | 2 | 60 | | 3 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 17% | | | 00% | | | 25% | | | -75% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 132 | Dec: | 0% | | | | |
| | | | | | | | | | | | '89 | 0 | | 0% | | | | |
| | | | | | | | | | | | '97 | 240 | | 25% | | | | |
| | | | | | | | | | | | '02 | 60 | | 0% | | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | | | | | | | |
| Y | 83 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 133 | | 2 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | - | 66 | | 1 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 80 | | 4 | |
| M | 83 | 1 | 3 | - | - | - | - | - | - | - | 4 | - | - | - | 266 | 21 | 51 | 4 |
| | 89 | 7 | 1 | 1 | - | - | - | - | - | - | 9 | - | - | - | 600 | 21 | 35 | 9 |
| | 97 | 24 | 6 | - | 1 | 1 | - | - | - | - | 30 | - | 2 | - | 640 | 24 | 39 | 32 |
| | 02 | 15 | 7 | 5 | - | - | - | - | - | - | 25 | 2 | - | - | 540 | 19 | 35 | 27 |
| D | 83 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 133 | | 2 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 11 | 3 | - | - | - | - | - | - | - | 5 | 1 | - | 8 | 280 | | 14 | |
| | 02 | 6 | 5 | 1 | - | - | - | - | - | - | 5 | - | - | 7 | 240 | | 12 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 360 | | 18 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 240 | | 12 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 38% | | | 00% | | | 00% | | | +20% | | | | | | | |
| '89 | | 10% | | | 10% | | | 10% | | | +29% | | | | | | | |
| '97 | | 21% | | | 00% | | | 21% | | | -9% | | | | | | | |
| '02 | | 28% | | | 14% | | | 16% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 532 | Dec: | 25% | | | | |
| | | | | | | | | | | | '89 | 666 | | 0% | | | | |
| | | | | | | | | | | | '97 | 940 | | 30% | | | | |
| | | | | | | | | | | | '02 | 860 | | 28% | | | | |

| A Y G R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|----------------------------|---------------------|---|---|------------------|---|---|-------------------|---|-------------|----------------|-----|-----|--------------------|--------------------------------|----|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Chrysothamnus viscidiflorus viscidiflorus | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | 2 | - | - | - | - | - | - | - | - | - | - | - | 133 | 16 | 10 | 2 |
| | 97 | 3 | - | - | - | - | - | - | - | - | - | - | - | 60 | 16 | 28 | 3 |
| | 02 | 3 | - | - | - | - | - | - | - | - | - | 1 | - | 60 | 10 | 15 | 3 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | 20 | | | 1 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -40% | | | | | | |
| '97 | | 00% | | | 00% | | | 25% | | | -25% | | | | | | |
| '02 | | 00% | | | 00% | | | 33% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | 0% | | |
| | | | | | | | | | | | | '89 | 133 | | 0% | | |
| | | | | | | | | | | | | '97 | 80 | | 25% | | |
| | | | | | | | | | | | | '02 | 60 | | 0% | | |
| Eriogonum heracleoides | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 3 | - | - | - | - | - | - | - | - | - | - | - | 60 | | | 3 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 7 | - | - | - | - | - | - | - | - | - | - | - | 140 | | | 7 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 23 | - | - | 2 | - | - | 1 | - | - | - | - | - | 520 | 12 | 13 | 26 |
| | 02 | 36 | 6 | 4 | - | - | - | - | - | - | - | - | - | 920 | 6 | 13 | 46 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | 20 | | | 1 |
| | 02 | 3 | - | - | - | - | - | - | - | - | - | - | - | 60 | | | 3 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 03% | | | +31% | | | | | | |
| '02 | | 12% | | | 08% | | | 02% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | 0% | | |
| | | | | | | | | | | | | '89 | 0 | | 0% | | |
| | | | | | | | | | | | | '97 | 680 | | 3% | | |
| | | | | | | | | | | | | '02 | 980 | | 6% | | |

| A G R E | Y R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|-------------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 2 | - | - | - | - | - | - | - | - | - | 2 | - | - | 40 | - | - | 2 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 40 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |
| Mahonia repens | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 32 | - | - | - | - | - | - | - | - | 32 | - | - | - | 640 | | | 32 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 64 | - | - | - | - | - | - | - | - | 64 | - | - | - | 1280 | 4 | 6 | 64 |
| | 02 | 6 | - | - | - | - | - | - | - | - | 6 | - | - | - | 120 | 2 | 3 | 6 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | -94% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 1920 | | - | | | |
| | | | | | | | | | | | | '02 | 120 | | - | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 140 | 8 | 32 | 7 |
| | 02 | 6 | - | - | - | - | - | - | - | - | 6 | - | - | - | 120 | 6 | 33 | 6 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | -14% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 140 | | - | | | |
| | | | | | | | | | | | | '02 | 120 | | - | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|----|--------------------|--------------------------------|----------------|-------|------|----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | |
| Pachistima myrsinites | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | 0 | 0 | |
| | 89 | 8 | - | - | - | - | - | - | 533 | 8 | |
| | 97 | 2 | - | - | - | - | - | - | 40 | 2 | |
| | 02 | - | - | - | - | - | - | - | 0 | 0 | |
| Y | 83 | - | - | - | - | - | - | - | 0 | 0 | |
| | 89 | 2 | - | - | - | - | - | - | 133 | 2 | |
| | 97 | 18 | - | - | 1 | - | - | - | 380 | 19 | |
| | 02 | - | - | - | - | - | - | - | 0 | 0 | |
| M | 83 | 11 | - | - | - | - | - | - | 733 | 5 4 | 11 |
| | 89 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 97 | 40 | - | - | 15 | - | - | 4 | 1180 | 5 12 | 59 |
| | 02 | 64 | - | 9 | 2 | 12 | - | - | 1740 | 4 7 | 87 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 00% | | 00% | | 00% | | -82% | | | |
| '89 | | 00% | | 00% | | 00% | | +91% | | | |
| '97 | | 00% | | 00% | | 00% | | +10% | | | |
| '02 | | 14% | | 10% | | 00% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 733 | Dec: | - | | |
| | | | | | | '89 | 133 | | - | | |
| | | | | | | '97 | 1560 | | - | | |
| | | | | | | '02 | 1740 | | - | | |
| Pseudotsuga menziesii | | | | | | | | | | | |
| D | 83 | - | - | - | - | - | - | - | 0 | 0 | |
| | 89 | - | - | - | - | - | - | - | 0 | 0 | |
| | 97 | - | - | - | - | - | - | - | 0 | 0 | |
| | 02 | 1 | - | - | - | - | - | - | 20 | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 00% | | 00% | | 00% | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | |
| '97 | | 00% | | 00% | | 00% | | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 0 | Dec: | 0% | | |
| | | | | | | '89 | 0 | | 0% | | |
| | | | | | | '97 | 0 | | 0% | | |
| | | | | | | '02 | 20 | | 100% | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | |
| Rosa woodsii | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 13 | - | - | - | - | - | - | - | - | 13 | - | - | - | 260 | | 13 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 37 | - | - | - | - | - | - | - | - | 37 | - | - | - | 740 | | 37 |
| | 02 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | | 5 |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - |
| | 97 | 16 | - | - | 1 | - | - | - | - | - | 17 | - | - | - | 340 | 12 | 17 |
| | 02 | 25 | 11 | - | - | - | - | - | - | - | 36 | - | - | - | 720 | 5 | 6 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 3 | - | - | - | - | - | - | - | - | 2 | - | - | 1 | 60 | | 3 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 02% | | | -28% | | | | | | |
| '02 | | 27% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | 0% | | |
| | | | | | | | | | | | | '89 | 0 | | 0% | | |
| | | | | | | | | | | | | '97 | 1140 | | 5% | | |
| | | | | | | | | | | | | '02 | 820 | | 0% | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | |
|------------------------------------------------|----------------------------|---------------------|----|------------------|----|--------------------|--------------------------------|----------------|-------|------|------|-----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | | |
| Symphoricarpos oreophilus | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 2 | - | - | - | - | - | - | 133 | | 2 | |
| | 97 | 1 | - | - | - | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | 16 | - | - | - | - | - | - | 1066 | | 16 | |
| | 89 | 43 | 2 | - | 10 | - | - | 4 | 3933 | | 59 | |
| | 97 | 28 | 3 | - | 7 | - | - | - | 760 | | 38 | |
| | 02 | 3 | - | - | - | - | - | - | 60 | | 3 | |
| M | 83 | 21 | - | - | - | - | - | - | 1400 | 24 | 21 | 21 |
| | 89 | 23 | - | - | - | - | - | - | 1533 | 30 | 31 | 23 |
| | 97 | 78 | 19 | - | 27 | 5 | - | - | 2580 | 16 | 29 | 129 |
| | 02 | 127 | - | - | 6 | - | - | 3 | 2720 | 14 | 22 | 136 |
| D | 83 | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 7 | 1 | - | - | - | - | - | 533 | | 8 | |
| | 97 | 9 | 2 | 2 | 1 | - | - | - | 280 | | 14 | |
| | 02 | 8 | - | - | 2 | - | - | - | 200 | | 10 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | |
| '83 | | 00% | | 00% | | 00% | | +59% | | | | |
| '89 | | 03% | | 00% | | 02% | | -40% | | | | |
| '97 | | 16% | | 01% | | 08% | | -18% | | | | |
| '02 | | 00% | | 00% | | 17% | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | '83 | 2466 | Dec: | 0% |
| | | | | | | | | | '89 | 5999 | | 9% |
| | | | | | | | | | '97 | 3620 | | 8% |
| | | | | | | | | | '02 | 2980 | | 7% |
| Tetradymia canescens | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | 1 | - | - | - | - | - | - | 20 | - | - | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | |
| '83 | | 00% | | 00% | | 00% | | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | | |
| '97 | | 00% | | 00% | | 00% | | | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | '83 | 0 | Dec: | - |
| | | | | | | | | | '89 | 0 | | - |
| | | | | | | | | | '97 | 0 | | - |
| | | | | | | | | | '02 | 20 | | - |

Trend Study 19B-4-02

Study site name: Harker Canyon.

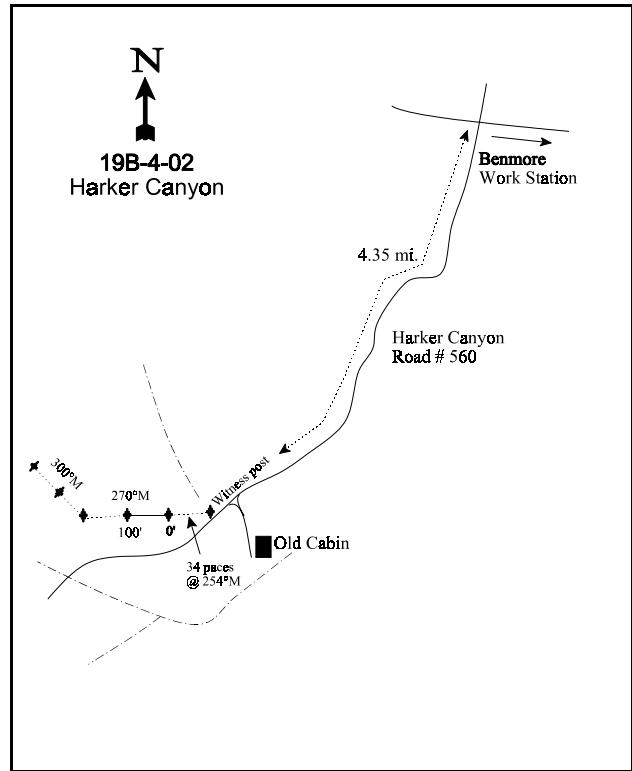
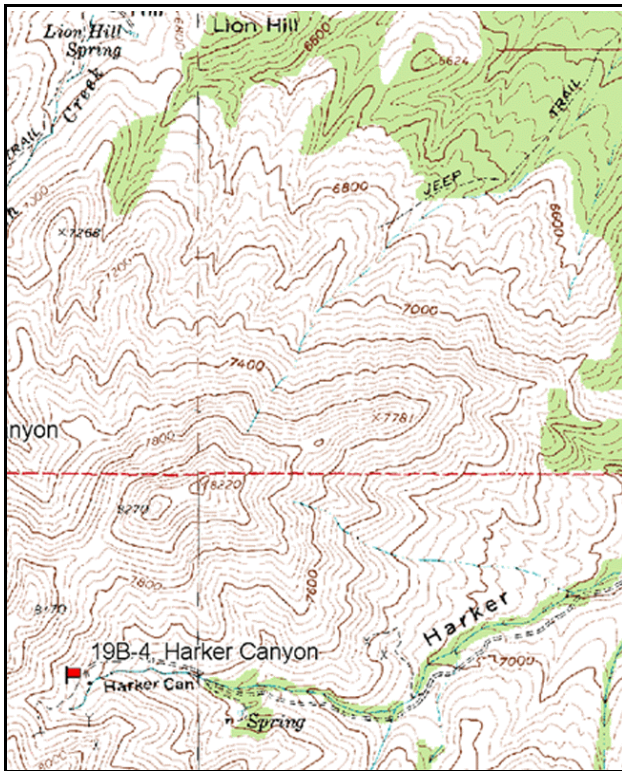
Vegetation type: Snowberry.

Compass bearing: frequency baseline 270 degrees magnetic (Line 3-4 @ 300°M).

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 3 on 7ft, belt 4 on 1ft, and belt 5 on 1ft.

LOCATION DESCRIPTION

From the Forest Service's Benmore Work Station, proceed south 0.10 miles to a "T" intersection. Turn right at the intersection (west) for 2.0 miles to an intersection and a sign for "Harker Canyon." Turn left, heading southwest towards Harker Canyon for 4.35 miles. Just after passing an old cabin on the lefthand side of the road, look for a half high green steel "T" fencepost with a white top on the right side of the road (northeast). From the fencepost the 0-foot stake of the baseline is 34 paces away at an azimuth of 245 degrees magnetic. The study is marked by green steel "T" fenceposts approximately 12-18 inches in height.



Map Name: Erickson Knoll

Diagrammatic Sketch

Township 10S, Range 6W, Section Unsurveyed (3)

GPS: NAD 27, UTM 12S 4425980 N 371421 E

DISCUSSION

Harker Canyon - Trend Study No. 19B-4

This study samples deer summer range located near the upper end of Harker Canyon. The transect samples a mountain brush community on land administered by the Forest Service at an elevation of 7,640 feet. Aspect is to the southeast with a 35% slope. There is a perennial water source about 150 yards from the transect. Nearby, in Harker Canyon, scattered aspen and tall brush thickets provide resting and escape cover during the summer. Uphill from the study are several small knolls and ridgetops occupied by curlleaf mountain mahogany. In 1983, two mature bucks and one doe were observed, as well as a moderate number of deer pellet groups and cattle pats. Only a few deer and elk pellet groups were observed on site in 1997. During the 2002 reading, several deer were seen near the site including a couple of small bucks. A pellet group transect read on site in 2002 estimated 40 deer days use/acre (99 ddu/ha), 10 cow days use/acre (25 cdu/ha), and only one elk day use/acre (3 edu/ha). The majority of all pellets sampled appeared to be from spring.

Soil is coarse, well drained, and rocky throughout. Textural and chemical analysis indicates the soil to be a loam with a moderately acidic reactivity (pH of 6.0). In 1997, the effective rooting depth was estimated at 13 inches with an average soil temperature of 54°F measured at 14 inches in depth. Organic matter content is moderately high at 5.4%. It was reported in the past that erosion was negligible as there was little bare ground and abundant vegetation and litter cover. Most signs of erosion occurred on animal trails that zig-zag through the area. With drought in 2002, cover of both vegetation and litter declined, and bare ground increased from 3% to 24%. This resulted in the ratio of protective cover (vegetation, litter, and cryptogams) to bare soil declining from very good (7.3:1) to marginal (2.6:1). Both surface litter and soil movement were noted during the 2002 reading. The erosion condition classification was stable to slight in 2002.

The vegetative community is dominated by the browse component. Although mountain snowberry is the most abundant browse on the site, several less abundant but more preferred species also occur including serviceberry, mountain big sagebrush, curlleaf mountain mahogany, and bitterbrush. Of these, only serviceberry and mountain big sagebrush were sampled in abundant numbers on the transect. Curlleaf mahogany occurs as large, scattered plants above the transect. The mountain snowberry population had an estimated density of 2,620 plants/acre in 1997, increasing to 3,000 plants/acre in 2002. This is a mostly mature population with 90% of the plants encountered classified as mature in both 1997 and 2002. Decadence was low in 1997 and 2002 at 2% and 9% respectively. Decadence peaked at 34% in 1989 which was a drought year. Utilization has been light, although a quarter of the population displayed poor vigor in 2002 due to a combination of drought and crickets.

Saskatoon serviceberry density increased from 560 plants/acre to 800 plants/acre between 1997 and 2002. Utilization on this species was light in 1983 and 1989, light to moderate in 1997, and moderate to heavy in 2002. Vigor was normal throughout the population during the first three readings, but with drought in 2002, 38% of the population displayed poor vigor. As with snowberry, a combination of leaf drop due to drought and browsing by crickets resulted in plants being categorized as having reduced vigor. Annual leader growth on serviceberry averaged about two inches in 2002.

Mountain big sagebrush density has fluctuated between years. The initial density estimate was 1,066 plants/acre in 1983. Density was estimated at 1,540 plants/acre in 1997, declining to 560 plants/acre in 2002. The decline in population in 2002 was the result of an increased number of dead, as well as the loss of the young age class due to drought. Utilization on mountain big sagebrush has been minimal in all years, except 1983, when 69% of the population showed moderate browsing. In 1989, it was noted that seed production was excellent although this was not the case in 2002. Decadence peaked at 50% in 1989, declining to 8% in 1997 and 21% in 2002. The proportion of the population classified in poor vigor has ranged between 11-17% in all readings. Annual sagebrush leader growth averaged 1.8 inches in 2002.

The site supports many other less preferred browse including Martin ceanothus, stickyleaf low rabbitbrush, whorled buckwheat, Oregon grape, mountain lover, and Wood's rose. Some of these species have seen drastic oscillations in density over the years due mostly to the greatly increased sample used in 1997 and 2002. It was noted in 2002, that as a whole, many of the browse species had been defoliated by a combination of drought and crickets.

The herbaceous understory has been diverse and abundant throughout the years. Perennial grass sum of nested frequency increased between 1983 and 1989, but decreased in 1997 and 2002. Oniongrass, spike fescue, mutton bluegrass, and mountain brome are the most abundant species. Cheatgrass was encountered in only one quadrat in 1997. It was not sampled in 2002. In 2002, grasses and forbs were dried out and crickets had already heavily utilized many plants making identification difficult.

Perennial forbs show the same trend as grasses. Sum of nested frequency increased between 1983 and 1989, but declined in both readings since. The decline in 2002 is not surprising due to the drought. This decline occurred on most other sites in the unit. The most abundant species prior to 2002 were wild onion, tapertip hawksbeard, silky lupine, longleaf phlox, and mulesear wyethia. As this is summer range, forbs are especially important to deer so maintenance of forb density and composition quality is important on this site. Hopefully the forb component will improve with better precipitation.

1983 APPARENT TREND ASSESSMENT

The soil trend appears to be stable. Soil condition is good and shows no immediate signs of deterioration. The browse composition is favorable, although there may be a trend towards a thickening of some shrub populations, especially mountain snowberry. The browse trend appears stable. The herbaceous understory is diverse and productive and will likely remain so, unless subjected to substantially heavier grazing rates. The herbaceous understory trend appears stable.

1989 TREND ASSESSMENT

The soil trend is slightly upward with an increase in percent vegetation cover and a decrease in percent bare ground cover. The browse trend is stable, although there are some changes in population densities. Percent decadency has increased to 50% in the mountain big sagebrush population, while density has declined to 800 plants/acre. However, densities of serviceberry and snowberry have increased. The herbaceous understory trend is upward with a large increase in herbaceous sum of nested frequency. There is a large diversity of forbs. There was no changes in composition or appearance of undesirable increasers.

TREND ASSESSMENT

soil - slightly up (4)

browse - stable (3)

herbaceous understory - up (5)

1997 TREND ASSESSMENT

The soil trend is slightly upward with a decrease in percent bare ground cover to 3% and there is little evidence of erosion at this time. The browse trend is stable overall. The sagebrush appears to be on the decline, but it only provides 6% of the browse cover at this time. Most populations do not appear to be expanding and they exhibit good vigor. Several additional species were encountered with the increased sample size. The herbaceous understory trend is slightly down for perennial grasses and downward with a large decrease in perennial forb sum of nested frequency. Overall trend for the herbaceous understory is considered down due to the importance of the forb component on deer summer range.

TREND ASSESSMENT

soil - slightly up (4)

browse - stable overall, but declining for sagebrush which is a minor browse component (3)

herbaceous understory - down (1)

2002 TREND ASSESSMENT

Trend for soil is down. Drought conditions have caused dramatic changes in surface soil conditions including decreases in both vegetation and litter cover, and a large increase in bare ground. Erosion was apparent in 2002 even with low precipitation. Trend for browse is stable, but most browse populations are in poor condition. The serviceberry and snowberry populations increased, while mountain big sagebrush showed further declines. Young sagebrush were abundant in 1997 (880 plants/acre), but none were sampled in 2002 with the drought. Serviceberry and snowberry show increased poor vigor, while mountain big sagebrush remained stable in that category. Decadence increased for both mountain big sagebrush and snowberry, but this is expected during drought and the current levels are well within acceptable levels. All three species show decreased reproduction, but this is also expected with drought and should improve with better precipitation. Trend for the herbaceous understory is down. Sum of nested frequency for grasses and forbs declined. The decline in forbs is critical on this important deer summer range.

TREND ASSESSMENT

soil - down (1)

browse - stable, but in poor condition (3)

herbaceous understory - down (1)

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 4

| T y p e | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|------------------------|------------------|------|-------|------|-------------------|-----|-----|-----|-----------------|-------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | Agropyron spicatum | a1 | b29 | ab16 | ab13 | 1 | 15 | 6 | 7 | .49 | .40 |
| G | Agropyron trachycaulum | a8 | b61 | a6 | a- | 4 | 27 | 2 | - | .06 | - |
| G | Bromus carinatus | a44 | b81 | b103 | ab61 | 20 | 42 | 39 | 26 | 3.81 | 1.21 |
| G | Bromus tectorum (a) | - | - | 2 | - | - | - | 1 | - | .00 | - |
| G | Carex spp. | - | - | - | 4 | - | - | - | 1 | - | .38 |
| G | Festuca ovina | - | - | 3 | - | - | - | 1 | - | .03 | - |
| G | Leucopoa kingii | a41 | a61 | b114 | b107 | 18 | 25 | 39 | 44 | 5.06 | 4.92 |
| G | Melica bulbosa | 243 | 224 | 179 | 197 | 86 | 85 | 62 | 71 | 6.02 | 5.75 |
| G | Poa fendleriana | a16 | ab28 | bc46 | c75 | 6 | 12 | 22 | 30 | 1.27 | 1.32 |
| G | Poa pratensis | a6 | b26 | ab20 | a2 | 3 | 12 | 8 | 1 | .26 | .03 |
| G | Poa secunda | a2 | b26 | ab13 | a- | 1 | 11 | 5 | - | .24 | - |
| G | Stipa columbiana | 1 | 11 | 1 | - | 1 | 4 | 1 | - | .00 | - |
| G | Stipa lettermani | 4 | 6 | 1 | - | 3 | 2 | 1 | - | .00 | - |
| Total for Annual Grasses | | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0.00 | 0 |
| Total for Perennial Grasses | | 366 | 553 | 502 | 459 | 143 | 235 | 186 | 180 | 17.27 | 14.03 |
| Total for Grasses | | 366 | 553 | 504 | 459 | 143 | 235 | 187 | 180 | 17.28 | 14.03 |
| F | Agoseris glauca | b15 | a2 | a- | a- | 7 | 1 | - | - | - | - |
| F | Alyssum alyssoides (a) | - | - | b19 | a- | - | - | 10 | - | .07 | - |
| F | Allium spp. | b87 | c124 | bc118 | a- | 40 | 62 | 54 | - | .52 | - |
| F | Arabis spp. | - | - | 2 | - | - | - | 2 | - | .01 | - |
| F | Aster chilensis | b20 | c84 | ab7 | a- | 10 | 31 | 2 | - | .03 | - |
| F | Astragalus ciliaris | b10 | b5 | ab1 | a- | 5 | 5 | 1 | - | .00 | - |

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|---------------------------|--------------------------|------------------|------------------|------------------|-----------------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| F | Balsamorhiza hookeri | 3 | - | - | - | 2 | - | - | - | - | - |
| F | Balsamorhiza sagittata | - | - | - | 1 | - | - | - | 1 | - | .18 |
| F | Calochortus nuttallii | - | 3 | 7 | - | - | 1 | 4 | - | .02 | - |
| F | Chaenactis douglasii | - | - | 1 | - | - | - | 1 | - | .00 | - |
| F | Cirsium spp. | a ⁻ | b ¹² | ab ¹ | a ⁻ | - | 5 | 1 | - | .23 | - |
| F | Collomia linearis (a) | - | - | b ³⁸ | a ⁻ | - | - | 14 | - | .09 | - |
| F | Collinsia parviflora (a) | - | - | b ³¹ | a ⁻ | - | - | 12 | - | .08 | - |
| F | Crepis acuminata | b ⁶⁵ | c ¹⁴³ | b ⁴⁶ | a ⁻ | 35 | 61 | 26 | - | .56 | - |
| F | Cruciferae | a ⁻ | b ³⁰ | a ⁻ | a ⁻ | - | 14 | - | - | - | - |
| F | Delphinium nuttallianum | - | - | 4 | 3 | - | - | 2 | 1 | .01 | .03 |
| F | Erigeron eatonii | b ²² | b ¹⁶ | a ⁻ | a ⁻ | 13 | 7 | - | - | - | - |
| F | Eriogonum racemosum | ab ¹⁴ | b ¹⁷ | ab ²⁰ | a ³ | 7 | 11 | 8 | 3 | .55 | .06 |
| F | Eriogonum umbellatum | c ⁵³ | b ³² | a ³ | a ² | 25 | 14 | 1 | 1 | .00 | .00 |
| F | Fritillaria pudica | 5 | 7 | - | - | 3 | 4 | - | - | - | - |
| F | Hackelia patens | 5 | - | 2 | - | 5 | - | 1 | - | .00 | - |
| F | Helianthella uniflora | 9 | 9 | - | 2 | 4 | 4 | - | 1 | - | .15 |
| F | Hydrophyllum capitatum | b ³⁵ | a ³ | a ⁻ | a ⁻ | 17 | 2 | - | - | - | - |
| F | Lomatium spp. | b ¹⁵ | b ³⁰ | b ²⁷ | a ⁻ | 9 | 16 | 11 | - | .18 | - |
| F | Lupinus sericeus | c ¹⁵⁵ | c ¹⁶⁰ | b ⁶⁸ | a ⁻ | 71 | 66 | 36 | - | 1.45 | - |
| F | Machaeranthera canescens | 1 | 8 | 3 | - | 1 | 3 | 1 | - | .00 | - |
| F | Microsteris gracilis (a) | - | - | b ¹⁰ | a ⁻ | - | - | 5 | - | .05 | - |
| F | Penstemon caespitosus | - | 2 | 3 | - | - | 1 | 1 | - | .00 | - |
| F | Petrorhiza pumila | - | - | - | - | - | - | - | - | - | .00 |
| F | Phlox longifolia | b ⁴⁷ | c ⁸⁷ | b ³⁷ | a ⁻ | 23 | 37 | 16 | - | .22 | - |
| F | Polygonum douglasii (a) | - | - | b ⁸⁵ | a ² | - | - | 33 | 1 | .41 | .00 |
| F | Senecio integerrimus | a ⁻ | b ²⁶ | a ⁻ | a ³ | - | 15 | - | 1 | - | .03 |
| F | Taraxacum officinale | a ⁻ | b ¹⁹ | a ³ | a ⁻ | - | 10 | 1 | - | .03 | - |
| F | Veronica biloba (a) | - | - | 1 | - | - | - | 1 | - | .00 | - |
| F | Viola spp. | 2 | 3 | - | 1 | 2 | 2 | - | 1 | - | .00 |
| F | Wyethia amplexicaulis | b ⁴⁹ | c ⁷⁴ | ab ³⁵ | a ²⁷ | 23 | 36 | 14 | 12 | 2.80 | 1.05 |
| F | Zigadenus paniculatus | 7 | 1 | 2 | - | 4 | 1 | 1 | - | .03 | - |
| Total for Annual Forbs | | 0 | 0 | 184 | 2 | 0 | 0 | 75 | 1 | 0.72 | 0.00 |
| Total for Perennial Forbs | | 619 | 897 | 390 | 42 | 306 | 409 | 184 | 21 | 6.71 | 1.52 |
| Total for Forbs | | 619 | 897 | 574 | 44 | 306 | 409 | 259 | 22 | 7.43 | 1.52 |

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

BROWSE TRENDS --
Herd unit 19B, Study no: 4

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|-------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | Amelanchier alnifolia | 21 | 27 | 3.65 | 4.08 |
| B | Artemisia tridentata vaseyana | 30 | 22 | 1.87 | 3.67 |
| B | Cercocarpus ledifolius | 0 | 1 | .45 | - |
| B | Ceanothus martinii | 9 | 0 | .60 | - |
| B | Cercocarpus montanus | 0 | 1 | - | - |
| B | Chrysothamnus nauseosus albicaulis | 3 | 0 | - | - |
| B | Chrysothamnus viscidiflorus viscidiflorus | 20 | 11 | 1.19 | .13 |
| B | Eriogonum heracleoides | 22 | 33 | 1.49 | 1.08 |
| B | Mahonia repens | 16 | 13 | .78 | .45 |
| B | Pachistima myrsinites | 0 | 9 | - | .64 |
| B | Rosa woodsii | 10 | 7 | .06 | .09 |
| B | Symphoricarpos oreophilus | 55 | 71 | 22.89 | 19.06 |
| Total for Browse | | 186 | 195 | 32.99 | 29.23 |

CANOPY COVER -- LINE INTERCEPT
Herd unit 19B, Study no: 4

| Species | Percent Cover | |
|-------------------------------------------|---------------|-------|
| | '97 | '02 |
| Amelanchier alnifolia | - | 6.25 |
| Artemisia tridentata vaseyana | - | 3.50 |
| Cercocarpus ledifolius | 1 | 6.33 |
| Chrysothamnus viscidiflorus viscidiflorus | - | .17 |
| Eriogonum heracleoides | - | 2.58 |
| Mahonia repens | - | .42 |
| Pachistima myrsinites | - | .75 |
| Rosa woodsii | - | .33 |
| Symphoricarpos oreophilus | - | 25.58 |

Key Browse Annual Leader Growth
Herd unit 19B , Study no: 4

| Species | Average leader growth (in) '02 |
|-------------------------------|-----------------------------------|
| Artemisia tridentata vaseyana | 1.8 |
| Amelanchier utahensis | 1.9 |
| Cercocarpus ledifolius | 2.5 |

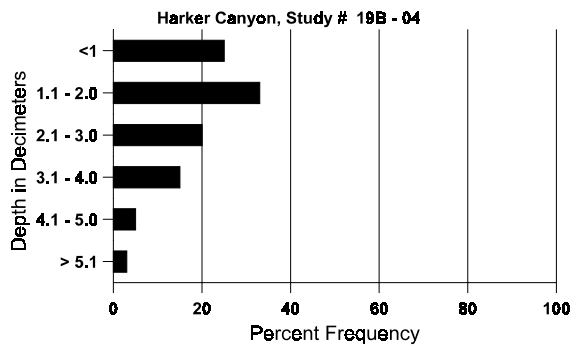
BASIC COVER --
Herd unit 19B, Study no: 4

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 358 | 318 | 1.75 | 18.50 | 61.45 | 41.98 |
| Rock | 151 | 229 | 3.50 | 5.50 | 4.61 | 9.05 |
| Pavement | 160 | 287 | 3.00 | 4.50 | 2.66 | 9.95 |
| Litter | 393 | 365 | 72.25 | 61.50 | 65.00 | 36.07 |
| Cryptogams | 5 | 3 | .25 | 0 | .01 | .38 |
| Bare Ground | 104 | 267 | 19.25 | 10.00 | 2.91 | 23.61 |

SOIL ANALYSIS DATA --
Herd Unit 19B, Study no: 4, Harker Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 13.1 | 54.0 (14.3) | 6.0 | 46.3 | 31.1 | 22.6 | 5.4 | 21.2 | 342.4 | 0.6 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 19B, Study no: 4

| Type | Quadrat Frequency | | Pellet Transect | |
|--------|-------------------|-----|------------------------------|------------------------------|
| | '97 | '02 | Pellet Groups per Acre 02 | Days Use per Acre (ha) 02 |
| Elk | 2 | - | 17 | 1 (3) |
| Deer | 6 | 11 | 522 | 40 (99) |
| Cattle | - | 5 | 122 | 10 (25) |

BROWSE CHARACTERISTICS --
Herd unit 19B, Study no: 4

| A G R E | Y R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|-------------|----------------------------|---|---|------------------|---|----|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Amelanchier alnifolia</i> | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | 2 | - | - | - | - | - | - | - | - | - | - | - | 133 | | | 2 | |
| | 97 | 3 | - | - | - | - | - | - | - | - | - | - | - | 60 | | | 3 | |
| | 02 | 2 | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 | |
| M | 83 | 5 | - | - | - | - | - | - | - | - | - | - | - | 333 | 39 | 35 | 5 | |
| | 89 | 12 | - | - | - | - | - | - | - | - | - | - | - | 800 | 55 | 31 | 12 | |
| | 97 | 14 | 7 | 1 | 2 | - | - | - | - | - | - | - | - | 480 | 55 | 51 | 24 | |
| | 02 | 8 | 8 | 8 | - | 2 | 10 | 1 | 1 | - | - | - | - | 760 | 47 | 43 | 38 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | 5 | - | - | - | - | - | - | - | - | - | - | - | 333 | | | 5 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +74% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -56% | | | | | | | |
| '97 | | 25% | | | 04% | | | 00% | | | +30% | | | | | | | |
| '02 | | 25% | | | 45% | | | 38% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 333 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 1266 | | 26% | | | |
| | | | | | | | | | | | | '97 | 560 | | 4% | | | |
| | | | | | | | | | | | | '02 | 800 | | 0% | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | | | | | | | |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | - | - | - | 66 | | | 1 | |
| | 89 | 2 | - | - | - | - | - | - | - | - | - | - | - | 133 | | | 2 | |
| | 97 | 43 | - | - | - | - | - | 1 | - | - | - | - | - | 880 | | | 44 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| M | 83 | 3 | 9 | - | - | - | - | - | - | - | - | - | - | 800 | 26 | 30 | 12 | |
| | 89 | 4 | - | - | - | - | - | - | - | - | - | - | - | 266 | 24 | 39 | 4 | |
| | 97 | 23 | 2 | 1 | 1 | - | - | - | - | - | - | - | - | 540 | 26 | 33 | 27 | |
| | 02 | 22 | - | - | - | - | - | - | - | - | - | - | - | 440 | 22 | 35 | 22 | |
| D | 83 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | 200 | | | 3 | |
| | 89 | 6 | - | - | - | - | - | - | - | - | - | - | - | 400 | | | 6 | |
| | 97 | 6 | - | - | - | - | - | - | - | - | - | - | 2 | 120 | | | 6 | |
| | 02 | 6 | - | - | - | - | - | - | - | - | - | - | 3 | 120 | | | 6 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 240 | | | 12 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 300 | | | 15 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 69% | | | 00% | | | 13% | | | -25% | | | | | | | |
| '89 | | 00% | | | 00% | | | 17% | | | +48% | | | | | | | |
| '97 | | 03% | | | 01% | | | 13% | | | -64% | | | | | | | |
| '02 | | 00% | | | 00% | | | 11% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 1066 | Dec: | 19% | | | |
| | | | | | | | | | | | | '89 | 799 | | 50% | | | |
| | | | | | | | | | | | | '97 | 1540 | | 8% | | | |
| | | | | | | | | | | | | '02 | 560 | | 21% | | | |

| A Y G R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|----------------------------|---------------------|---|---|------------------|---|---|-------------------|---|-------------|----------------|-----|-----|--------------------|--------------------------------|-----|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Cercocarpus ledifolius | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 157 | 177 | 0 |
| | 02 | - | - | - | - | - | - | - | 1 | - | 1 | - | - | 20 | 161 | 236 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | |
| | | | | | | | | | | | | '89 | 0 | | - | | |
| | | | | | | | | | | | | '97 | 0 | | - | | |
| | | | | | | | | | | | | '02 | 20 | | - | | |
| Ceanothus martinii | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 12 | - | - | 1 | - | - | - | - | - | 13 | - | - | 260 | | | 13 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 14 | 1 | - | 1 | - | - | - | - | - | 16 | - | - | 320 | 8 | 18 | 16 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '97 | | 03% | | | 00% | | | 00% | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | |
| | | | | | | | | | | | | '89 | 0 | | - | | |
| | | | | | | | | | | | | '97 | 580 | | - | | |
| | | | | | | | | | | | | '02 | 0 | | - | | |
| Cercocarpus montanus | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | 20 | 51 | 70 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 100% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | |
| | | | | | | | | | | | | '89 | 0 | | - | | |
| | | | | | | | | | | | | '97 | 0 | | - | | |
| | | | | | | | | | | | | '02 | 20 | | - | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | |
| Chrysothamnus nauseosus albicaulis | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 1 | 1 | 2 | - | - | - | - | - | - | 3 | - | 1 | - | 80 | | 4 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| | '83 | 00% | | | 00% | | | 00% | | | | | | | | | |
| | '89 | 00% | | | 00% | | | 00% | | | | | | | | | |
| | '97 | 25% | | | 50% | | | 25% | | | | | | | | | |
| | '02 | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | |
| | | | | | | | | | | | | '89 | 0 | | - | | |
| | | | | | | | | | | | | '97 | 80 | | - | | |
| | | | | | | | | | | | | '02 | 0 | | - | | |
| Chrysothamnus viscidiflorus viscidiflorus | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 133 | | 2 |
| | 97 | 6 | - | - | 2 | - | - | - | - | - | 8 | - | - | - | 160 | | 8 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| M | 83 | 10 | - | - | - | - | - | - | - | - | 10 | - | - | - | 666 | 12 10 | 10 |
| | 89 | 8 | - | - | - | - | - | - | - | - | 8 | - | - | - | 533 | 16 14 | 8 |
| | 97 | 29 | - | - | 1 | - | - | - | - | - | 30 | - | - | - | 600 | 16 17 | 30 |
| | 02 | 5 | - | - | 1 | - | - | - | - | - | 5 | - | 1 | - | 120 | 10 12 | 6 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 02 | 5 | - | - | 2 | - | - | - | - | - | 3 | - | - | 4 | 140 | | 7 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| | '83 | 00% | | | 00% | | | 00% | | | + 0% | | | | | | |
| | '89 | 00% | | | 00% | | | 00% | | | +12% | | | | | | |
| | '97 | 00% | | | 00% | | | 00% | | | -66% | | | | | | |
| | '02 | 00% | | | 00% | | | 38% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 666 | Dec: | 0% | | |
| | | | | | | | | | | | | '89 | 666 | | 0% | | |
| | | | | | | | | | | | | '97 | 760 | | 0% | | |
| | | | | | | | | | | | | '02 | 260 | | 54% | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Cowania mexicana stansburiana</i> | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 11 | 70 | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |
| <i>Eriogonum heracleoides</i> | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 46 | - | - | - | - | - | - | - | - | 46 | - | - | - | 920 | 15 | 14 | 46 |
| | 02 | 52 | 14 | 2 | 1 | - | - | - | - | - | 63 | 1 | 5 | - | 1380 | 7 | 14 | 69 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | 5 | 2 | 2 | - | - | - | - | - | - | 6 | - | - | 3 | 180 | | | 9 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +41% | | | | | | | |
| '02 | | 21% | | | 05% | | | 10% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 0 | | 0% | | | |
| | | | | | | | | | | | | '97 | 920 | | 0% | | | |
| | | | | | | | | | | | | '02 | 1560 | | 12% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|-------|------|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Mahonia repens | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | 15 | - | - | - | - | - | - | - | - | - | - | - | 300 | | | 15 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| M | 83 | 10 | - | - | - | - | - | - | - | - | - | - | - | 666 | 8 | 7 | 10 | |
| | 89 | 7 | - | - | - | - | - | - | - | - | - | - | - | 466 | 3 | 3 | 7 | |
| | 97 | 72 | - | - | - | - | - | 22 | - | - | - | - | - | 1880 | 4 | 6 | 94 | |
| | 02 | 38 | - | - | - | - | - | 14 | - | - | - | - | - | 1040 | 3 | 4 | 52 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | 66 | | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | -20% | | | | | | | |
| '89 | | 00% | | | 00% | | | 13% | | | +76% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | -52% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 666 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 532 | | 12% | | | |
| | | | | | | | | | | | | '97 | 2180 | | 0% | | | |
| | | | | | | | | | | | | '02 | 1040 | | 0% | | | |
| Pachistima myrsinites | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | 16 | - | - | - | - | - | - | - | - | - | - | - | 1066 | | | 16 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | 95 | 2 | - | - | - | - | - | - | - | - | - | - | 6466 | | | 97 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | 6 | 3 | - | - | - | - | - | - | - | - | - | - | 180 | | | 9 | |
| M | 83 | 6 | - | - | - | - | - | - | - | - | - | - | - | 400 | 16 | 49 | 6 | |
| | 89 | 47 | 25 | 8 | 15 | 4 | - | 6 | - | - | - | - | - | 7000 | 10 | 9 | 105 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 02 | 33 | - | - | - | - | - | 2 | - | - | - | - | - | 700 | 3 | 6 | 35 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | 7 | 3 | 5 | 3 | 1 | - | - | - | - | - | - | - | 1266 | | | 19 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +97% | | | | | | | |
| '89 | | 16% | | | 06% | | | 01% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 07% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 400 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 14732 | | 9% | | | |
| | | | | | | | | | | | | '97 | 0 | | 0% | | | |
| | | | | | | | | | | | | '02 | 880 | | 0% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Purshia tridentata | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 35 | 61 | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |
| Rosa woodsii | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 16 | - | - | 8 | - | - | - | - | - | 24 | - | - | - | 480 | | | 24 |
| | 02 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | | | 5 |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 20 | - | - | - | - | - | - | - | - | 20 | - | - | - | 400 | 9 | 8 | 20 |
| | 02 | 16 | - | - | - | - | - | - | - | - | 16 | - | - | - | 320 | 9 | 8 | 16 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | -52% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 880 | | - | | | |
| | | | | | | | | | | | | '02 | 420 | | - | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Symphoricarpos oreophilus | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 200 | | 3 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 8 | - | - | - | - | - | - | - | - | 8 | - | - | - | 533 | | 8 | |
| | 97 | 8 | - | - | 2 | - | - | - | - | - | 10 | - | - | - | 200 | | 10 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 83 | 15 | - | - | - | - | - | - | - | - | 15 | - | - | - | 1000 | 32 | 31 | 15 |
| | 89 | 13 | - | - | - | - | - | - | - | - | 12 | - | 1 | - | 866 | 27 | 35 | 13 |
| | 97 | 94 | - | - | 24 | - | - | - | - | - | 118 | - | - | - | 2360 | 33 | 64 | 118 |
| | 02 | 109 | - | - | 20 | - | - | 7 | - | - | 102 | - | 32 | 2 | 2720 | 27 | 45 | 136 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 11 | - | - | - | - | - | - | - | - | 11 | - | - | - | 733 | | 11 | |
| | 97 | 3 | - | - | - | - | - | - | - | - | 1 | - | - | 2 | 60 | | 3 | |
| | 02 | 11 | 1 | - | 1 | - | - | - | - | - | 11 | - | 2 | - | 260 | | 13 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +53% | | | | | | | |
| '89 | | 00% | | | 00% | | | 03% | | | +19% | | | | | | | |
| '97 | | 00% | | | 00% | | | 02% | | | +13% | | | | | | | |
| '02 | | .66% | | | 00% | | | 24% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 1000 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 2132 | | 34% | | | |
| | | | | | | | | | | | | '97 | 2620 | | 2% | | | |
| | | | | | | | | | | | | '02 | 3000 | | 9% | | | |

Trend Study 19B-5-02

Study site name: West Government Creek.

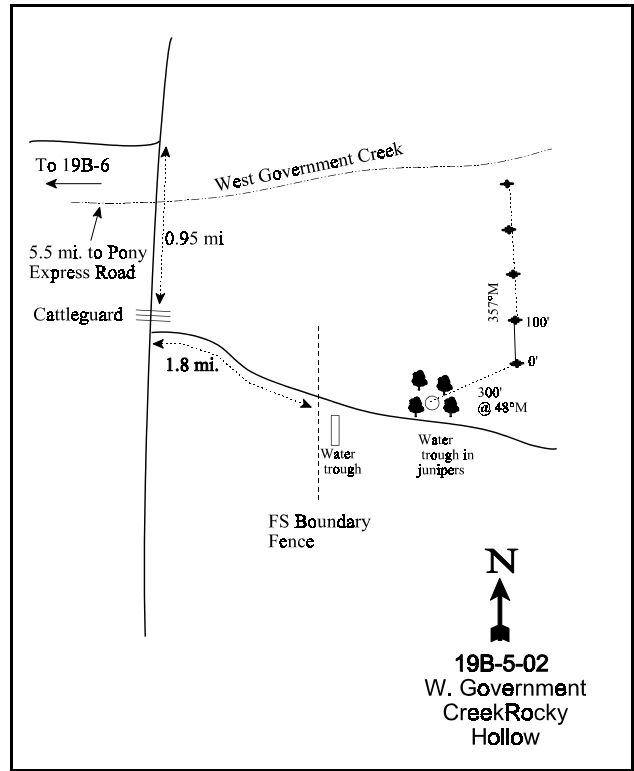
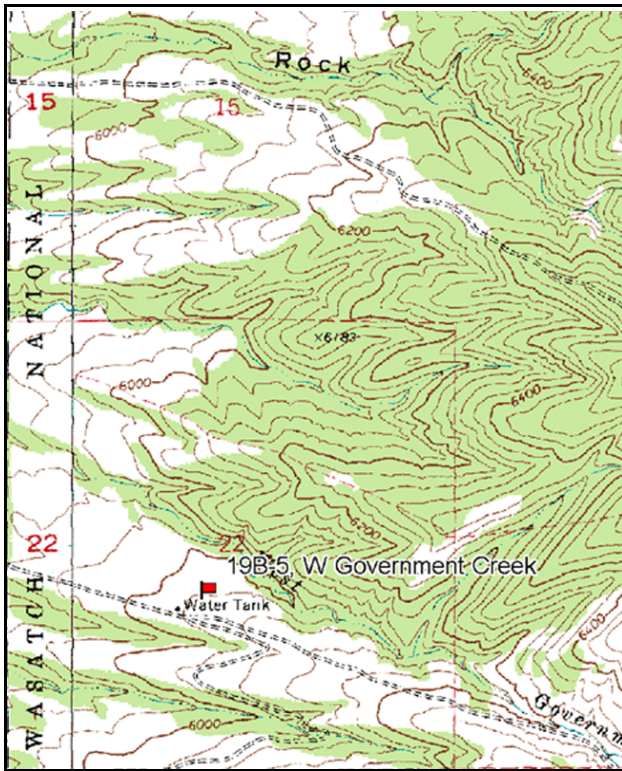
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 357 degrees magnetic.

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

LOCATION DESCRIPTION

Turn south off the Pony Express Road onto the Erickson Pass Road. Go 4.6 miles to the turnoff to study 19B-6. Continue 0.95 miles to a cattleguard. Turn left 60 yards past the cattleguard. Go 1.8 miles to a water trough. From the northeast side of the circular trough, the 0-foot baseline stake is 300 feet away at an azimuth of 48 degrees. This stake is marked by browse tag #3975.



Map Name: Lookout Pass

Diagrammatic Sketch

Township 9S, Range 7W, Section 22

GPS: NAD 27, UTM 12S 4430789 N 361786 E

DISCUSSION

West Government Creek - Trend Study No. 19B-5

The West Government Creek study samples deer winter range on Forest Service administered land. The site has a 7-10% slope and a west to northwest aspect. The range type is Wyoming big sagebrush-grass, but this area was formerly occupied by juniper-pinyon woodland. In the late 1960's, the trees were chained and windrowed. The area was then seeded using a rangeland drill. Remnant tree windrows and drill rows are still partially visible, but are being concealed by a thick canopy cover of Wyoming big sagebrush. In 1983, it was noted that heavy cattle use was depressing grass vigor. Past intense cattle grazing has in part help to contribute to the high Wyoming big sagebrush canopy cover. Scattered pinyon and juniper trees are present but it does not appear that they will become a problem reoccupying the site in the near future. Juniper density was estimated at only 30 trees/acre from point-center quarter data in 2002. Use of the site by big game is very light. A pellet group transect read on site in 2002 estimated 14 deer days use/acre (35 ddu/ha) and no elk pellet groups were sampled. Cattle use was estimated at 33 days use/acre (82 cdu/ha). Rabbit droppings were also moderately abundant.

Soil is alluvial with a gravelly texture. The soil profile, judging from nearby road and stream cuts, appears relatively unconsolidated. Textural and chemical analysis indicates a loam with a slightly alkaline reactivity (pH of 7.6). Effective rooting depth was estimated at 12 inches with an average soil temperature of 59°F at 14 inches in depth. Surface soil movement and pedestalling around plants has been apparent on the site. Percent bare ground was initially very high at 51% in 1983. Bare soil declined to more moderate levels in both 1989 and 1997, but with drought in 2002, again increased bare soil to 40%. The erosion condition class was determined as slight in 2002.

Wyoming big sagebrush is the key browse which dominates the site with an estimated density of 3,160 plants/acre in 2002. In 1983 and 1989, this shrub was identified as basin big sagebrush (*Artemisia tridentata tridentata*), but further scrutiny in 1997 revealed it as actually Wyoming big sagebrush (*Artemisia tridentata wyomingensis*). From 1983-1997, percent decadence was low, vigor generally normal, with very few dead in the population. Decadence increased to 24% in 2002, but with drought, this is not excessive for Wyoming big sagebrush. Mature plants have made up anywhere from two-thirds to three-fourths of the population in all readings. Recruitment by young plants was moderate to high during the first three readings, but declined considerably in 2002. Utilization has been light to moderate in all years. Canopy cover of Wyoming big sagebrush was estimated at 31% in 2002. It will be difficult for the herbaceous understory to remain healthy and productive with sagebrush canopy at this level. Annual sagebrush leader growth averaged just over one inch of growth in 2002. Antelope bitterbrush provides additional, but limited forage. Density was estimated at about 100 plants/acre in 1997 and 2002. These plants have a prostrate growth form due to heavy browsing over the years. Even with heavy use, bitterbrush plants show normal vigor and no decadent plants were sampled in 1997 or 2002.

The grass component is composed primarily of three species, crested wheatgrass, intermediate wheatgrass, and Sandberg bluegrass. Crested wheatgrass has been the most abundant grass providing nearly one-half of the grass cover in 1997 and 2002. Nested frequency of crested wheatgrass and Sandberg bluegrass were identical in 2002 after crested wheatgrass significantly declined. Intermediate wheatgrass remained stable in nested frequency in 2002, and is more common in the depressions throughout the area. Cheatgrass brome was sampled in 1997 and 2002, but was found in only a few quadrats. Sum of nested frequency for all perennial grasses combined has remained similar over all readings.

Forb diversity and abundance has been fair. The most abundant perennials include silky milkvetch, tapertip hawksbeard, alfalfa, American vetch, and longleaf phlox. Perennial forb sum of nested frequency increased between 1983 and 1989, and remained stable in 1997. With drought in 2002, most of the forbs on the site did not appear or remained dormant as sum of nested frequency declined by 92%. Only three forb species were sampled in low abundances in 2002, pale agoseris, rock goldenrod, and American vetch. Annual forbs were abundant in 1997, but none were sampled in 2002 with drought. The most common species were pale alyssum and bur buttercup. Forbs should rebound with better precipitation in the future.

1983 APPARENT TREND ASSESSMENT

Soil trend appears stable, but only due to the flat terrain. On nearby steeper slopes, considerable soil movement is apparent. Wyoming big sagebrush does not appear to be increasing and exhibits good vigor, resulting in an apparent stable browse trend. The herbaceous understory trend also looks stable with a moderately diverse understory.

1989 TREND ASSESSMENT

Although some soil loss appears to have occurred, the soil trend is slightly up with more protective ground cover from vegetation and litter with less bare soil. The browse trend is up. Young sagebrush make up 26% of the population, as density increased significantly. Decadence is low, while use is mostly light. Although the herbaceous understory is depleted, the sum of nested frequency for both perennial grasses and forbs increased. This leads to a slightly upward herbaceous understory trend.

TREND ASSESSMENT

soil - slightly up (4)

browse - up (5)

herbaceous understory - slightly up (4)

1997 TREND ASSESSMENT

The soil trend is slightly upward with a decrease in percent bare ground with a corresponding increase in litter and vegetative cover. Soil erosion is minimal at this time. The browse trend is stable with similar age structure in the Wyoming big sagebrush population. Density declined from an estimated 5,298 plants/acre to 2,300 plants/acre, but this is primarily due to the greatly increased sample size as there were no dead plants sampled. The larger sample used in 1997 better estimates shrub densities. Canopy cover may be slightly high at this time which could be negatively affecting the herbaceous understory production. The herbaceous understory trend is stable. Perennial herbaceous understory sum of nested frequency has slightly increased since 1989 and provides adequate protection against erosion.

TREND ASSESSMENT

soil - slightly up (4)

browse - stable (3)

herbaceous understory - stable (3)

2002 TREND ASSESSMENT

Trend for soil is down. Drought conditions in 2002 resulted in an increase in bare ground from 16% to 40%, and decreases in both litter and vegetation cover. Although the erosion index is rated as only slight, erosion is apparent at the present time. Trend for browse is stable. Sagebrush decadence increased, but considering the drought, the current level of 24% is not excessive. Use remains light to moderate. Vigor is generally good throughout the population. Trend for the herbaceous understory is down. Perennial grasses slightly declined in sum of nested frequency, while perennial forbs drastically declined. Drought, crickets, and a high canopy cover of Wyoming big sagebrush are combining to depress the understory on this site. This area would be a good candidate for some type of treatment to thin the canopy of sagebrush and promote an increase in the herbaceous understory.

TREND ASSESSMENT

soil - down (1)

browse - stable (3)

herbaceous understory - down (1)

HERBACEOUS TRENDS --
Herd unit 19B, Study no: 5

| T y p e | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|-----------------------------|------------------|-------|-------|------|-------------------|-----|-----|-----|-----------------|-------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | Agropyron cristatum | c279 | bc263 | b231 | a176 | 94 | 96 | 85 | 64 | 8.53 | 5.74 |
| G | Agropyron intermedium | bc154 | c192 | ab136 | a132 | 69 | 78 | 50 | 49 | 3.59 | 3.02 |
| G | Agropyron spicatum | - | - | 7 | 9 | - | - | 2 | 6 | .18 | .39 |
| G | Bromus tectorum (a) | - | - | 12 | 3 | - | - | 5 | 1 | .02 | .00 |
| G | Oryzopsis hymenoides | 1 | - | - | - | 1 | - | - | - | - | - |
| G | Poa secunda | a39 | a50 | b168 | b176 | 18 | 24 | 70 | 67 | 3.95 | 2.73 |
| G | Sitanion hystrix | 3 | - | - | 4 | 1 | - | - | 2 | - | .03 |
| Total for Annual Grasses | | 0 | 0 | 12 | 3 | 0 | 0 | 5 | 1 | 0.02 | 0.00 |
| Total for Perennial Grasses | | 476 | 505 | 542 | 497 | 183 | 198 | 207 | 188 | 16.26 | 11.93 |
| Total for Grasses | | 476 | 505 | 554 | 500 | 183 | 198 | 212 | 189 | 16.29 | 11.93 |
| F | Agoseris glauca | - | - | 2 | 3 | - | - | 1 | 1 | .00 | .00 |
| F | Alyssum alyssoides (a) | - | - | b249 | a- | - | - | 87 | - | .63 | - |
| F | Antennaria rosea | - | 8 | 3 | - | - | 5 | 1 | - | .00 | - |
| F | Arabis spp. | - | - | 6 | - | - | - | 3 | - | .01 | - |
| F | Astragalus cibarius | b25 | c74 | b25 | a- | 12 | 32 | 11 | - | 1.14 | - |
| F | Astragalus convallarius | 3 | 6 | 3 | - | 1 | 4 | 3 | - | .04 | - |
| F | Castilleja chromosa | - | 2 | 1 | - | - | 1 | 1 | - | .03 | - |
| F | Calochortus nuttallii | 1 | - | 1 | - | 1 | - | 1 | - | .00 | - |
| F | Chaenactis douglasii | b16 | ab9 | ab3 | a- | 6 | 3 | 1 | - | .00 | - |
| F | Cirsium neomexicanum | 1 | 6 | 2 | - | 1 | 3 | 2 | - | .03 | - |
| F | Comandra pallida | - | - | 3 | - | - | - | 1 | - | .03 | - |
| F | Collinsia parviflora (a) | - | - | b45 | a- | - | - | 21 | - | .11 | - |
| F | Crepis acuminata | b14 | b26 | b15 | a- | 6 | 13 | 7 | - | .16 | - |
| F | Cymopterus longipes | b11 | c31 | ab10 | a- | 6 | 18 | 4 | - | .04 | - |
| F | Eriogonum spp. | - | - | 1 | - | - | - | 1 | - | .03 | - |
| F | Erigeron pumilus | b16 | b16 | ab9 | a- | 10 | 11 | 4 | - | .02 | - |
| F | Galium boreale | - | - | 4 | - | - | - | 3 | - | .18 | - |
| F | Lathyrus brachycalyx | a- | a- | b34 | a- | - | - | 15 | - | .37 | - |
| F | Medicago sativa | b18 | c38 | b13 | a- | 12 | 17 | 7 | - | 1.72 | - |
| F | Microsteris gracilis (a) | - | - | b23 | a- | - | - | 8 | - | .04 | - |
| F | Petradoria pumila | bc30 | c37 | ab18 | a12 | 17 | 17 | 10 | 7 | .34 | .28 |
| F | Phlox longifolia | b55 | b69 | b68 | a- | 26 | 31 | 30 | - | .66 | - |
| F | Ranunculus testiculatus (a) | - | - | b200 | a- | - | - | 67 | - | 1.00 | - |
| F | Tragopogon dubius | - | 2 | - | - | - | 1 | - | - | - | - |
| F | Vicia americana | b4 | a- | c89 | b10 | 3 | - | 40 | 4 | .57 | .04 |

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|------|---------------------------|------------------|-----|-----|-----|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| | Total for Annual Forbs | 0 | 0 | 517 | 0 | 0 | 0 | 183 | 0 | 1.78 | 0 |
| | Total for Perennial Forbs | 194 | 324 | 310 | 25 | 101 | 156 | 146 | 12 | 5.43 | 0.33 |
| | Total for Forbs | 194 | 324 | 827 | 25 | 101 | 156 | 329 | 12 | 7.21 | 0.33 |

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

BROWSE TRENDS --

Herd unit 19B, Study no: 5

| Type | Species | Strip Frequency | | Average Cover % | |
|------|------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | <i>Artemisia tridentata wyomingensis</i> | 73 | 76 | 17.67 | 20.67 |
| B | <i>Atriplex canescens</i> | 0 | 0 | - | .38 |
| B | <i>Gutierrezia sarothrae</i> | 10 | 10 | .03 | .12 |
| B | <i>Juniperus osteosperma</i> | 1 | 3 | .85 | 1.37 |
| B | <i>Purshia tridentata</i> | 5 | 4 | .71 | .38 |
| | Total for Browse | 89 | 93 | 19.27 | 22.94 |

CANOPY COVER -- LINE INTERCEPT

Herd unit 19B, Study no: 5

| Species | Percent Cover | |
|------------------------------------------|---------------|-------|
| | '97 | '02 |
| <i>Artemisia tridentata wyomingensis</i> | - | 31.33 |
| <i>Gutierrezia sarothrae</i> | - | .07 |
| <i>Juniperus osteosperma</i> | - | 2.25 |
| <i>Purshia tridentata</i> | - | .05 |

Key Browse Annual Leader Growth

Herd unit 19B, Study no: 5

| Species | Average leader growth (in) |
|------------------------------------------|----------------------------|
| | '02 |
| <i>Artemisia tridentata wyomingensis</i> | 1.2 |

Point-Quarter Tree Data

Herd unit 19B, Study no: 5

| Species | Trees per Acre | | Average diameter (in) | |
|------------------------------|----------------|-----|-----------------------|-----|
| | '97 | '02 | '97 | '02 |
| <i>Juniperus osteosperma</i> | 24 | 30 | 4.6 | 4.1 |

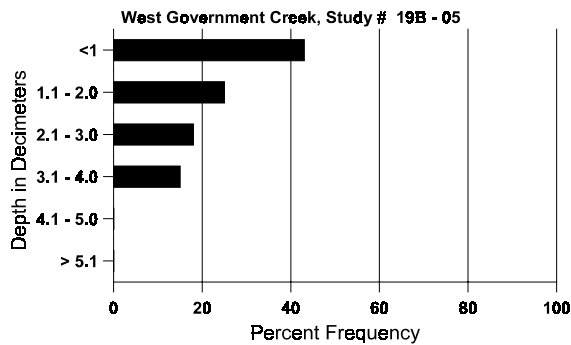
BASIC COVER --
Herd unit 19B, Study no: 5

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 361 | 317 | 5.25 | 10.00 | 42.08 | 35.67 |
| Rock | 134 | 129 | 2.75 | 2.75 | .76 | 1.08 |
| Pavement | 254 | 263 | 8.75 | 22.50 | 6.08 | 5.15 |
| Litter | 388 | 378 | 32.25 | 38.75 | 42.22 | 37.11 |
| Cryptogams | 190 | 39 | 0 | 0 | 4.57 | 1.06 |
| Bare Ground | 240 | 296 | 51.00 | 26.00 | 16.29 | 40.34 |

SOIL ANALYSIS DATA --
Herd Unit 19B, Study no: 5, West Government Creek

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 12.2 | 58.5 (14.0) | 7.6 | 40.4 | 35.1 | 24.6 | 3.4 | 23.8 | 336.0 | 0.2 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 19B, Study no: 5

| Type | Quadrat Frequency | | Pellet Transect | |
|--------|-------------------|-----|------------------------|------------------------|
| | '97 | '02 | Pellet Groups per Acre | Days Use per Acre (ha) |
| Rabbit | 21 | 12 | 0 | 0 |
| Deer | 3 | 3 | 183 | 14 (35) |
| Cattle | 10 | 10 | 400 | 33 (82) |

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 5

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Artemisia tridentata wyomingensis | | | | | | | | | | | | | | | | | | |
| S | '83 | 35 | - | - | - | - | - | - | - | - | 35 | - | - | - | 1166 | | 35 | |
| | '89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | '97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | '83 | 21 | 8 | - | - | - | - | - | - | - | 29 | - | - | - | 966 | | 29 | |
| | '89 | 36 | 5 | - | - | - | - | - | - | - | 35 | - | 6 | - | 1366 | | 41 | |
| | '97 | 12 | 6 | - | - | - | - | - | - | - | 17 | 1 | - | - | 360 | | 18 | |
| | '02 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | | 5 | |
| M | '83 | 21 | 42 | - | - | - | - | - | - | - | 63 | - | - | - | 2100 | 25 36 | 63 | |
| | '89 | 82 | 22 | - | - | - | - | - | - | - | 101 | 2 | 1 | - | 3466 | 21 24 | 104 | |
| | '97 | 48 | 37 | - | - | 2 | - | - | - | - | 78 | 4 | 5 | - | 1740 | 31 51 | 87 | |
| | '02 | 81 | 30 | 1 | 3 | - | - | - | - | - | 115 | - | - | - | 2300 | 30 47 | 115 | |
| D | '83 | - | 1 | - | - | - | - | - | - | - | - | - | 1 | - | 33 | | 1 | |
| | '89 | 14 | - | - | - | - | - | - | - | - | 9 | 1 | 2 | 2 | 466 | | 14 | |
| | '97 | 8 | 1 | - | 1 | - | - | - | - | - | 6 | 2 | - | 2 | 200 | | 10 | |
| | '02 | 18 | 17 | 3 | - | - | - | - | - | - | 28 | 1 | - | 9 | 760 | | 38 | |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 55% | | | 00% | | | 01% | | | +42% | | | | | | | |
| '89 | | 17% | | | 00% | | | 07% | | | -57% | | | | | | | |
| '97 | | 40% | | | 00% | | | 06% | | | +27% | | | | | | | |
| '02 | | 30% | | | 03% | | | 06% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 3099 | Dec: | 1% | | | |
| | | | | | | | | | | | | '89 | 5298 | | 9% | | | |
| | | | | | | | | | | | | '97 | 2300 | | 9% | | | |
| | | | | | | | | | | | | '02 | 3160 | | 24% | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|---|--------------------|--------------------------------|----------------|-----|----|----|
| | | 1 | 2 | 3 | 4 | | | | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 1 | - | - | - | - | - | - | 20 | | 1 |
| | 02 | - | - | - | - | - | - | - | 0 | | 0 |
| Y | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 3 | - | - | - | - | - | - | 60 | | 3 |
| | 02 | 1 | - | - | - | - | - | - | 20 | | 1 |
| M | 83 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 89 | 1 | - | - | - | - | - | - | 33 | 7 | 4 |
| | 97 | 9 | - | - | - | - | - | - | 180 | 12 | 11 |
| | 02 | 20 | - | - | - | - | - | - | 400 | 7 | 9 |
| D | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | - | - | - | - | - | - | - | 0 | | 0 |
| | 02 | 1 | - | - | - | - | - | - | 20 | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 00% | | 00% | | 00% | | | | | |
| '89 | | 00% | | 00% | | 00% | | +86% | | | |
| '97 | | 00% | | 00% | | 00% | | +45% | | | |
| '02 | | 00% | | 00% | | 00% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 0 | Dec: | 0% | | |
| | | | | | | '89 | 33 | | 0% | | |
| | | | | | | '97 | 240 | | 0% | | |
| | | | | | | '02 | 440 | | 5% | | |
| <i>Juniperus osteosperma</i> | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 1 | - | - | - | - | - | - | 20 | | 1 |
| | 02 | 1 | - | - | - | - | - | - | 20 | | 1 |
| M | 83 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 97 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 02 | 1 | - | - | - | - | 1 | - | 40 | - | 2 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 00% | | 00% | | 00% | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | |
| '97 | | 00% | | 00% | | 00% | | +67% | | | |
| '02 | | 00% | | 00% | | 00% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 0 | Dec: | - | | |
| | | | | | | '89 | 0 | | - | | |
| | | | | | | '97 | 20 | | - | | |
| | | | | | | '02 | 60 | | - | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|---|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Purshia tridentata | | | | | | | | | | | | | | | | | | |
| Y | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | '83 | - | - | 2 | - | - | - | - | - | - | 2 | - | - | - | 66 | 9 28 | 2 | |
| | '89 | - | - | 1 | - | 1 | - | - | - | - | 2 | - | - | - | 66 | 12 22 | 2 | |
| | '97 | - | - | 2 | 1 | 1 | - | - | - | - | 4 | - | - | - | 80 | 15 38 | 4 | |
| | '02 | - | - | 5 | - | - | - | - | - | - | 5 | - | - | - | 100 | 17 51 | 5 | |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | 1 | - | - | 1 | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 100% | | | 00% | | | +50% | | | | | | | |
| '89 | | 25% | | | 75% | | | 00% | | | -24% | | | | | | | |
| '97 | | 20% | | | 40% | | | 00% | | | +17% | | | | | | | |
| '02 | | 00% | | | 83% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 66 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 132 | | 50% | | | |
| | | | | | | | | | | | | '97 | 100 | | 0% | | | |
| | | | | | | | | | | | | '02 | 120 | | 0% | | | |

Trend Study 19B-6-02

Study site name: Lee's Creek.

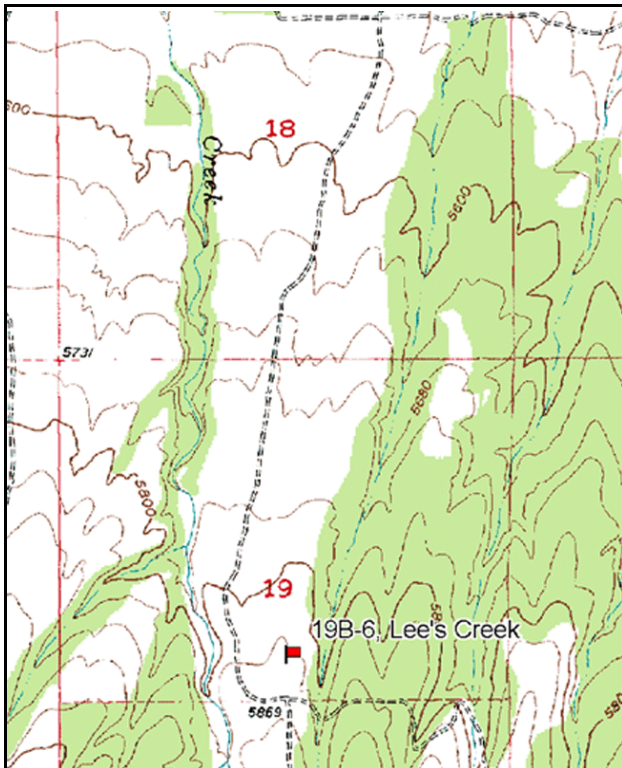
Vegetation type: Chained, Seeded PJ.

Compass bearing: frequency baseline 345 degrees magnetic.

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

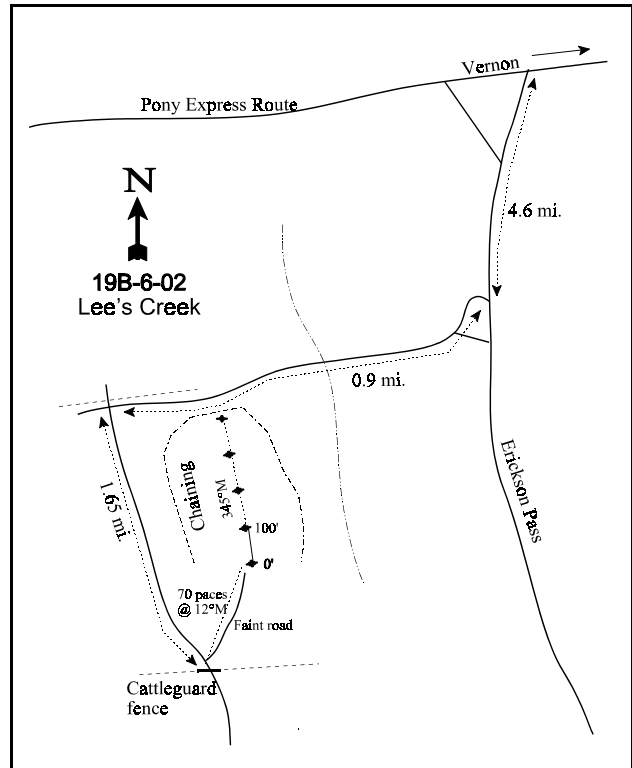
LOCATION DESCRIPTION

Starting at the intersection of the Erickson Pass and Pony Express Roads, proceed south on the Erickson Pass Road for 4.60 miles to an intersection. Turn right at the intersection and proceed west for 0.9 miles to another intersection. Turn left at the intersection and proceed south for 1.65 miles to a cattle guard and gate. From the cattle guard, the 0-foot stake of the baseline, is 70 paces away at an azimuth of 12 degrees magnetic. The study runs at an azimuth of 345 degrees true. The study is located just inside the chaining that is adjacent to the burn. A red browse tag, number 3973, is attached to the 0-foot marker of the baseline.



Map Name: Indian Peaks

Township 9S, Range 7W, Section 19



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4430784 N 357071 E

DISCUSSION

Lee's Creek - Trend Study No. 19B-6

The Lee's Creek study is located in the lower portion of the Lee's Creek drainage on an old BLM juniper chaining. The study is situated on a north-south running ridge that slopes gently to the north at an elevation of 5,850 feet. It was noted in 1983 that the seeded grasses were heavily utilized by cattle causing vigor to be depressed. In 1989, observations indicated that crested wheatgrass had not grown yet from the previous grazing season due to the exceptionally hot and dry spring and summer. Vigor was depressed with very little associated litter. Observations through the years have always noted that the area has shown very little wildlife use. The area does not appear to be utilized heavily by deer, but signs of cattle and rabbit are moderate. In 1997, cattle were grazing a burned area west of the study site. The study site is now a fairly narrow corridor between burned areas of the seeded juniper chaining. A pellet group transect read on site in 2002 estimated 21 cow days use/acre (52 cdu/ha) and less than one deer day use/acre (2 ddu/ha). Rabbit pellets were also abundant in 2002. Nearly all of the cattle pats sampled in 2002 were from the previous grazing season.

Soil is alluvially deposited with minimal surface rock. However, pavement is abundant at an estimated 23% in 2002. Chemical and textural analysis indicates a loam soil with a neutral reactivity (pH of 7.0). Estimated effective rooting depth was 10 inches in 1997, and average temperature was 63°F at 13 inches in depth. Soil phosphorous was measured to be 6.3 ppm which is considered low (10 ppm is considered minimal for normal plant growth and development). Erosion is currently minimal due to minimal slope and moderate vegetation and litter cover. The erosion condition class was determined to be stable in 2002.

The key browse is Wyoming big sagebrush which had an estimated density of 3,260 plants/acre in 2002. This represents an increase from 2,260 plants/acre in 1997. Density has increased due to a very high proportion of young plants in the population in 1997 (72%), of which many entered the mature class by 2002. Recruitment continues to be good in 2002 (23%). The age structure of this Wyoming big sagebrush population has included a moderate to high proportion of young plants and a low number of decadent plants in all readings. Utilization is light and plants exhibit good vigor for the most part. During the 2002 reading, Wyoming big sagebrush showed poor annual leader growth (1.1 inches) and low seed production. Antelope bitterbrush is present in limited numbers on the site. Density was estimated at 40 plants/acre in 2002. Utilization was heavy resulting in a prostrate growth form, but this is expected with such a low density.

Point-center quarter data indicates little change in Utah juniper density. Estimated juniper density has ranged from 93-97 trees per acre since 1989. Other species scattered around the site include white-stemmed rubber rabbitbrush, pricklypear cactus, and broom snakeweed.

The herbaceous understory is dominated by crested wheatgrass, with Sandberg bluegrass being secondary. Nested frequency of crested wheatgrass slightly increased between 1983 and 1989, but has decreased the last two readings. Sandberg bluegrass increased in nested frequency with each reading between 1983 and 1997. It remained stable in 2002. Crested wheatgrass seedheads were apparent in 2002, but overall biomass production was only fair. It was noted in 2002 that crested wheatgrass plants in the adjacent burned areas had better vigor, stature, and provided more cover compared to the plants sampled by this transect. Other grasses sampled on the site in very low frequencies are bluebunch wheatgrass, bottlebrush squirreltail, and Letterman needlegrass.

The forb component is limited on this site. The most abundant species have poor forage value including Hoods phlox and rock goldenrod. Pale alyssum and bur buttercup, both annual species, were the most abundant forbs in 1997, but neither was sampled in 2002 with the drought conditions.

1983 APPARENT TREND ASSESSMENT

Although soil erosion or sedimentation are not currently serious problems, continuing livestock use is having some deleterious effects. Most notable are soil compaction from trampling, prevention of litter accumulation, and a slight but detectable reduction in vigor of the principal grass species. Overall soil trend appears stable. Browse data and visual observations indicate that the rather sparse Wyoming big sagebrush stand may be slowly increasing in density. Antelope bitterbrush, although heavily hedged, is maintaining its population. Reproduction and vigor of the herbaceous component is adequate to maintain the current stand but probably insufficient to allow any significant expansion.

1989 TREND ASSESSMENT

Although percent vegetation cover increased, percent bare ground increased and litter cover decreased. These factors, combined with an increase in rock and pavement cover, lead to a slightly downward soil trend. The browse trend is stable with a healthy Wyoming big sagebrush population. Density remained nearly identical to 1983 estimates, decadence remains low, and recruitment is good. The herbaceous understory trend is slightly upward with an increase in herbaceous understory sum of nested frequency.

TREND ASSESSMENT

soil - slightly down (2)

browse - stable (3)

herbaceous understory - slightly up (4)

1997 TREND ASSESSMENT

The soil trend is stable. Although still relatively high, percent bare ground decreased as vegetative cover increased. The levelness of the site, in conjunction with the vegetation and litter cover, help keep erosion to a minimum. The Wyoming big sagebrush population continues to be healthy with many seedling and young plants present in 1997. Utilization is light and the plants exhibit good vigor. The browse trend is up. Perennial herbaceous understory sum of nested frequency has increased since 1989, but only slightly. Crested wheatgrass is still the dominate grass, even though it significantly declined in nested frequency. Conversely, Sandberg bluegrass has significantly increased in frequency since 1989. The herbaceous understory trend is stable.

TREND ASSESSMENT

soil - stable (3)

browse - up (5)

herbaceous understory - stable (3)

2002 TREND ASSESSMENT

Trend for soil is stable. The basic cover categories are similar compared to the 1997 estimates. The erosion condition class was also determined as stable. Trend for browse is slightly up. Wyoming big sagebrush density increased, recruitment from young plants remains good, and decadence is low. Considering the drought conditions in 2002, these are very positive signs for Wyoming big sagebrush on this site. Trend for the herbaceous understory is stable, but composition and abundance are poor. Crested wheatgrass declined in nested frequency but not significantly, and Sandberg bluegrass remained stable in nested frequency.

TREND ASSESSMENT

soil - stable (3)

browse - slightly up (4)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 19B, Study no: 6

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|------------------------------------|------------------|------------------|------------------|------------------|-------------------|-----|-----|-----|-----------------|-------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | <i>Agropyron cristatum</i> | _b 298 | _b 308 | _a 277 | _a 238 | 97 | 98 | 93 | 85 | 10.01 | 8.93 |
| G | <i>Agropyron spicatum</i> | _b 25 | _a - | _a - | _a 3 | 10 | - | - | 1 | - | .03 |
| G | <i>Bromus tectorum</i> (a) | - | - | _b 21 | _a - | - | - | 8 | - | .21 | - |
| G | <i>Oryzopsis hymenoides</i> | 1 | - | - | - | 1 | - | - | - | .00 | - |
| G | <i>Poa secunda</i> | _a 94 | _b 165 | _c 215 | _c 213 | 44 | 71 | 79 | 81 | 4.44 | 3.03 |
| G | <i>Sitanion hystrix</i> | _b 28 | _a 8 | _a 2 | _a 4 | 16 | 4 | 2 | 2 | .03 | .18 |
| G | <i>Stipa lettermani</i> | - | - | 1 | - | - | - | 1 | - | .03 | - |
| Total for Annual Grasses | | 0 | 0 | 21 | 0 | 0 | 0 | 8 | 0 | 0.20 | 0 |
| Total for Perennial Grasses | | 446 | 481 | 495 | 458 | 168 | 173 | 175 | 169 | 14.53 | 12.17 |
| Total for Grasses | | 446 | 481 | 516 | 458 | 168 | 173 | 183 | 169 | 14.74 | 12.17 |
| F | <i>Alyssum alyssoides</i> (a) | - | - | _b 116 | _a - | - | - | 41 | - | .25 | - |
| F | <i>Antennaria rosea</i> | - | - | - | 1 | - | - | - | 1 | - | .00 |
| F | <i>Astragalus</i> spp. | - | 1 | 8 | - | - | 1 | 4 | - | .20 | - |
| F | <i>Astragalus utahensis</i> | - | - | - | - | - | - | - | - | .00 | - |
| F | <i>Chaenactis douglasii</i> | 1 | - | 5 | 2 | 1 | - | 2 | 1 | .01 | .00 |
| F | <i>Crepis acuminata</i> | - | 3 | 4 | - | - | 1 | 3 | - | .01 | - |
| F | <i>Hymenoxys acaulis</i> | - | 4 | - | - | - | 2 | - | - | - | - |
| F | <i>Microsteris gracilis</i> (a) | - | - | 1 | - | - | - | 1 | - | .00 | - |
| F | <i>Petradoria pumila</i> | _a 4 | _{ab} 11 | _{bc} 28 | _c 30 | 2 | 5 | 12 | 13 | 1.33 | .76 |
| F | <i>Phlox hoodii</i> | 25 | 29 | 23 | 17 | 11 | 16 | 9 | 8 | .31 | .09 |
| F | <i>Phlox longifolia</i> | - | 1 | 2 | - | - | 1 | 2 | - | .01 | - |
| F | <i>Ranunculus testiculatus</i> (a) | - | - | _b 98 | _a - | - | - | 38 | - | .31 | - |
| F | <i>Townsendia incana</i> | - | 2 | - | - | - | 1 | - | - | - | - |
| F | <i>Zigadenus paniculatus</i> | - | - | - | - | - | - | - | - | .03 | - |
| Total for Annual Forbs | | 0 | 0 | 215 | 0 | 0 | 0 | 80 | 0 | 0.57 | 0 |
| Total for Perennial Forbs | | 30 | 51 | 70 | 50 | 14 | 27 | 32 | 23 | 1.92 | 0.86 |
| Total for Forbs | | 30 | 51 | 285 | 50 | 14 | 27 | 112 | 23 | 2.49 | 0.86 |

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

BROWSE TRENDS --
Herd unit 19B, Study no: 6

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | Artemisia tridentata wyomingensis | 42 | 52 | 4.61 | 5.14 |
| B | Atriplex canescens | 0 | 1 | - | - |
| B | Chrysothamnus nauseosus albicaulis | 5 | 1 | .01 | - |
| B | Gutierrezia sarothrae | 4 | 4 | .30 | 1.23 |
| B | Juniperus osteosperma | 6 | 7 | 9.64 | 9.37 |
| B | Purshia tridentata | 1 | 1 | - | - |
| Total for Browse | | 58 | 66 | 14.57 | 15.75 |

CANOPY COVER -- LINE INTERCEPT
Herd unit 19B, Study no: 6

| Species | Percent Cover | |
|------------------------------------|---------------|-------|
| | '97 | '02 |
| Artemisia tridentata wyomingensis | - | 6.92 |
| Chrysothamnus nauseosus albicaulis | - | .08 |
| Gutierrezia sarothrae | - | .50 |
| Juniperus osteosperma | 6 | 14.42 |

Key Browse Annual Leader Growth
Herd unit 19B , Study no: 6

| Species | Average leader growth (in) |
|-----------------------------------|----------------------------|
| | '02 |
| Artemisia tridentata wyomingensis | 1.1 |

Point-Quarter Tree Data
Herd unit 19B , Study no: 6

| Species | Trees per Acre | | Average diameter (in) | |
|-----------------------|----------------|-----|-----------------------|-----|
| | '97 | '02 | '97 | '02 |
| Juniperus osteosperma | 93 | 97 | 4.3 | 5.1 |

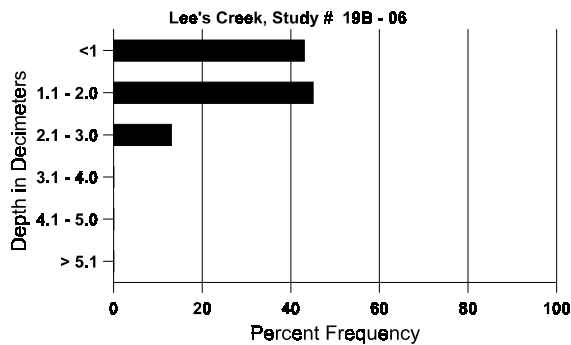
BASIC COVER --
Herd unit 19B, Study no: 6

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 337 | 309 | 3.25 | 7.75 | 26.29 | 27.71 |
| Rock | 167 | 194 | 0 | 5.00 | 1.88 | 2.55 |
| Pavement | 299 | 324 | 4.50 | 11.50 | 11.55 | 23.43 |
| Litter | 386 | 357 | 59.75 | 36.75 | 32.06 | 31.87 |
| Cryptogams | 213 | 67 | 0 | 0 | 5.19 | .58 |
| Bare Ground | 281 | 291 | 32.50 | 39.00 | 24.19 | 25.08 |

SOIL ANALYSIS DATA --
Herd Unit 19B, Study no: 6, Lee's Creek

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 10.2 | 62.5 (12.7) | 7.0 | 38.0 | 36.1 | 25.9 | 3.0 | 6.3 | 182.4 | 0.7 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 19B, Study no: 6

| Type | Quadrat Frequency | | Pellet Transect | |
|--------|-------------------|-----|------------------------|------------------------|
| | '97 | '02 | Pellet Groups per Acre | Days Use per Acre (ha) |
| Rabbit | 27 | 8 | 0 | - |
| Deer | 14 | 3 | 9 | 1 (2) |
| Cattle | 22 | 14 | 252 | 21 (52) |

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 6

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | | | | | | |
|------------------------------------------------|----------------------------|-------------|----|---|---|--------------------|--------------------------------|---|-------|---------------------|---|------------------|-------|-------------------|--|----------------|--|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | | | | | | | |
| Artemisia tridentata wyomingensis | | | | | | | | | | | | | | | | | |
| S | 83 | 4 | - | - | - | - | - | - | 4 | - | - | 133 | | 4 | | | |
| | 89 | - | - | - | 3 | - | - | - | 3 | - | - | 100 | | 3 | | | |
| | 97 | 86 | - | - | 2 | - | - | - | 88 | - | - | 1760 | | 88 | | | |
| | 02 | 1 | - | - | - | - | - | - | 1 | - | - | 20 | | 1 | | | |
| Y | 83 | 10 | - | - | - | - | - | - | 10 | - | - | 333 | | 10 | | | |
| | 89 | 6 | 2 | - | - | - | - | - | 7 | - | 1 | 266 | | 8 | | | |
| | 97 | 77 | 4 | - | - | - | - | - | 81 | - | - | 1620 | | 81 | | | |
| | 02 | 38 | - | - | - | - | - | - | 36 | - | 2 | 760 | | 38 | | | |
| M | 83 | 7 | 1 | - | - | - | - | - | 8 | - | - | 266 | 35 36 | 8 | | | |
| | 89 | 6 | 5 | - | - | - | - | - | 6 | 3 | 2 | 366 | 25 27 | 11 | | | |
| | 97 | 27 | 3 | 1 | 1 | - | - | - | 26 | - | 6 | 640 | 25 38 | 32 | | | |
| | 02 | 103 | 10 | - | - | - | - | - | 112 | - | 1 | 2260 | 21 30 | 113 | | | |
| D | 83 | 3 | - | - | - | - | - | - | 3 | - | - | 100 | | 3 | | | |
| | 89 | 1 | 1 | - | - | - | - | - | 2 | - | - | 66 | | 2 | | | |
| | 97 | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | | |
| | 02 | 10 | 2 | - | - | - | - | - | 3 | - | - | 240 | | 12 | | | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | | |
| | 89 | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | | |
| | 97 | - | - | - | - | - | - | - | - | - | - | 40 | | 2 | | | |
| | 02 | - | - | - | - | - | - | - | - | - | - | 40 | | 2 | | | |
| % Plants Showing | | | | | | | | | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | |
| '83 | | | | | | | | | | 05% | | 00% | | 00% | | - 0% | |
| '89 | | | | | | | | | | 38% | | 00% | | 14% | | +69% | |
| '97 | | | | | | | | | | 06% | | .88% | | 05% | | +31% | |
| '02 | | | | | | | | | | 07% | | 00% | | 07% | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | '83 | | 699 Dec: 14% | |
| | | | | | | | | | | | | | | '89 | | 698 9% | |
| | | | | | | | | | | | | | | '97 | | 2260 0% | |
| | | | | | | | | | | | | | | '02 | | 3260 7% | |
| Atriplex canescens | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | 0 | - - | 0 | | | |
| | 89 | - | - | - | - | - | - | - | - | - | - | 0 | - - | 0 | | | |
| | 97 | - | - | - | - | - | - | - | - | - | - | 0 | - - | 0 | | | |
| | 02 | 2 | - | - | - | - | - | - | 2 | - | - | 40 | - - | 2 | | | |
| % Plants Showing | | | | | | | | | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | |
| '83 | | | | | | | | | | 00% | | 00% | | 00% | | | |
| '89 | | | | | | | | | | 00% | | 00% | | 00% | | | |
| '97 | | | | | | | | | | 00% | | 00% | | 00% | | | |
| '02 | | | | | | | | | | 00% | | 00% | | 00% | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | '83 | | 0 Dec: - | |
| | | | | | | | | | | | | | | '89 | | 0 - | |
| | | | | | | | | | | | | | | '97 | | 0 - | |
| | | | | | | | | | | | | | | '02 | | 40 - | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Chrysothamnus nauseosus albicaulis | | | | | | | | | | | | | | | | | | |
| S | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | | 3 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | 4 | 1 | 2 | - | - | - | - | - | - | 6 | - | 1 | - | 140 | | 7 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 11 | 16 | |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | - | - | 1 | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 14% | | | 29% | | | 14% | | | -86% | | | | | | | |
| '02 | | 00% | | | 100% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 0 | | 0% | | | |
| | | | | | | | | | | | | '97 | 140 | | 0% | | | |
| | | | | | | | | | | | | '02 | 20 | | 100% | | | |

| A G R E | Y R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|-------------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Gutierrezia sarothrae | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 97 | 10 | - | - | - | - | - | - | - | - | - | - | - | 200 | 7 | 10 | 10 | |
| | 02 | 14 | - | - | - | - | - | - | - | - | - | - | - | 280 | 7 | 11 | 14 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | 9 | - | - | - | - | - | - | - | - | - | - | 3 | 180 | | | 9 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +50% | | | | | | | |
| '02 | | 00% | | | 00% | | | 13% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 0 | | 0% | | | |
| | | | | | | | | | | | | '97 | 240 | | 0% | | | |
| | | | | | | | | | | | | '02 | 480 | | 38% | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| M | 83 | 2 | - | - | - | - | - | - | - | - | - | - | - | 66 | 67 | 41 | 2 | |
| | 89 | 3 | - | - | - | - | - | - | - | - | - | - | - | 100 | 87 | 52 | 3 | |
| | 97 | 4 | - | - | 2 | - | - | - | - | - | - | - | - | 120 | - | - | 6 | |
| | 02 | 3 | - | - | 2 | - | - | 3 | - | - | - | - | - | 160 | - | - | 8 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +34% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +17% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +25% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 66 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 100 | | - | | | |
| | | | | | | | | | | | | '97 | 120 | | - | | | |
| | | | | | | | | | | | | '02 | 160 | | - | | | |

| A G R E | Y R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|-------------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|-----|--------------------|--------------------------------|---|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Leptodactylon pungens | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 100 | 8 15 | 3 | |
| | 89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | 6 7 | 2 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - - | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - - | 0 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 2 | - | - | - | - | - | - | - | - | - | - | - | 2 | 66 | | 2 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +49% | | | | | | | |
| '89 | | 00% | | | 00% | | | 33% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 100 | Dec: | 0% | | | | |
| | | | | | | | | | | | '89 | 198 | | 33% | | | | |
| | | | | | | | | | | | '97 | 0 | | 0% | | | | |
| | | | | | | | | | | | '02 | 0 | | 0% | | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | | |
| M | 83 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | - | 33 | 6 15 | 1 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 6 15 | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 6 21 | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 5 18 | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 33 | Dec: | - | | | | |
| | | | | | | | | | | | '89 | 33 | | - | | | | |
| | | | | | | | | | | | '97 | 0 | | - | | | | |
| | | | | | | | | | | | '02 | 0 | | - | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Purshia tridentata | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | 1 | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| M | 83 | - | - | 4 | - | - | - | - | - | - | 4 | - | - | - | 133 | 13 | 31 | 4 |
| | 89 | - | - | 4 | - | - | - | - | - | - | 4 | - | - | - | 133 | 10 | 19 | 4 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 9 | 24 | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 12 | 51 | 0 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | 33 | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 100% | | | 00% | | | +20% | | | | | | | |
| '89 | | 00% | | | 80% | | | 20% | | | -88% | | | | | | | |
| '97 | | 00% | | | 100% | | | 00% | | | +50% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 133 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 166 | | 20% | | | |
| | | | | | | | | | | | | '97 | 20 | | 0% | | | |
| | | | | | | | | | | | | '02 | 40 | | 0% | | | |

Trend Study 19B-7-02

Study site name: Judd Creek.

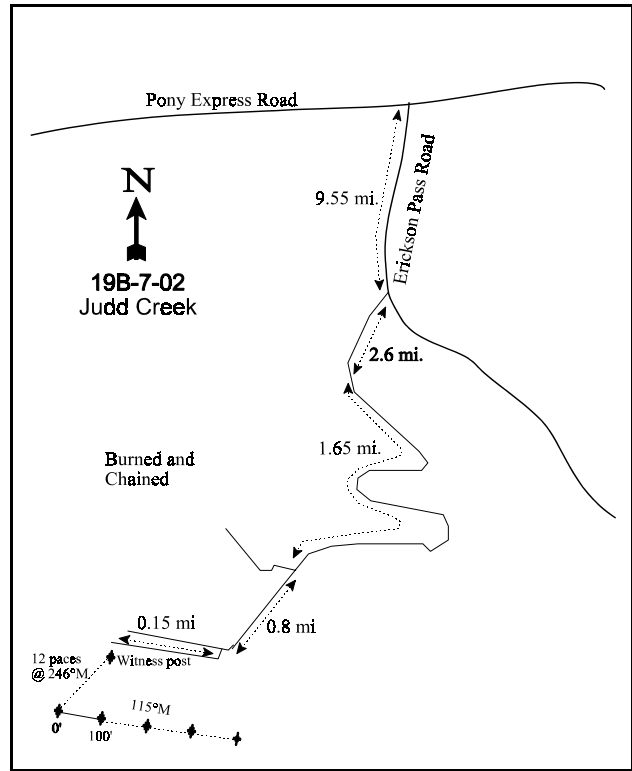
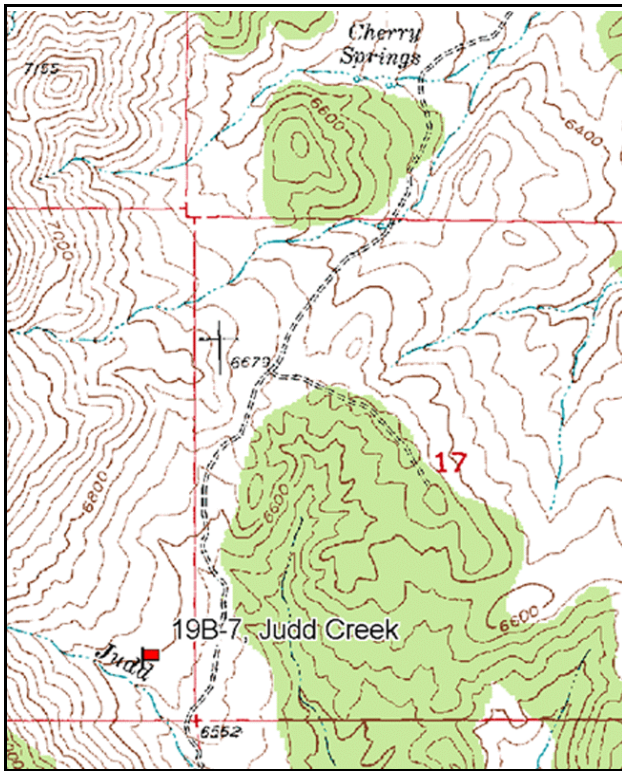
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 115 degrees magnetic.

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

LOCATION DESCRIPTION

Starting at the intersection of the Pony Express and Erickson Pass Roads, proceed south the on Erickson Pass Road for 9.55 miles to an intersection just before where the road crosses Government Creek. Turn right (i.e., southwest) at the intersection and proceed 2.5 miles to an intersection. Stay to the right (i.e., southerly) and proceed 1.9 miles to a green steel "T" fencepost on the west side of the road (next to a Rhus trilobata). From the fencepost, the 0-foot stake of the baseline is 12 paces away at an azimuth of 246 degrees magnetic. The baseline runs at 115 degrees magnetic. The study is marked by green steel "T" fenceposts approximately 12 to 18 inches in height.



Map Name: Indian Springs

Diagrammatic Sketch

Township 10S, Range 7W, Section 18

GPS: NAD 27, UTM 12S 4423215 N 357382 E

DISCUSSION

Judd Creek - Trend Study No. 19B-7

The Judd Creek study is located within a small parcel of private property surrounded by BLM land. The area is categorized as deer winter range, which is also used by cattle during the spring-fall period. The site slopes gently to the south at an elevation of 6,600 feet. The range type is a mixture of Wyoming big sagebrush and antelope bitterbrush with a sparse juniper overstory. Portions of the site were burned in 1996 and then apparently seeded. Lines 2 and 3 of the baseline sample an area that was not burned and the remaining lines are within burned areas. Judd Creek, an intermittent stream, is found several hundred feet south of the baseline. It has a developing willow community associated with it. Use of the site by wildlife is light, but more moderate by livestock. A pellet group transect read on site in 2002 estimated 9 deer days use/acre (23 ddu/ha) and 49 cow days use/acre (120 cdu/ha).

Soils are clay loam in texture and neutral in reactivity (pH of 6.7). Effective rooting depth was estimated at 9 inches in 1997. Average soil temperature was 67°F measured at 12 inches in depth. In 1997, the soil condition was reported as good and erosion was minimal. In 2002 however, bare ground was high and the erosion condition class was determined to be moderate. Litter cover prior to the fire was high at about 60% in 1983 and 1989, but was greatly reduced following fire to less than 30% in 1997 and 2002. Rock and pavement combined, are moderately high on the soil surface. The upper six inches of the profile are also very rocky.

The key browse species are Wyoming big sagebrush and antelope bitterbrush. In 1989, prior to the burn, the estimated density for Wyoming big sagebrush was 1,466 plants/acre, while bitterbrush density was estimated at 2,166 plants/acre. Sagebrush showed moderate use while bitterbrush received moderate to heavy use. Eighty-six percent of the Wyoming big sagebrush population displayed poor vigor in 1989 and percent decadence was high at 61%. The 1989 reading incidentally coincided with a drought period. Density for both species was much lower in the 1997, and also for 2002 which sampled following a fire. Big sagebrush density was estimated at 340 and 260 plants/acre in 1997 and 2002 respectively. Although vigor and decadence both improved between 1989 and 1997 for big sagebrush, both increased to high levels in the 2002 sample, also a drought year. Use was light on big sagebrush in 2002, although annual leader growth averaged 2.2 inches. Bitterbrush density was estimated at 360 and 420 plants/acre in 1997 and 2002 respectively. Use was mostly heavy in 2002, but decadence was low at 14%. Annual leader growth averaged 3.9 inches on bitterbrush. Most of the sagebrush and bitterbrush plants are found in the unburned portion of the transect. A few serviceberry plants (60 plants/acre) are also scattered throughout the site. Serviceberry shows moderate to heavy use, with one-third of the population classified with poor vigor and being decadent in 2002.

Less preferred and/or palatable browse species sampled on this site include Oregon grape, stickyleaf low rabbitbrush, broom snakeweed, Wood's rose, pricklypear cactus, and snowberry. With the exception of broom snakeweed, these species occur in relatively low densities. Snakeweed had an estimated density of 2,000 plants/acre in 2002.

The herbaceous understory was abundant and diverse prior to the burn. Following the fire, perennial grasses and forbs both declined in sum of nested frequency initially (1997). In 2002, sum of nested frequency for perennial grasses increased due to a significant increase in crested wheatgrass which was seeded following the fire. Most other grasses declined in abundance in 2002. Other perennial grasses that have been sampled include intermediate wheatgrass, bluebunch wheatgrass, Indian ricegrass, mutton bluegrass, Kentucky bluegrass, and Sandberg bluegrass. Cheatgrass brome was moderately abundant in 1997, but was not sampled in 2002 with the drought conditions. Grasses had been moderately to heavily utilized when the site was read in 2002.

The forb component had high diversity and was moderately abundant in 1983 and 1989. Even following the burn, perennial forbs only slightly declined in nested frequency, but diversity remained high. With drought and the abundance of Mormon crickets in 2002, the forb component saw drastic reductions in both frequency and diversity. Annual forbs were abundant in 1997, but only one species, knotweed, was sampled in 2002. All forbs combined to provided nearly 15% average cover in 1997, decreasing to 4% in 2002. The most abundant perennial forbs prior to the 2002 reading included wild onion, Louisiana sage, bastard toadflax, longleaf phlox, and American vetch. The only common perennial forbs sampled in 2002 included bastard toadflax and stoneseed.

1983 APPARENT TREND ASSESSMENT

Soil trend appears stable. However, in the event of site disturbance or exceptionally intense storms, the nature of the ground cover and plant composition suggest a potential for increased erosion. Two valuable shrub species, Wyoming big sagebrush and antelope bitterbrush, exhibit relatively stable populations but may be threatened by increasing numbers of undesirable invaders and an apparent increase of the juniper canopy. The herbaceous understory is dominated by low to medium value forbs. These, along with a sparse grass composition, provide minimal ground cover and forage. Overall vegetative trend appears stable.

1989 TREND ASSESSMENT

Protective ground cover characteristics remain almost unchanged. The soil trend is stable, although the dusty surface shows ample evidence of cattle trails and beds. The antelope bitterbrush population is maintaining itself under recent heavy grazing by cattle. However, the Wyoming big sagebrush is not doing as well with 86% of the population showing poor vigor. The browse trend is slightly downward. The herbaceous understory trend is stable. Even though there is a small increase in herbaceous understory sum of nested frequency, many of the species are considered increasers.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - stable (3)

1997 TREND ASSESSMENT

The soil trend is stable with little erosion apparent, even after the wildfire. The fire removed much of the herbaceous understory litter, but there is still adequate ground cover to protect the soil. The browse trend is slightly upward. Although density of the key species decreased after the fire, the Wyoming big sagebrush and bitterbrush populations show improvements in vigor, decadence, and utilization. The populations appear stable at this time, but could increase with the right climatic conditions. Increaser or invader species, primarily broom snakeweed, low rabbitbrush, and Wood's rose, are in low abundance but could also increase under favorable climatic conditions. The herbaceous understory trend is downward with an overall decline in perennial herbaceous understory sum of nested frequency following the fire.

TREND ASSESSMENT

soil - stable (3)

browse - slightly up (4)

herbaceous understory - down (1)

2002 TREND ASSESSMENT

Soils have a downward trend. Several important soil parameters show negative changes since 1997 including increased bare ground, a decrease in cover of litter and herbaceous vegetation, and a decline in the sum of nested frequency value of perennial forbs. The erosion condition class was determined as moderate in 2002. Trend for the key browse species, Wyoming big sagebrush and bitterbrush is slightly down. The big sagebrush population decreased in density, has declining vigor, and has increased decadence. Although bitterbrush slightly increased in density, heavy use was estimated on 71% of the population and poor vigor increased. The herbaceous understory component also has a downward trend. The main positive trend with the understory was the significant increase in crested wheatgrass, which is now the primary grass on the site. However, perennial forbs were the most abundant component of the understory both before the fire as well as one year after the burn in 1997. Sum of nested frequency for perennial forbs declined by 70% in 2002. Downward trends for soils, browse, and herbaceous species are the combination of drought and an abundance of Mormon crickets on the site in 2002. With normal precipitation patterns, most if not all of these trends should improve.

TREND ASSESSMENT

soil - down (1)

browse - slightly down (2)

herbaceous understory - down (1)

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 7

| T y p e | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|------------------------|------------------|-----|------|------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | Agropyron cristatum | a- | a- | a1 | b131 | - | - | 1 | 51 | .15 | 4.61 |
| G | Agropyron intermedium | a- | a- | ab7 | b13 | - | - | 3 | 5 | .09 | .12 |
| G | Agropyron smithii | - | - | 3 | 4 | - | - | 1 | 1 | .03 | .03 |
| G | Agropyron spicatum | 59 | 72 | 85 | 73 | 26 | 28 | 38 | 33 | 3.92 | 2.80 |
| G | Bromus tectorum (a) | - | - | b186 | a- | - | - | 69 | - | 3.39 | - |
| G | Melica bulbosa | - | - | 2 | - | - | - | 1 | - | .00 | - |
| G | Oryzopsis hymenoides | b62 | b62 | a19 | a8 | 30 | 28 | 8 | 4 | .12 | .09 |
| G | Phleum pratense | - | - | 1 | - | - | - | 1 | - | .00 | - |
| G | Poa fendleriana | b38 | c95 | a13 | a3 | 20 | 43 | 6 | 1 | .28 | .03 |
| G | Poa pratensis | a- | a- | b19 | ab10 | - | - | 8 | 4 | .16 | .04 |
| G | Poa secunda | a12 | b47 | b57 | a13 | 4 | 22 | 20 | 6 | .98 | .08 |
| G | Sitanion hystrix | 6 | 9 | 1 | - | 4 | 4 | 1 | - | .00 | - |
| G | Stipa lettermani | - | - | 2 | - | - | - | 1 | - | .03 | - |
| Total for Annual Grasses | | 0 | 0 | 186 | 0 | 0 | 0 | 69 | 0 | 3.39 | 0 |
| Total for Perennial Grasses | | 177 | 285 | 210 | 255 | 84 | 125 | 89 | 105 | 5.79 | 7.83 |
| Total for Grasses | | 177 | 285 | 396 | 255 | 84 | 125 | 158 | 105 | 9.18 | 7.83 |
| F | Agoseris glauca | 14 | - | 3 | - | 5 | - | 2 | - | .06 | - |
| F | Alyssum alyssoides (a) | - | - | b189 | a- | - | - | 62 | - | 3.73 | - |
| F | Allium spp. | c122 | b28 | c105 | a- | 51 | 14 | 38 | - | 1.12 | - |
| F | Antennaria rosea | - | - | 3 | - | - | - | 1 | - | .15 | - |

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|------|-----------------------------|------------------|------------------|------------------|------------------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| F | Arabis spp. | - | 4 | - | - | - | 2 | - | - | - | - |
| F | Artemisia ludoviciana | _b 32 | _b 23 | _a 3 | _{ab} 19 | 15 | 13 | 3 | 7 | .30 | .37 |
| F | Aster chilensis | _b 50 | _b 52 | _a - | _a 2 | 21 | 25 | - | 2 | - | .03 |
| F | Astragalus convallarius | _{ab} 5 | _{ab} 6 | _b 15 | _a 1 | 3 | 3 | 6 | 1 | .23 | .00 |
| F | Astragalus spp. | _a - | _a 3 | _b 25 | _a - | - | 1 | 12 | - | .16 | - |
| F | Astragalus utahensis | - | 2 | - | - | - | 1 | - | - | - | - |
| F | Balsamorhiza sagittata | 5 | 4 | 9 | 3 | 3 | 2 | 3 | 1 | .56 | .15 |
| F | Castilleja linariaefolia | - | - | 1 | - | - | - | 1 | - | .00 | - |
| F | Camelina microcarpa (a) | - | - | _b 21 | _a - | - | - | 12 | - | .63 | - |
| F | Calochortus nuttallii | _b 12 | _{ab} 8 | _{ab} 8 | _a - | 7 | 3 | 4 | - | .04 | - |
| F | Cirsium spp. | _b 33 | _{ab} 25 | _a 10 | _{ab} 16 | 16 | 11 | 5 | 8 | .29 | .27 |
| F | Collomia linearis (a) | - | - | _b 17 | _a - | - | - | 8 | - | .06 | - |
| F | Comandra pallida | _a 33 | _a 27 | _{ab} 59 | _b 71 | 18 | 13 | 26 | 30 | .99 | 1.39 |
| F | Collinsia parviflora (a) | - | - | _b 47 | _a - | - | - | 18 | - | .21 | - |
| F | Crepis acuminata | _b 18 | _c 38 | _b 11 | _a - | 10 | 22 | 6 | - | .46 | - |
| F | Cryptantha spp. | 13 | 9 | 9 | 20 | 6 | 5 | 4 | 9 | .07 | .14 |
| F | Delphinium nuttallianum | 2 | - | - | - | 1 | - | - | - | - | - |
| F | Descurainia spp. (a) | - | - | 3 | - | - | - | 1 | - | .18 | - |
| F | Eriogonum brevicaulis | - | - | - | 1 | - | - | - | 1 | - | .00 |
| F | Erodium cicutarium (a) | - | - | 1 | - | - | - | 1 | - | .00 | - |
| F | Erigeron spp. | - | - | 3 | 2 | - | - | 1 | 1 | .03 | .00 |
| F | Eriogonum racemosum | - | - | 3 | - | - | - | 1 | - | .00 | - |
| F | Galium boreale | - | - | 5 | - | - | - | 2 | - | .18 | - |
| F | Hackelia patens | _c 61 | _b 22 | _a 5 | _a 3 | 30 | 14 | 2 | 2 | .01 | .04 |
| F | Lathyrus brachycalyx | _a - | _a - | _b 25 | _a - | - | - | 10 | - | .37 | - |
| F | Lactuca serriola | - | - | - | 4 | - | - | - | 2 | - | .03 |
| F | Linum lewisii | _b 13 | _a - | _a 3 | _a - | 6 | - | 1 | - | .01 | - |
| F | Lithospermum ruderales | 17 | 30 | 16 | 18 | 9 | 13 | 8 | 9 | 1.32 | 1.35 |
| F | Lomatium grayi | _{ab} 4 | _{ab} 5 | _b 11 | _a - | 2 | 3 | 5 | - | .05 | - |
| F | Microsteris gracilis (a) | - | - | _b 26 | _a - | - | - | 12 | - | .08 | - |
| F | Monolepis nuttalliana (a) | 3 | - | - | - | 1 | - | - | - | - | - |
| F | Oenothera spp. | 1 | - | - | - | 1 | - | - | - | - | - |
| F | Penstemon spp. | - | 3 | - | 1 | - | 1 | - | 1 | - | .00 |
| F | Petrorhiza pumila | - | 2 | 8 | 8 | - | 1 | 4 | 5 | .24 | .24 |
| F | Phlox hoodii | - | - | - | 1 | - | - | - | 1 | - | .00 |
| F | Phlox longifolia | _b 54 | _c 172 | _c 167 | _a 1 | 26 | 71 | 68 | 1 | 1.27 | .00 |
| F | Polygonum douglasii (a) | - | - | _b 14 | _a 3 | - | - | 7 | 1 | .18 | .00 |
| F | Ranunculus testiculatus (a) | - | - | _b 36 | _a - | - | - | 15 | - | .51 | - |
| F | Taraxacum officinale | - | - | 7 | - | - | - | 4 | - | .05 | - |

| T y p e | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|---------------------------|------------------------|------------------|------------------|-----------------|----------------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| F | Tragopogon dubius | _b 21 | _a - | _b 19 | _a - | 11 | - | 9 | - | .47 | - |
| F | Trifolium spp. | - | - | 1 | - | - | - | 1 | - | .00 | - |
| F | Unknown forb-perennial | - | 1 | - | - | - | 1 | - | - | - | - |
| F | Veronica biloba (a) | - | - | _b 54 | _a - | - | - | 19 | - | .21 | - |
| F | Vicia americana | _c 168 | _c 188 | _b 43 | _a - | 68 | 74 | 20 | - | .59 | - |
| F | Viguiera multiflora | - | - | 1 | - | - | - | 1 | - | .00 | - |
| Total for Annual Forbs | | 3 | 0 | 408 | 3 | 1 | 0 | 155 | 1 | 5.82 | 0.00 |
| Total for Perennial Forbs | | 678 | 652 | 578 | 171 | 309 | 293 | 248 | 81 | 9.09 | 4.07 |
| Total for Forbs | | 681 | 652 | 986 | 174 | 310 | 293 | 403 | 82 | 14.92 | 4.07 |

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

BROWSE TRENDS --

Herd unit 19B, Study no: 7

| T y p e | Species | Strip Frequency | | Average Cover % | |
|------------------|-------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | Amelanchier utahensis | 3 | 3 | .63 | .38 |
| B | Artemisia tridentata wyomingensis | 10 | 9 | 3.13 | 1.91 |
| B | Cercocarpus montanus | 1 | 0 | - | - |
| B | Chrysothamnus nauseosus albicaulis | 0 | 6 | - | .30 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 5 | 12 | .18 | .78 |
| B | Gutierrezia sarothrae | 16 | 30 | .19 | .82 |
| B | Juniperus osteosperma | 2 | 5 | 2.92 | 4.84 |
| B | Mahonia repens | 20 | 9 | .41 | .07 |
| B | Opuntia spp. | 9 | 10 | .33 | .68 |
| B | Purshia tridentata | 13 | 14 | 2.36 | 2.50 |
| B | Rosa woodsii | 9 | 11 | .26 | .42 |
| B | Symphoricarpos oreophilus | 3 | 1 | .15 | .00 |
| B | Tetradymia canescens | 5 | 6 | .03 | .04 |
| Total for Browse | | 96 | 116 | 10.61 | 12.78 |

CANOPY COVER -- LINE INTERCEPT

Herd unit 19B, Study no: 7

| Species | Percent Cover | |
|-------------------------------------------|---------------|------|
| | '97 | '02 |
| Amelanchier utahensis | - | .50 |
| Artemisia tridentata wyomingensis | - | .75 |
| Chrysothamnus nauseosus albicaulis | - | .05 |
| Chrysothamnus viscidiflorus viscidiflorus | - | .83 |
| Gutierrezia sarothrae | - | .75 |
| Juniperus osteosperma | 2 | 3.58 |
| Opuntia spp. | - | .42 |
| Purshia tridentata | - | 1.67 |
| Rosa woodsii | - | .33 |
| Tetradymia canescens | - | .67 |

Key Browse Annual Leader Growth

Herd unit 19B , Study no: 7

| Species | Average leader growth (in) |
|-----------------------------------|----------------------------|
| | '02 |
| Artemisia tridentata wyomingensis | 2.2 |
| Purshia tridentata | 3.9 |

BASIC COVER --

Herd unit 19B, Study no: 7

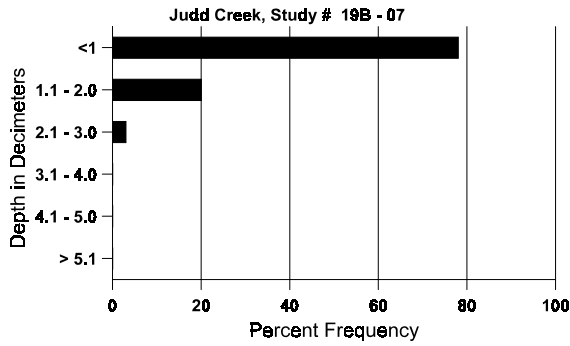
| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 329 | 281 | 2.25 | 4.75 | 34.89 | 26.16 |
| Rock | 246 | 274 | 12.50 | 8.50 | 8.64 | 10.54 |
| Pavement | 334 | 338 | 7.00 | 9.50 | 14.81 | 9.06 |
| Litter | 355 | 355 | 59.00 | 60.75 | 28.76 | 26.81 |
| Cryptogams | 41 | 1 | 0 | 0 | .87 | .00 |
| Bare Ground | 286 | 323 | 19.25 | 16.50 | 15.31 | 37.90 |

SOIL ANALYSIS DATA --

Herd Unit 19B, Study no: 7, Judd Creek

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %0M | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 9.1 | 66.8 (11.9) | 6.7 | 40.4 | 25.1 | 34.6 | 4.9 | 27.5 | 611.2 | 0.8 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19B, Study no: 7

| Type | Quadrat Frequency | | Pellet Transect | |
|--------|-------------------|-----|------------------------------|------------------------------|
| | '97 | '02 | Pellet Groups per Acre Ø2 | Days Use per Acre (ha) Ø2 |
| Rabbit | 5 | 3 | - | - |
| Deer | 11 | 10 | 122 | 9 (23) |
| Cattle | 5 | 15 | 583 | 49 (120) |

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 7

| A G R E | Y | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) | | Total |
|------------------------------------------------|-----|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|----|------|-----------------|------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | Ht. Cr. | | |
| Amelanchier utahensis | | | | | | | | | | | | | | | | | | |
| Y | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| M | '83 | - | - | 1 | - | - | - | - | - | - | - | - | 1 | - | 33 | 35 | 35 | 1 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '97 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | 27 | 35 | 1 |
| | '02 | - | - | - | - | - | 2 | - | - | - | 2 | - | - | - | 40 | 30 | 36 | 2 |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '89 | - | - | 2 | - | - | - | - | - | - | 2 | - | - | - | 66 | | | 2 |
| | '97 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | 20 | | | 1 |
| | '02 | - | - | - | - | 1 | - | - | - | - | - | - | - | 1 | 20 | | | 1 |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 100% | | | 100% | | | +50% | | | | | | | |
| '89 | | 00% | | | 100% | | | 00% | | | - 9% | | | | | | | |
| '97 | | 00% | | | 00% | | | 33% | | | + 0% | | | | | | | |
| '02 | | 33% | | | 67% | | | 33% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 33 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 66 | | 100% | | | |
| | | | | | | | | | | | | '97 | 60 | | 33% | | | |
| | | | | | | | | | | | | '02 | 60 | | 33% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Artemisia tridentata wyomingensis | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | 89 | 2 | - | - | - | - | - | - | - | - | 1 | - | 1 | - | 66 | | 2 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 83 | 13 | 15 | - | - | - | - | - | - | - | 25 | 3 | - | - | 933 | 25 29 | 28 | |
| | 89 | 8 | 6 | 1 | - | - | - | - | - | - | 1 | 1 | 13 | - | 500 | 18 25 | 15 | |
| | 97 | 10 | 1 | - | - | - | - | - | - | - | 10 | - | 1 | - | 220 | 28 41 | 11 | |
| | 02 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | 20 33 | 3 | |
| D | 83 | - | 7 | 1 | - | - | - | - | - | - | 2 | 5 | 1 | - | 266 | | 8 | |
| | 89 | 8 | 18 | - | 1 | - | - | - | - | - | 2 | 1 | 24 | - | 900 | | 27 | |
| | 97 | 5 | - | - | - | - | - | - | - | - | 3 | - | - | 2 | 100 | | 5 | |
| | 02 | 5 | - | - | - | 1 | - | 3 | - | - | 2 | - | - | 7 | 180 | | 9 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 260 | | 13 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 220 | | 11 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 58% | | | 03% | | | 03% | | | +14% | | | | | | | |
| '89 | | 55% | | | 02% | | | 86% | | | -77% | | | | | | | |
| '97 | | 06% | | | 00% | | | 18% | | | -24% | | | | | | | |
| '02 | | 08% | | | 00% | | | 54% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 1265 | Dec: | 21% | | | |
| | | | | | | | | | | | | '89 | 1466 | | 61% | | | |
| | | | | | | | | | | | | '97 | 340 | | 29% | | | |
| | | | | | | | | | | | | '02 | 260 | | 69% | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | | | | | | |
|------------------------------------------------|----------------------------|---------------------|---|---|------------------|--------------------|--------------------------------|-------------------|-------|-----|----------------|------|------|-----|----|----|---|
| | | 1 | 2 | 3 | 4 | | 5 | 6 | | 7 | 8 | 9 | 1 | 2 | 3 | 4 | |
| Cercocarpus montanus | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | 1 | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 72 | 74 | 0 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '97 | | 100% | | | 00% | | | 00% | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 0 | Dec: | - | | | | |
| | | | | | | | | | | '89 | 0 | | - | | | | |
| | | | | | | | | | | '97 | 20 | | - | | | | |
| | | | | | | | | | | '02 | 0 | | - | | | | |
| Chrysothamnus nauseosus albicaulis | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | 7 | - | 1 | - | - | - | - | - | 7 | - | - | 1 | 160 | 12 | 16 | 8 |
| D | 83 | 2 | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '02 | | 00% | | | 13% | | | 13% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 66 | Dec: | 100% | | | | |
| | | | | | | | | | | '89 | 0 | | 0% | | | | |
| | | | | | | | | | | '97 | 0 | | 0% | | | | |
| | | | | | | | | | | '02 | 160 | | 0% | | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Chrysothamnus viscidiflorus viscidiflorus | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 80 | | 4 | |
| M | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 13 | 28 | 1 |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 11 | 13 | 1 |
| | 97 | 8 | - | - | - | - | - | - | - | - | 8 | - | - | - | 160 | 14 | 19 | 8 |
| | 02 | 13 | 1 | 1 | - | - | - | - | - | - | 13 | - | 2 | - | 300 | 11 | 21 | 15 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | 1 | 1 | - | - | - | - | - | - | - | 1 | - | 1 | - | 40 | | 2 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | 2 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +79% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +62% | | | | | | | |
| '02 | | 10% | | | 05% | | | 14% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 33 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 33 | | 0% | | | |
| | | | | | | | | | | | | '97 | 160 | | 0% | | | |
| | | | | | | | | | | | | '02 | 420 | | 10% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | | |
| S | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | '97 | 11 | - | - | - | - | - | - | - | - | 11 | - | - | - | 220 | | 11 | |
| | '02 | - | - | - | 2 | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| Y | '83 | 12 | - | - | - | - | - | - | - | - | 12 | - | - | - | 400 | | 12 | |
| | '89 | 10 | - | - | 4 | - | - | - | - | - | 14 | - | - | - | 466 | | 14 | |
| | '97 | 18 | - | - | - | - | - | - | - | - | 18 | - | - | - | 360 | | 18 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | '83 | 58 | - | - | - | - | - | - | - | - | 58 | - | - | - | 1933 | 9 | 7 | 58 |
| | '89 | 169 | - | - | 8 | - | - | - | - | - | 177 | - | - | - | 5900 | 8 | 8 | 177 |
| | '97 | 39 | - | - | - | - | - | - | - | - | 39 | - | - | - | 780 | 9 | 5 | 39 |
| | '02 | 98 | - | - | 2 | - | - | - | - | - | 99 | - | 1 | - | 2000 | 11 | 16 | 100 |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | 26 | - | - | - | - | - | - | - | - | 25 | - | 1 | - | 866 | | 26 | |
| | '97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | 2 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +68% | | | | | | | |
| '89 | | 00% | | | 00% | | | .46% | | | -84% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +42% | | | | | | | |
| '02 | | 00% | | | 00% | | | 01% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 2333 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 7232 | | 12% | | | |
| | | | | | | | | | | | | '97 | 1160 | | 2% | | | |
| | | | | | | | | | | | | '02 | 2000 | | 0% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-------|-------|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | - | - | - | 33 | | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 | |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | - | - | - | 33 | | | 1 | |
| | 89 | 3 | - | - | - | - | - | - | - | - | - | - | - | 100 | | | 3 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 | |
| | 02 | 2 | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 | |
| M | 83 | - | - | - | 1 | - | - | - | - | - | - | - | - | 33 | 67 | 79 | 1 | |
| | 89 | - | - | - | 1 | - | - | - | - | - | - | - | - | 33 | 138 | 118 | 1 | |
| | 97 | - | - | - | 1 | - | - | - | - | - | - | - | - | 20 | - | - | 1 | |
| | 02 | 2 | - | - | 1 | - | - | - | - | - | - | - | - | 60 | - | - | 3 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +50% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -70% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +60% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 66 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 133 | | - | | | |
| | | | | | | | | | | | | '97 | 40 | | - | | | |
| | | | | | | | | | | | | '02 | 100 | | - | | | |
| Mahonia repens | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | 4 | - | - | 13 | - | - | - | - | - | - | - | - | 566 | | | 17 | |
| | 97 | 17 | - | - | - | - | - | - | - | - | - | - | - | 340 | | | 17 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| Y | 83 | 24 | - | - | - | - | - | - | - | - | - | - | - | 800 | | | 24 | |
| | 89 | 67 | - | - | 39 | - | - | - | - | - | - | - | - | 3533 | | | 106 | |
| | 97 | 21 | - | - | - | - | - | - | - | - | - | - | - | 420 | | | 21 | |
| | 02 | 3 | - | - | - | - | - | - | - | - | - | - | - | 60 | | | 3 | |
| M | 83 | 305 | - | - | - | - | - | - | - | - | - | - | - | 10166 | 4 | 6 | 305 | |
| | 89 | 297 | - | - | 200 | - | - | - | - | - | - | - | - | 16566 | 3 | 3 | 497 | |
| | 97 | 53 | - | - | - | - | - | - | - | - | - | - | - | 1060 | 2 | 4 | 53 | |
| | 02 | 18 | - | - | - | - | - | - | - | - | - | - | - | 360 | 2 | 2 | 18 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +45% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -93% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | -72% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 10966 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 20099 | | - | | | |
| | | | | | | | | | | | | '97 | 1480 | | - | | | |
| | | | | | | | | | | | | '02 | 420 | | - | | | |

| A Y G R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | |
|------------------------------------------------|----------------------------|---------------------|----|----|------------------|---|---|-------------------|---|-------------|----------------|------|------|--------------------|--------------------------------|----|-------|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | | |
| Y | 83 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 100 | | 3 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | 4 | 16 | 1 |
| | 89 | 9 | - | - | - | - | - | - | - | - | 8 | - | 1 | - | 300 | 6 | 8 | 9 |
| | 97 | 9 | - | - | 3 | - | - | - | - | - | 12 | - | - | - | 240 | 6 | 14 | 12 |
| | 02 | 13 | - | - | - | - | - | - | - | - | 13 | - | - | - | 260 | 8 | 20 | 13 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +60% | | | | | | | |
| '89 | | 00% | | | 00% | | | 10% | | | -16% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 133 | Dec: | 0% | | | | |
| | | | | | | | | | | | '89 | 333 | | 0% | | | | |
| | | | | | | | | | | | '97 | 280 | | 7% | | | | |
| | | | | | | | | | | | '02 | 280 | | 7% | | | | |
| Purshia tridentata | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 89 | 3 | 3 | - | - | - | - | - | - | - | 5 | - | 1 | - | 200 | | 6 | |
| | 97 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 80 | | 4 | |
| | 02 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 83 | - | 3 | 19 | - | - | - | - | - | - | 22 | - | - | - | 733 | 14 | 36 | 22 |
| | 89 | 1 | 20 | 19 | - | 1 | - | - | - | - | 41 | - | - | - | 1366 | 15 | 33 | 41 |
| | 97 | 12 | - | - | - | - | - | - | - | - | 12 | - | - | - | 240 | 18 | 54 | 12 |
| | 02 | 2 | 3 | 6 | - | - | 6 | - | - | - | 14 | - | 3 | - | 340 | 15 | 45 | 17 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | 18 | - | - | - | - | - | - | - | 18 | - | - | - | 600 | | 18 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| | 02 | - | - | 1 | - | - | 2 | - | - | - | 3 | - | - | - | 60 | | 3 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 100 | | 5 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 17% | | | 83% | | | 00% | | | +65% | | | | | | | |
| '89 | | 65% | | | 29% | | | 02% | | | -83% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +14% | | | | | | | |
| '02 | | 19% | | | 71% | | | 14% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 766 | Dec: | 0% | | | | |
| | | | | | | | | | | | '89 | 2166 | | 28% | | | | |
| | | | | | | | | | | | '97 | 360 | | 11% | | | | |
| | | | | | | | | | | | '02 | 420 | | 14% | | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | | |
|------------------------------------------------|----------------------------|---------------------|---|---|------------------|--------------------|--------------------------------|-------------------|-------|----------------|------|------|-----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | | | |
| Rhus trilobata | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 89 | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 97 | - | - | - | - | - | - | - | 0 | 30 | 48 | 0 | |
| | 02 | - | - | - | - | - | - | - | 0 | 42 | 60 | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 0 | Dec: | - |
| | | | | | | | | | | '89 | 0 | | - |
| | | | | | | | | | | '97 | 0 | | - |
| | | | | | | | | | | '02 | 0 | | - |
| Rosa woodsii | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 6 | - | - | - | - | - | - | - | 6 | | 6 | |
| | 02 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 32 | - | - | - | - | - | - | - | 32 | | 32 | |
| | 02 | 81 | - | - | - | - | - | - | - | 81 | | 81 | |
| M | 83 | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 89 | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | 20 | 10 | 5 | 1 |
| | 02 | 29 | - | - | - | - | - | - | - | 580 | 8 | 9 | 29 |
| D | 83 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | 10 | - | - | - | - | - | - | - | 4 | | 6 | 200 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | +73% | | | |
| '02 | | 00% | | | 00% | | | 05% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 0 | Dec: | 0% |
| | | | | | | | | | | '89 | 0 | | 0% |
| | | | | | | | | | | '97 | 660 | | 0% |
| | | | | | | | | | | '02 | 2400 | | 8% |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|---|--------------------|--------------------------------|----------------|-------|------|------|---|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | | |
| Symphoricarpos oreophilus | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 97 | 1 | - | - | 2 | - | - | - | 60 | | 3 | |
| | 02 | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 1 | - | - | - | - | - | - | 33 | 11 | 18 | 1 |
| | 89 | - | - | - | 1 | - | - | - | 33 | 13 | 15 | 1 |
| | 97 | - | - | - | - | - | - | - | 0 | 19 | 32 | 0 |
| | 02 | - | - | - | - | - | - | - | 0 | - | - | 0 |
| D | 83 | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | 4 | - | - | - | 80 | | | 4 |
| | 02 | - | - | - | - | - | 1 | - | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | |
| '83 | | 00% | | 00% | | 00% | | +50% | | | | |
| '89 | | 00% | | 00% | | 50% | | +53% | | | | |
| '97 | | 00% | | 00% | | 00% | | -86% | | | | |
| '02 | | 00% | | 00% | | 100% | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | '83 | 33 | Dec: | 0% | |
| | | | | | | | | '89 | 66 | | 0% | |
| | | | | | | | | '97 | 140 | | 57% | |
| | | | | | | | | '02 | 20 | | 100% | |
| Tetradymia canescens | | | | | | | | | | | | |
| Y | 83 | 1 | - | - | - | - | - | - | 33 | | 1 | |
| | 89 | 2 | - | - | - | - | - | - | 66 | | 2 | |
| | 97 | 2 | - | - | - | - | - | - | 40 | | 2 | |
| | 02 | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 4 | - | - | - | - | - | - | 133 | 5 | 10 | 4 |
| | 89 | 3 | 1 | - | - | - | - | - | 133 | 7 | 10 | 4 |
| | 97 | 6 | - | - | - | - | - | - | 120 | 10 | 7 | 6 |
| | 02 | 5 | - | - | - | - | - | - | 100 | 10 | 21 | 5 |
| D | 83 | 3 | - | - | - | - | - | - | 100 | | | 3 |
| | 89 | 1 | - | - | - | - | - | - | 33 | | | 1 |
| | 97 | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | 2 | - | - | - | - | - | - | 40 | | | 2 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | |
| '83 | | 00% | | 00% | | 00% | | -13% | | | | |
| '89 | | 14% | | 00% | | 43% | | -31% | | | | |
| '97 | | 00% | | 00% | | 00% | | -13% | | | | |
| '02 | | 00% | | 00% | | 29% | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | '83 | 266 | Dec: | 38% | |
| | | | | | | | | '89 | 232 | | 14% | |
| | | | | | | | | '97 | 160 | | 0% | |
| | | | | | | | | '02 | 140 | | 29% | |

Trend Study 19B-8-02

Study site name: South Pine Canyon.

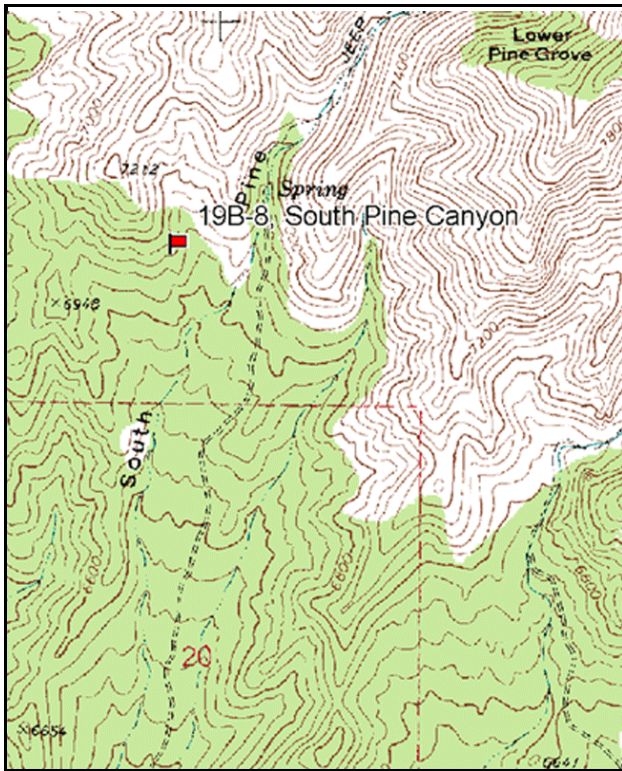
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 149 degrees magnetic.

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

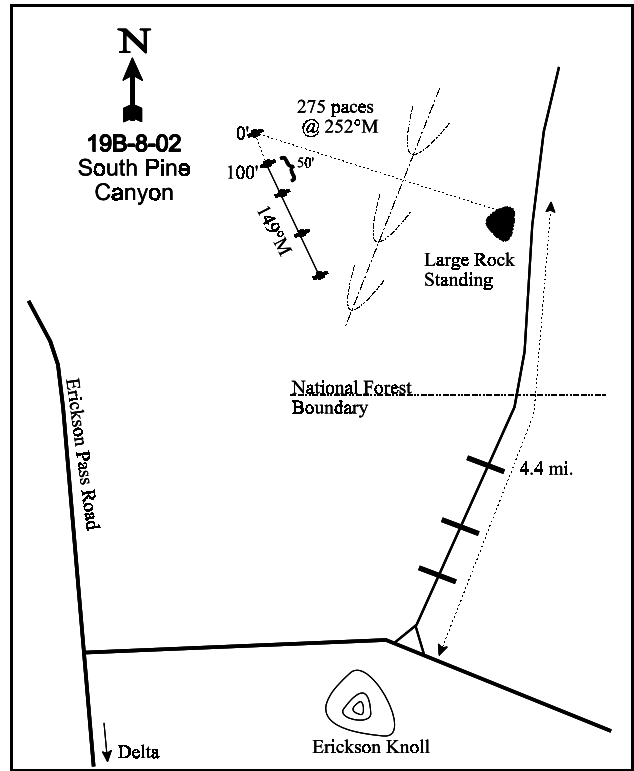
LOCATION DESCRIPTION

Starting on the road north of Erickson Knoll (road #564), take the South Pine Canyon Rd north for 4.4 Miles. In route, you will pass through a series of four gates and the National Forest Service boundary. Stop next to a huge rock on the west side of the road. From the west side of the road, the 0-foot baseline stake is 250 paces away at 317 degrees magnetic (across South Pine wash). The 0-foot baseline is marked by browse tag #3976.



Map Name: Erickson Knoll

Township 10S, Range 6W, Section 17



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4423318 N 368150 E

DISCUSSION

South Pine Canyon - Trend Study No. 19B-8

The South Pine Canyon study is located on Forest Service administered land and samples important deer winter range. The site slopes moderately to the south at an elevation of 6,900 feet. This study was not sampled during the 1997 rotation because a recent wildfire had eliminated all of the browse on the site. Prior to the burn, the site consisted of a mountain brush community with a sparse herbaceous understory. No information was available for wildlife use prior to the burn. Deer use on the site appears moderate following the fire. A pellet group transect read on site in 2002 estimated 55 deer days use/acre (136 ddu/ha). Most of the use appeared to be from late winter and spring use. Cattle were grazing in the vicinity when the site was read in 2002. Livestock use was estimated at six days use/acre (14 cdu/ha) on the immediate site.

Soil is sandy loam in texture and neutral in reactivity (pH of 7.1). Soils are rocky and well drained with little evidence of any topsoil development. Rock and pavement combined to cover 38% of the soil surface in 2002. The profile is also very rocky throughout. Effective rooting depth was estimated at just over 11 inches in 2002 with an average soil temperature of 67°F at 11 inches in depth. It was reported in the past that there were signs of significant sheet and gully erosion. In 2002, an erosion condition class assessment showed soils to be stable. Litter and vegetation cover are lacking, but the abundance of rock and pavement armor the surface. Bare ground was estimated at 27% in 2002, an increase from 19% in 1989. Pedestalling of plants was common prior to the burn.

The key browse prior to and following the burn are Saskatoon serviceberry, antelope bitterbrush, and mountain big sagebrush. Each of these species have lower densities in 2002 compared to 1983 and 1989. Between the 1989 and 2002 readings, two events occurred that resulted in these density changes. First, the wildfire that burned through the area likely accounted for some of the loss. Second, the baseline was expanded in 2002 and shrub densities were determined using strips instead of the old circular plots. This more than tripled the sample size used to determine shrub densities, so some of the change may be due to this as well. Serviceberry density was estimated at 320 plants/acre in 2002. Use was heavy. The population showed poor vigor with percent decadence rated as moderate at respectively 38% and 31% of the population. No young were sampled in 2002. Mormon crickets had done some defoliating on serviceberry in 2002. Mountain big sagebrush density was estimated at 100 plants/acre in 2002. Forty percent of the sagebrush sampled were young plants, vigor was normal, use light to moderate, and no decadent plants were sampled. Bitterbrush density was estimated at only 60 mature plants/acre in 2002. All plants sampled were heavily utilized, but vigor was normal and there were no decadent plants. Annual leader growth for serviceberry, bitterbrush, and mountain big sagebrush averaged respectively 1.3 inches, 2.5 inches, and 2.1 inches in 2002.

As noted above, the understory was rather sparse before the fire, and is even more so now. Prior to the burn, the grass component was composed of only three perennial species. These included bluebunch wheatgrass, mutton bluegrass, and Sandberg bluegrass. An additional grass, sand dropseed, was sampled in 2002. All species of perennial grasses were sampled in only one quadrat in the 2002 reading, with the exception of bluebunch wheatgrass, which had a quadrat frequency of 16%. Cheatgrass brome was the most abundant grass sampled in 2002 as it provided 85% of the grass cover, and 64% of the total vegetation cover on the site. Cheatgrass was uniformly distributed over the site, but was small statured in 2002. Cattle were reported to have heavily grazed the limited wheatgrass plants on the site in the past.

Forbs had fair compositional diversity in 1983 and 1989, but provided little forage or ground cover. The most common species were American vetch, wild onion, spring parsley, longleaf phlox, and thistle. All are poor to medium value forage plants. More desirable species such as redroot eriogonum, tapertip hawksbeard, and gray lomatium occurred infrequently. With drought in 2002, forbs were insignificant on the site. The perennial forbs had a 93% decline in sum of nested frequency between 1989 and 2002.

1983 APPARENT TREND ASSESSMENT

Soil trend appears to be declining because of excessive erosion and sedimentation. This in turn, prevents any significant buildup of litter and inhibits seedling establishment of more desirable plants. Although the browse trend appears more stable, some discouraging signs are apparent; most notably heavy use on the key browse species. The herbaceous cover is sparse but appears to be stable at this time.

1989 TREND ASSESSMENT

Protective ground cover values have stayed relatively the same between readings. Soil erosion does not appear to be any worse leading to a stable soil trend. Although there are signs of moderate to heavy use on all species. The bitterbrush population declined in density, while the other key browse populations appear to be stable. The browse trend is stable, although grazing pressures should be reduced on these species. The herbaceous understory is lacking. Very little forage or cover is contributed by forbs or grasses. The herbaceous understory trend is slightly up as the sum of nested frequency for perennial forbs has increased since 1983.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly up (4)

2002 TREND ASSESSMENT

Trend for soil is down. Bare soil increased from 19% to 27%, and litter cover decreased from 63% to 27%. Vegetation cover is low and provided by herbaceous species, mostly from cheatgrass. The ratio of protective cover (vegetation and litter) to bare soil is poor at only 2:1. Trend for browse is down. Densities of all the key species have declined since 1989, due at least in part to a wildfire that burned through the site. Use remains heavy on bitterbrush and serviceberry, whereas moderate on mountain big sagebrush. Recruitment by young plants is low for all species, so increased populations in the future is unlikely especially with the current drought cycle. The herbaceous understory trend is down. The understory was reportedly sparse prior to the burn and is even more so in 2002 with drought. Sum of nested frequency for all perennial grasses and forbs declined by 87% between 1989 and 2002.

TREND ASSESSMENT

soil - down (1)

browse - down (1)

herbaceous understory - down (1)

HERBACEOUS TRENDS --
Herd unit 19B, Study no: 8

| Type | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|-----------------------------|---------------------------------|------------------|------------------|-----------------|-------------------|-----|-----|-----------------|
| | | '83 | '89 | '02 | '83 | '89 | '02 | '02 |
| G | <i>Agropyron spicatum</i> | _b 90 | _b 90 | _a 33 | 41 | 36 | 16 | 1.70 |
| G | <i>Bromus tectorum</i> (a) | - | - | 290 | - | - | 94 | 9.86 |
| G | <i>Poa fendleriana</i> | 1 | 9 | 3 | 1 | 4 | 1 | .03 |
| G | <i>Poa secunda</i> | _b 13 | _b 15 | _a 1 | 7 | 7 | 1 | .01 |
| G | <i>Sporobolus cryptandrus</i> | - | - | 2 | - | - | 1 | .03 |
| Total for Annual Grasses | | 0 | 0 | 290 | 0 | 0 | 94 | 9.86 |
| Total for Perennial Grasses | | 104 | 114 | 39 | 49 | 47 | 19 | 1.77 |
| Total for Grasses | | 104 | 114 | 329 | 49 | 47 | 113 | 11.63 |
| F | <i>Agoseris glauca</i> | 5 | - | - | 3 | - | - | - |
| F | <i>Allium</i> spp. | _c 54 | _b 29 | _a - | 26 | 13 | - | - |
| F | <i>Arabis</i> spp. | - | 11 | - | - | 4 | - | - |
| F | <i>Arenaria</i> spp. | - | 3 | - | - | 1 | - | - |
| F | <i>Artemisia ludoviciana</i> | 11 | 7 | - | 4 | 2 | - | - |
| F | <i>Astragalus</i> spp. | 3 | 2 | - | 2 | 1 | - | - |
| F | <i>Calochortus nuttallii</i> | - | 2 | - | - | 1 | - | - |
| F | <i>Chaenactis douglasii</i> | _a 1 | _b 21 | _a 1 | 1 | 9 | 1 | .00 |
| F | <i>Cirsium</i> spp. | 13 | 7 | 9 | 7 | 4 | 6 | .45 |
| F | <i>Comandra pallida</i> | _{ab} 7 | _b 11 | _a - | 3 | 5 | - | - |
| F | <i>Crepis acuminata</i> | _b 18 | _b 24 | _a - | 9 | 12 | - | - |
| F | <i>Cryptantha</i> spp. | _{ab} 18 | _b 20 | _a 2 | 7 | 9 | 1 | .03 |
| F | <i>Cymopterus longipes</i> | _b 29 | _a - | _a - | 16 | - | - | - |
| F | <i>Descurainia pinnata</i> (a) | - | 3 | - | - | 2 | - | - |
| F | <i>Erodium cicutarium</i> (a) | - | - | 14 | - | - | 8 | .21 |
| F | <i>Eriogonum racemosum</i> | 2 | - | - | 1 | - | - | - |
| F | <i>Hackelia patens</i> | 12 | 12 | - | 5 | 4 | - | - |
| F | <i>Lactuca serriola</i> | _a - | _a - | _b 10 | - | - | 5 | .13 |
| F | <i>Lithospermum ruderale</i> | 5 | 5 | 5 | 2 | 3 | 3 | .24 |
| F | <i>Lomatium grayi</i> | _b 11 | _c 77 | _a - | 7 | 36 | - | - |
| F | <i>Machaeranthera canescens</i> | 2 | 3 | - | 2 | 1 | - | - |
| F | <i>Phlox longifolia</i> | _a 2 | _b 45 | _a 3 | 1 | 22 | 1 | .00 |
| F | <i>Sanguisorba minor</i> | - | - | 2 | - | - | 1 | .03 |
| F | <i>Tragopogon dubius</i> | - | 4 | - | - | 2 | - | - |
| F | <i>Vicia americana</i> | _b 140 | _c 155 | _a - | 57 | 60 | - | - |
| F | <i>Viola</i> spp. | 1 | - | - | 1 | - | - | - |
| Total for Annual Forbs | | 0 | 3 | 14 | 0 | 2 | 8 | 0.21 |
| Total for Perennial Forbs | | 334 | 438 | 32 | 154 | 189 | 18 | 0.90 |
| Total for Forbs | | 334 | 441 | 46 | 154 | 191 | 26 | 1.11 |

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

BROWSE TRENDS --
Herd unit 19B, Study no: 8

| Type | Species | Strip Frequency | Average Cover % |
|------------------|-------------------------------------------|-----------------|-----------------|
| | | '02 | '02 |
| B | Amelanchier alnifolia | 13 | 1.45 |
| B | Artemisia tridentata vaseyana | 5 | .33 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 7 | .56 |
| B | Mahonia repens | 2 | .06 |
| B | Opuntia spp. | 1 | - |
| B | Purshia tridentata | 3 | .38 |
| B | Tetradymia canescens | 1 | - |
| Total for Browse | | 32 | 2.78 |

CANOPY COVER -- LINE INTERCEPT
Herd unit 19B, Study no: 8

| Species | Percent Cover '02 |
|-------------------------------------------|----------------------|
| Amelanchier alnifolia | 2.75 |
| Artemisia tridentata vaseyana | 1.08 |
| Chrysothamnus viscidiflorus viscidiflorus | .83 |
| Purshia tridentata | .42 |

Key Browse Annual Leader Growth
Herd unit 19B , Study no: 8

| Species | Average leader growth (in) '02 |
|-------------------------------|-----------------------------------|
| Artemisia tridentata vaseyana | 2.1 |
| Purshia tridentata | 2.5 |

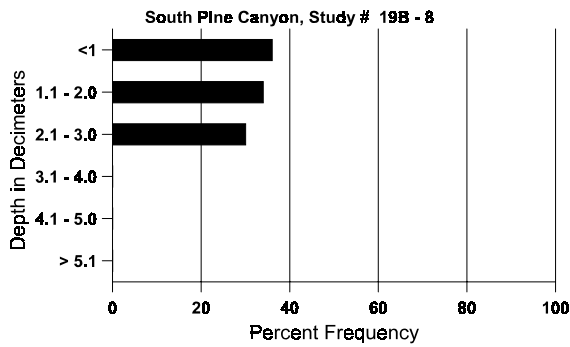
BASIC COVER --
Herd unit 19B, Study no: 8

| Cover Type | Nested Frequency '02 | Average Cover % | | |
|-------------|-------------------------|-----------------|-------|-------|
| | | '83 | '89 | '02 |
| Vegetation | 302 | 2.75 | 6.25 | 15.07 |
| Rock | 297 | 6.75 | 9.50 | 13.52 |
| Pavement | 376 | 1.75 | 2.75 | 24.91 |
| Litter | 358 | 65.25 | 62.75 | 27.26 |
| Cryptogams | - | .25 | .25 | 0 |
| Bare Ground | 329 | 23.25 | 18.50 | 26.89 |

SOIL ANALYSIS DATA --
 Herd Unit 19B, Study no: 8, South Pine Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 11.4 | 67.0 (11.7) | 7.1 | 69.3 | 16.7 | 14.0 | 2.5 | 13.8 | 227.2 | 0.6 |

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 19B, Study no: 8

| Type | Quadrat Frequency | Pellet Transect | |
|--------|-------------------|------------------------|------------------------|
| | | Pellet Groups per Acre | Days Use per Acre (ha) |
| | '02 | 02 | 02 |
| Rabbit | 1 | - | - |
| Deer | 20 | 713 | 55 (136) |
| Cattle | 5 | 70 | 6 (14) |

BROWSE CHARACTERISTICS --
Herd unit 19B, Study no: 8

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|----|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Amelanchier alnifolia</i> | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | 1 | - | - | 1 | - | - | - | - | - | 2 | - | - | - | 133 | | | 2 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| M | 83 | - | - | 12 | - | - | - | - | - | - | 12 | - | - | - | 800 | 45 | 53 | 12 |
| | 89 | - | 10 | - | - | - | - | - | - | - | 10 | - | - | - | 666 | 45 | 48 | 10 |
| | 02 | - | - | 7 | - | - | 3 | - | - | 1 | 10 | - | 1 | - | 220 | 21 | 44 | 11 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | 1 | 1 | - | - | - | - | - | - | - | 2 | - | - | - | 133 | | | 2 |
| | 02 | - | - | - | - | - | - | 2 | - | 3 | - | - | - | 5 | 100 | | | 5 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 100% | | | 00% | | | +14% | | | | | | | |
| '89 | | 79% | | | 00% | | | 00% | | | -66% | | | | | | | |
| '02 | | 00% | | | 88% | | | 38% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 800 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 932 | | 14% | | | |
| | | | | | | | | | | | | '02 | 320 | | 31% | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | | 2 |
| M | 83 | 3 | 3 | - | - | - | - | - | - | - | 6 | - | - | - | 400 | 28 | 36 | 6 |
| | 89 | 3 | 5 | - | - | - | - | - | - | - | 7 | - | 1 | - | 533 | 11 | 13 | 8 |
| | 02 | 1 | 2 | - | - | - | - | - | - | - | 3 | - | - | - | 60 | 20 | 34 | 3 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 200 | | | 10 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 50% | | | 00% | | | 00% | | | +25% | | | | | | | |
| '89 | | 63% | | | 00% | | | 13% | | | -81% | | | | | | | |
| '02 | | 40% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 400 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 533 | | - | | | |
| | | | | | | | | | | | | '02 | 100 | | - | | | |
| <i>Atriplex canescens</i> | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 10 | 22 | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |

| A G R E | Y R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|--------------------------------------------------|-------------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|-----|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | | | | | | | | | | | |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | | 1 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| M | 83 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 200 | 14 | 10 | 3 |
| | 89 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 266 | 9 | 9 | 4 |
| | 02 | 10 | 1 | - | - | - | - | - | - | - | 11 | - | - | - | 220 | 15 | 33 | 11 |
| D | 83 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | - | 66 | | | 1 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | -20% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -17% | | | | | | | |
| '02 | | 09% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 332 | Dec: | 20% | | | | |
| | | | | | | | | | | | '89 | 266 | | 0% | | | | |
| | | | | | | | | | | | '02 | 220 | | 0% | | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 0 | Dec: | - | | | | |
| | | | | | | | | | | | '89 | 0 | | - | | | | |
| | | | | | | | | | | | '02 | 0 | | - | | | | |
| <i>Juniperus osteosperma</i> | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 66 | 67 | 173 | 1 |
| | 89 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 66 | 197 | 157 | 1 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 66 | Dec: | - | | | | |
| | | | | | | | | | | | '89 | 66 | | - | | | | |
| | | | | | | | | | | | '02 | 0 | | - | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Mahonia repens | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 02 | 9 | - | - | - | - | - | - | - | - | 1 | - | 8 | - | 180 | 2 | 6 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 80% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 200 | | - | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 200 | | 3 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 13 | - | - | - | - | - | - | - | - | 13 | - | - | - | 866 | 10 | 17 | |
| | 89 | 9 | - | - | - | - | - | - | - | - | 3 | - | 6 | - | 600 | 7 | 28 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 6 | 18 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | 1 | - | - | - | - | - | - | - | - | 1 | 66 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '89 | | 00% | | | 00% | | | 54% | | | -98% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 866 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 866 | | 8% | | | |
| | | | | | | | | | | | | '02 | 20 | | 0% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|----|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Purshia tridentata | | | | | | | | | | | | | | | | | | |
| M | 83 | - | 1 | 23 | - | - | - | - | - | - | 24 | - | - | - | 1600 | 17 | 25 | 24 |
| | 89 | - | 6 | 10 | - | - | - | - | - | - | 16 | - | - | - | 1066 | 14 | 31 | 16 |
| | 02 | - | - | 1 | - | - | 2 | - | - | - | 3 | - | - | - | 60 | 8 | 24 | 3 |
| D | 83 | - | - | 1 | - | - | - | - | - | - | 1 | - | - | - | 66 | | | 1 |
| | 89 | - | - | 2 | - | - | - | - | - | - | 2 | - | - | - | 133 | | | 2 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 04% | | | 96% | | | 00% | | | -28% | | | | | | | |
| '89 | | 33% | | | 67% | | | 00% | | | -95% | | | | | | | |
| '02 | | 00% | | | 100% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 1666 | Dec: | 4% | | | |
| | | | | | | | | | | | | '89 | 1199 | | 11% | | | |
| | | | | | | | | | | | | '02 | 60 | | 0% | | | |
| Tetradymia canescens | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 100% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 20 | | - | | | |

Trend Study 19B-10-02

Study site name: Sioux Pass.

Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 347 degrees magnetic (lines 2-4 @ 330°M).

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 1 on 1ft and belt 2 on 1ft.

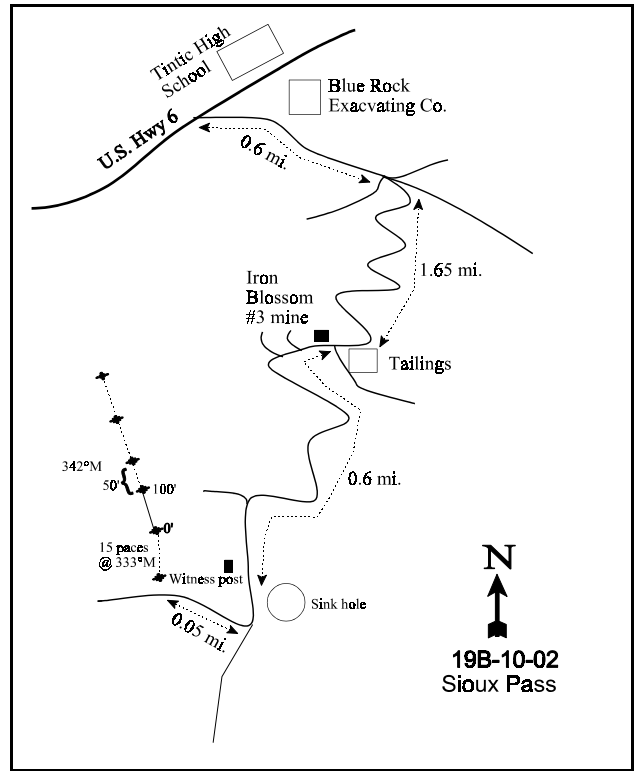
LOCATION DESCRIPTION

From Highway U.S. 6 on the east side of Eureka, turn south on a gravel road just west of Tintic High School. Travel south on this road for 2.25 miles, always staying on the main road. At this point, turn right (west) on the road at the Iron Blossom number 3 mine. Travel on this road for 0.60 miles just past a large sinkhole to the left. At this point, a small jeep trail turns off sharply to the right. Drive or walk up this trail for 0.05 miles, at which point there is a steel fencepost stake on the right side of the road. From this point, the 0-foot mark of the baseline is located 15 paces away due north.



Map Name: Eureka

Township 10S, Range 2W, Section 29



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4419932 N 406106 E

DISCUSSION

Sioux Pass - Trend Study No. 19B-10

The Sioux Pass study is located at an elevation of 7,400 feet on a moderately steep (35%), east to northeast facing slope. The study samples deer summer range located on private property. This mountain brush community supports a variety of browse with a very limited herbaceous understory. Nearby ridges and draws, occupied by pinyon-juniper and curlleaf mountain mahogany, provide important escape and resting cover. In 1983, more than a dozen deer were observed in the immediate study area. No cattle were seen in 1983, but evidence of previous use was apparent. The site showed moderate deer use in 1997 and 2002, with evidence of lighter use by elk and domestic sheep also present. A pellet group transect read on site in 2002 estimated 78 deer days use/acre (193 ddu/ha) and 19 sheep days use/acre (46 sdu/ha). Sheep use appeared heavier than what was estimated by the pellet group transect in 2002.

The soil is rocky on the surface and throughout the profile. Chemical and textural analysis indicates soils to be a sandy loam and neutral in reactivity (pH of 6.7). Effective rooting depth was estimated at 15 inches with an average soil temperature of 43°F measured at 17 inches in depth in 1997. Although herbaceous vegetation is low on the site, the browse component is abundant and combines with litter to minimize erosion. The erosion condition class was determined as stable in 2002.

Browse composition includes a wide variety of shrub species. The key browse species are mountain big sagebrush and antelope bitterbrush as they provide about 75% of the total browse cover on the site. The mountain big sagebrush population occurs in a stable and moderately dense stand of about 3,000 plants/acre since 1989. Young plants were abundant in 1983 and 1989, but were much lower in 1997 and 2002. The majority of the population consists of mature plants with a stabilized percent decadence of about 20% in 1997 and 2002. The proportion of the population showing poor vigor peaked at 47% during the drought in 1989, but has been much lower at 10% since then. Utilization has been mostly light in all readings. Annual sagebrush leader growth averaged 1.8 inches in 2002. The population of bitterbrush is estimated at 1,120 plants/acre in 2002. Age class structure consists of mostly mature plants, with moderate decadency, and low recruitment of young in 2002. Due to consistent heavy use on bitterbrush, most plants are prostrate in growth form averaging less than one foot in height. Annual leaders were minimal on bitterbrush in 2002, with growth averaging 1.9 inches. Flowering and seed production were also minimal in 2002. Vigor has been mostly normal since 1989, a big improvement from the initial reading when 61% of the bitterbrush plants displayed poor vigor.

Other preferred shrubs include Saskatoon serviceberry and Martin ceanothus. Serviceberry provides very little cover with an estimated density of about 100 plants/acre. Use was heavy and percent decadency high at 50% in 2002. Martin ceanothus density was estimated at just under 200 plants/acre in 1997 and 2002. Use was mostly light, while decadence and poor vigor were moderate. Most of the population is made up of mature plants. Increaser shrubs include primarily stickyleaf low rabbitbrush, white-stemmed rubber rabbitbrush, broom snakeweed, and pricklypear cactus.

Grass composition and diversity are low. Bluebunch wheatgrass is the dominant perennial which provided nearly 80% of the grass cover in 2002. Bluebunch wheatgrass increased in nested frequency in 2002, although the increase was not significant. It was noted as being healthy and vigorous even with drought in 2002, yet seedheads were limited. Cheatgrass brome is also present on the site. It is the second most abundant grass. However, the nested frequency of cheatgrass declined by over half in 2002 with the drought conditions. Indian ricegrass, mutton bluegrass, crested wheatgrass, and Sandberg bluegrass have also been sampled, but all occur in very low numbers and only Indian ricegrass has been sampled in all readings.

Forb composition, although more diverse than grasses, also has poor productivity. Although no single species is abundant, forbs such as low penstemon, redroot eriogonum, and lupine collectively help provide some of the succulent forage important to deer on this summer range. Sum of nested frequency for perennial forbs slightly declined in 2002 with drought as most forbs were dried up when the site was read in August.

1983 APPARENT TREND ASSESSMENT

The soil trend appears stable. Erosion will continue unless the herbaceous understory increases in abundance. Browse trend appears stable, especially for the big sagebrush population. Species such as antelope bitterbrush and Martin ceanothus are more precarious. These are the most preferred plants on the area, and not surprisingly, their vigor appears depressed. Increaser shrubs are not currently a significant problem. Herbaceous understory cover, density, and composition are fair but still well below optimum for good quality summer habitat.

1989 TREND ASSESSMENT

The large amount of bare ground allows continued soil movement, but it has changed very little since 1983. The soil trend is stable. The preferred browse species, antelope bitterbrush, has a slightly downward trend due to the continuous heavy browsing by deer and sheep. Vigor has improved but percent decadency has increased. Mountain big sagebrush trend is slightly downward as well with an increase in plants displaying poor vigor. Overall browse trend is slightly downward. The herbaceous understory is depleted. Although bluebunch wheatgrass nested frequency has significantly increased since 1983, the overall herbaceous understory trend is only stable.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - stable (3)

1997 TREND ASSESSMENT

The soil trend is stable. While percent bare ground cover has decreased, rock and pavement cover have increased. The browse trend is stable. Antelope bitterbrush stills exhibits heavy utilization, but not as much as in the past. Percent decadency has declined from 29% in 1989 to 8% in 1997. Mountain big sagebrush vigor has improved since 1989 and decadence is moderately low at 19%. The main negative factor with sagebrush is that 50% of the decadent plants were classified as dying. This would indicate possible continuing losses to the population. Currently, the dead to live ratio is 1:3, or 25% of the population are dead. Increaser plants do not appear to be increasing at this time. The perennial herbaceous understory sum of nested frequency is nearly identical to that of 1989. The herbaceous understory is still depleted, but appears to have a stable trend.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

2002 TREND ASSESSMENT

Soils have a slightly downward trend. Cover of bare ground increased, and litter cover slightly decreased. Most of the vegetation cover on the site comes from shrubs which are not as effective as herbaceous species at holding soils in place. Trend for browse is stable. The key species, bitterbrush and mountain big sagebrush, have stable densities, decadence remains within acceptable limits, and vigor is generally normal throughout their respective populations. Mountain big sagebrush has moderately low reproduction with 280 young plants/acre being sampled, while no young bitterbrush were sampled in 2002. Low shrub reproduction often results during periods of drought and should improve with better precipitation. Trend for the herbaceous component is stable. The herbaceous understory has been rather sparse in all readings which has not changed in 2002. Drought, Mormon crickets, and a diverse and abundant mountain brush community combined to suppress the understory in 2002. Due to the fact that the understory has been limited since site establishment in 1983, it is unlikely that the understory will ever increase in productivity on it's own without changes in management, perhaps even restoration efforts.

TREND ASSESSMENT

soil - slightly down (2)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 10

| T y p e | Species | Nestled Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|------------------------------|-------------------|-------------------|-------------------|------------------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | Agropyron cristatum | - | - | - | 1 | - | - | - | 1 | - | .00 |
| G | Agropyron spicatum | _a 83 | _{ab} 101 | _{bc} 123 | _c 146 | 32 | 40 | 49 | 54 | 3.69 | 5.84 |
| G | Bromus tectorum (a) | - | - | _b 224 | _a 101 | - | - | 78 | 39 | 2.20 | 1.21 |
| G | Oryzopsis hymenoides | _{ab} 19 | _b 20 | _{ab} 15 | _a 6 | 10 | 11 | 8 | 3 | .30 | .37 |
| G | Poa fendleriana | 3 | - | - | - | 1 | - | - | - | - | - |
| G | Poa secunda | 1 | 2 | 2 | - | 1 | 1 | 2 | - | .03 | - |
| Total for Annual Grasses | | 0 | 0 | 224 | 101 | 0 | 0 | 78 | 39 | 2.20 | 1.21 |
| Total for Perennial Grasses | | 106 | 123 | 140 | 153 | 44 | 52 | 59 | 58 | 4.02 | 6.22 |
| Total for Grasses | | 106 | 123 | 364 | 254 | 44 | 52 | 137 | 97 | 6.23 | 7.44 |
| F | Alyssum alyssoides (a) | - | - | _a 5 | _b 13 | - | - | 2 | 4 | .01 | .02 |
| F | Arabis spp. | - | - | 1 | - | - | - | 1 | - | .03 | - |
| F | Astragalus spp. | - | - | - | 1 | - | - | - | 1 | - | .00 |
| F | Calochortus nuttallii | 4 | - | - | - | 2 | - | - | - | - | - |
| F | Chenopodium fremontii (a) | - | - | _b 9 | _a - | - | - | 6 | - | .11 | - |
| F | Chenopodium leptophyllum (a) | - | - | 4 | - | - | - | 1 | - | .00 | - |
| F | Cirsium spp. | _b 10 | _{ab} 3 | _a - | _a - | 5 | 1 | - | - | - | - |
| F | Collomia linearis (a) | - | - | 1 | 1 | - | - | 1 | 1 | .00 | .00 |
| F | Corallorrhiza maculata | - | 1 | - | - | - | 1 | - | - | - | - |
| F | Collinsia parviflora (a) | - | - | - | 1 | - | - | - | 1 | - | .03 |
| F | Crepis acuminata | - | 2 | 1 | 3 | - | 2 | 1 | 1 | .03 | .00 |
| F | Cryptantha spp. | - | - | 1 | - | - | - | 1 | - | .00 | - |

| T y p e | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|---------------------------|-----------------------------------|------------------|-----------------|------------------|-----------------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| F | <i>Cynoglossum officinale</i> | - | 2 | 2 | - | - | 1 | 2 | - | .03 | - |
| F | <i>Epilobium brachycarpum</i> (a) | - | - | 3 | - | - | - | 2 | - | .01 | - |
| F | <i>Eriogonum brevicaule</i> | - | - | - | 3 | - | - | - | 1 | - | .00 |
| F | <i>Eriogonum racemosum</i> | _a 9 | _b 25 | _a 4 | _a 8 | 4 | 12 | 3 | 4 | .01 | .02 |
| F | <i>Eriogonum umbellatum</i> | _{ab} 6 | _b 16 | _{ab} 10 | _a - | 2 | 6 | 4 | - | .09 | - |
| F | <i>Hackelia patens</i> | 7 | 10 | 5 | - | 4 | 4 | 2 | - | .04 | - |
| F | <i>Lappula occidentalis</i> (a) | - | - | 5 | - | - | - | 2 | - | .01 | - |
| F | <i>Lactuca serriola</i> | - | 6 | - | - | - | 2 | - | - | - | - |
| F | <i>Lomatium</i> spp. | 3 | 1 | - | - | 1 | 1 | - | - | - | - |
| F | <i>Lupinus argenteus</i> | 6 | 17 | 4 | 16 | 2 | 8 | 2 | 8 | .15 | .21 |
| F | <i>Machaeranthera canescens</i> | _b 27 | _a 2 | _a 2 | _a 3 | 14 | 1 | 2 | 1 | .06 | .03 |
| F | <i>Mentzelia albicaulis</i> (a) | - | - | _b 18 | _a - | - | - | 9 | - | .11 | - |
| F | <i>Oenothera pallida</i> | 3 | - | - | - | 1 | - | - | - | - | - |
| F | <i>Penstemon humilis</i> | _b 46 | _a - | _b 48 | _b 30 | 19 | - | 19 | 15 | .54 | .58 |
| F | <i>Phlox longifolia</i> | _a 6 | _b 50 | _a 25 | _a 8 | 3 | 25 | 12 | 5 | .11 | .02 |
| F | <i>Polygonum douglasii</i> (a) | - | - | 9 | 1 | - | - | 5 | 1 | .02 | .00 |
| F | <i>Sisymbrium altissimum</i> (a) | - | - | 4 | - | - | - | 2 | - | .01 | - |
| F | <i>Streptanthus cordatus</i> | 2 | - | - | 1 | 2 | - | - | 1 | - | .00 |
| F | <i>Tragopogon dubius</i> | - | - | 2 | - | - | - | 1 | - | .00 | - |
| Total for Annual Forbs | | 0 | 0 | 58 | 16 | 0 | 0 | 30 | 7 | 0.30 | 0.05 |
| Total for Perennial Forbs | | 129 | 135 | 105 | 73 | 59 | 64 | 50 | 37 | 1.12 | 0.89 |
| Total for Forbs | | 129 | 135 | 163 | 89 | 59 | 64 | 80 | 44 | 1.42 | 0.95 |

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

BROWSE TRENDS --
Herd unit 19B, Study no: 10

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|--------------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | <i>Acer grandidentatum</i> | 3 | 2 | 1.26 | 1.00 |
| B | <i>Amelanchier utahensis</i> | 6 | 4 | .15 | .53 |
| B | <i>Artemisia tridentata vaseyana</i> | 76 | 84 | 15.04 | 16.47 |
| B | <i>Cercocarpus ledifolius</i> | 3 | 0 | .15 | - |
| B | <i>Ceanothus martinii</i> | 4 | 7 | .74 | .18 |
| B | <i>Chrysothamnus nauseosus albicaulis</i> | 2 | 3 | .15 | .18 |
| B | <i>Chrysothamnus viscidiflorus viscidiflorus</i> | 56 | 62 | 1.73 | 2.05 |
| B | <i>Eriogonum microthecum</i> | 27 | 30 | 1.05 | 1.63 |
| B | <i>Gutierrezia sarothrae</i> | 0 | 3 | - | - |
| B | <i>Opuntia spp.</i> | 22 | 28 | 1.42 | .64 |
| B | <i>Pinus monophylla</i> | 0 | 3 | .63 | .03 |
| B | <i>Purshia tridentata</i> | 44 | 36 | 6.42 | 5.48 |
| B | <i>Symphoricarpos oreophilus</i> | 3 | 1 | .03 | .15 |
| Total for Browse | | 246 | 263 | 28.80 | 28.38 |

CANOPY COVER -- LINE INTERCEPT
Herd unit 19B, Study no: 10

| Species | Percent Cover | |
|--------------------------------------------------|---------------|-------|
| | '97 | '02 |
| <i>Acer grandidentatum</i> | - | 2.00 |
| <i>Amelanchier utahensis</i> | - | .42 |
| <i>Artemisia tridentata vaseyana</i> | - | 17.00 |
| <i>Ceanothus martinii</i> | - | .33 |
| <i>Chrysothamnus nauseosus albicaulis</i> | - | .42 |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | - | 2.75 |
| <i>Eriogonum microthecum</i> | - | .75 |
| <i>Opuntia spp.</i> | - | .25 |
| <i>Pinus monophylla</i> | .40 | .17 |
| <i>Purshia tridentata</i> | - | 6.17 |
| <i>Symphoricarpos oreophilus</i> | - | .05 |

Key Browse Annual Leader Growth
Herd unit 19B , Study no: 10

| Species | Average leader growth (in) '02 |
|-------------------------------|-----------------------------------|
| Artemisia tridentata vaseyana | 1.8 |
| Purshia tridentata | 1.9 |

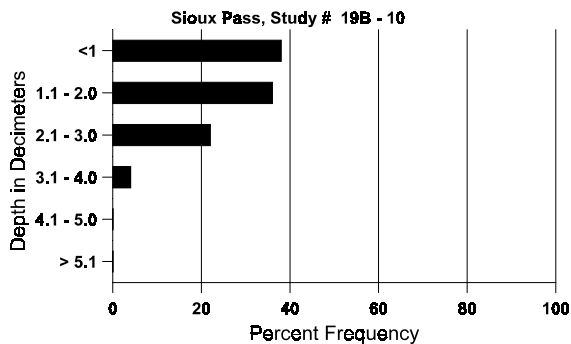
BASIC COVER --
Herd unit 19B, Study no: 10

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 308 | 272 | 4.25 | 12.50 | 35.70 | 35.09 |
| Rock | 268 | 261 | 14.50 | 14.25 | 15.34 | 18.14 |
| Pavement | 263 | 262 | 2.25 | 1.25 | 9.17 | 8.52 |
| Litter | 388 | 380 | 48.00 | 37.75 | 40.42 | 37.02 |
| Cryptogams | 8 | - | 0 | 0 | .16 | 0 |
| Bare Ground | 223 | 262 | 31.00 | 34.25 | 11.55 | 24.42 |

SOIL ANALYSIS DATA --
Herd Unit 19B, Study no: 10, Sioux Pass

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 15.4 | 43.2 (16.5) | 6.7 | 72.7 | 15.4 | 11.8 | 1.9 | 14.2 | 169.6 | 0.6 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 19B, Study no: 10

| Type | Quadrat Frequency | | Pellet Transect | | | |
|--------|-------------------|-----|------------------------|------|------------------------|----------|
| | '97 | '02 | Pellet Groups per Acre | | Days Use per Acre (ha) | |
| | | | '97 | '02 | '97 | '02 |
| Sheep | 4 | 1 | 165 | 244 | 13 (31) | 19 (46) |
| Rabbit | 4 | 2 | - | - | - | - |
| Elk | 4 | 1 | 17 | - | 1 (4) | - |
| Deer | 29 | 15 | 418 | 1018 | 32 (79) | 78 (193) |
| Cattle | - | - | 17 | - | 1 (4) | - |

BROWSE CHARACTERISTICS --
Herd unit 19B, Study no: 10

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | |
|------------------------------------------------|----------------------------|---------------------|------------------|-------------------|----------------|--------------------|--------------------------------|-------|-------|
| | | 1 | 2 | 3 | 4 | | | | |
| Acer grandidentatum | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | 0 | 0 |
| | 89 | - | - | - | - | - | - | 0 | 0 |
| | 97 | 10 | - | - | - | - | 2 | 240 | 12 |
| | 02 | - | - | - | - | - | - | 0 | 0 |
| M | 83 | - | - | - | - | - | - | 0 | 0 |
| | 89 | - | - | - | - | - | - | 0 | 0 |
| | 97 | - | - | - | - | - | - | 0 | 67 36 |
| | 02 | 5 | - | - | - | - | - | 100 | - |
| X | 83 | - | - | - | - | - | - | 0 | 0 |
| | 89 | - | - | - | - | - | - | 0 | 0 |
| | 97 | - | - | - | - | - | - | 20 | 1 |
| | 02 | - | - | - | - | - | - | 0 | 0 |
| % Plants Showing | | <u>Moderate Use</u> | <u>Heavy Use</u> | <u>Poor Vigor</u> | <u>%Change</u> | | | | |
| '83 | | 00% | 00% | 00% | | | | | |
| '89 | | 00% | 00% | 00% | | | | | |
| '97 | | 00% | 00% | 00% | -58% | | | | |
| '02 | | 00% | 00% | 00% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | '83 | 0 | Dec: | - | |
| | | | | | '89 | 0 | | - | |
| | | | | | '97 | 240 | | - | |
| | | | | | '02 | 100 | | - | |
| Amelanchier utahensis | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | 0 | 0 |
| | 89 | - | - | - | 1 | - | - | 33 | 1 |
| | 97 | 1 | - | - | 1 | - | - | 40 | 2 |
| | 02 | - | - | - | - | - | - | 0 | 0 |
| M | 83 | - | - | - | - | - | - | 0 | 0 |
| | 89 | - | - | - | - | - | - | 0 | 0 |
| | 97 | - | 1 | 1 | - | - | 1 | 60 | 30 29 |
| | 02 | - | - | - | - | 2 | - | 40 | 20 33 |
| D | 83 | - | - | - | - | - | - | 0 | 0 |
| | 89 | - | - | - | - | - | - | 0 | 0 |
| | 97 | - | - | - | - | 1 | - | 20 | 1 |
| | 02 | - | - | - | - | 1 | 1 | 40 | 2 |
| % Plants Showing | | <u>Moderate Use</u> | <u>Heavy Use</u> | <u>Poor Vigor</u> | <u>%Change</u> | | | | |
| '83 | | 00% | 00% | 00% | | | | | |
| '89 | | 00% | 00% | 00% | +73% | | | | |
| '97 | | 33% | 33% | 17% | -33% | | | | |
| '02 | | 25% | 75% | 00% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | '83 | 0 | Dec: | 0% | |
| | | | | | '89 | 33 | | 0% | |
| | | | | | '97 | 120 | | 17% | |
| | | | | | '02 | 80 | | 50% | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | | |
|------------------------------------------------|----------------------------|---------------------|----|------------------|---|--------------------|--------------------------------|----------------|-------|-----|------|------|-----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | 0 | | 0 | | |
| | 89 | 5 | - | - | 1 | - | - | - | 200 | | 6 | | |
| | 97 | 2 | - | - | - | - | - | - | 40 | | 2 | | |
| | 02 | - | - | - | - | - | - | - | 0 | | 0 | | |
| Y | 83 | 19 | - | - | - | - | - | - | 633 | | 19 | | |
| | 89 | 33 | - | - | 1 | - | - | - | 1133 | | 34 | | |
| | 97 | 1 | - | - | - | 1 | - | - | 40 | | 2 | | |
| | 02 | 14 | - | - | - | - | - | - | 280 | | 14 | | |
| M | 83 | 30 | 8 | - | - | - | - | - | 1266 | 20 | 22 | 38 | |
| | 89 | 38 | 9 | 1 | - | - | - | - | 1600 | 26 | 33 | 48 | |
| | 97 | 81 | 26 | 6 | - | 1 | - | - | 2280 | 21 | 37 | 114 | |
| | 02 | 102 | 5 | 1 | 2 | - | - | - | 2200 | 22 | 36 | 110 | |
| D | 83 | 9 | 6 | - | - | - | - | - | 500 | | | 15 | |
| | 89 | 9 | 2 | - | - | - | - | - | 366 | | | 11 | |
| | 97 | 21 | 6 | - | 1 | - | - | - | 560 | | | 28 | |
| | 02 | 30 | - | - | 1 | - | - | 2 | 660 | | | 33 | |
| X | 83 | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 89 | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 97 | - | - | - | - | - | - | - | 920 | | | 46 | |
| | 02 | - | - | - | - | - | - | - | 620 | | | 31 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | |
| '83 | | 19% | | 00% | | 14% | | +23% | | | | | |
| '89 | | 12% | | 01% | | 47% | | - 7% | | | | | |
| '97 | | 24% | | 04% | | 10% | | + 8% | | | | | |
| '02 | | 03% | | .63% | | 10% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 2399 | Dec: | 21% |
| | | | | | | | | | | '89 | 3099 | | 12% |
| | | | | | | | | | | '97 | 2880 | | 19% |
| | | | | | | | | | | '02 | 3140 | | 21% |
| <i>Cercocarpus ledifolius</i> | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 89 | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 97 | 2 | 1 | - | - | - | - | - | 60 | - | - | 3 | |
| | 02 | - | - | - | - | - | - | - | 0 | 104 | 117 | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | |
| '83 | | 00% | | 00% | | 00% | | | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | | | |
| '97 | | 33% | | 00% | | 00% | | | | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 0 | Dec: | - |
| | | | | | | | | | | '89 | 0 | | - |
| | | | | | | | | | | '97 | 60 | | - |
| | | | | | | | | | | '02 | 0 | | - |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|----|------------------|---|---|-------------------|---|---|----------------|------|------|-----|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Ceanothus martinii</i> | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 28 | - | - | - | - | - | - | - | - | 28 | - | - | - | 933 | | 28 | |
| | 97 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | | 3 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | - | 2 | 26 | - | - | - | - | - | - | 18 | - | 10 | - | 933 | 16 | 20 | 28 |
| | 89 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 166 | 12 | 30 | 5 |
| | 97 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | 60 | 13 | 39 | 3 |
| | 02 | 4 | 1 | 1 | 1 | - | - | - | - | - | 7 | - | - | - | 140 | 10 | 19 | 7 |
| D | 83 | - | - | 3 | - | - | - | - | - | - | - | - | 3 | - | 100 | | 3 | |
| | 89 | 74 | - | - | - | - | - | - | - | - | 73 | - | 1 | - | 2466 | | 74 | |
| | 97 | - | - | - | 2 | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| | 02 | 2 | - | - | - | - | - | - | - | - | - | - | - | 2 | 40 | | 2 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 06% | | | 94% | | | 42% | | | +71% | | | | | | | |
| '89 | | 00% | | | 00% | | | .93% | | | -96% | | | | | | | |
| '97 | | 00% | | | 00% | | | 38% | | | +11% | | | | | | | |
| '02 | | 11% | | | 11% | | | 22% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 1033 | Dec: | 10% | | | | |
| | | | | | | | | | | | '89 | 3565 | | 69% | | | | |
| | | | | | | | | | | | '97 | 160 | | 25% | | | | |
| | | | | | | | | | | | '02 | 180 | | 22% | | | | |
| <i>Chrysothamnus nauseosus albicaulis</i> | | | | | | | | | | | | | | | | | | |
| Y | 83 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 100 | 11 | 14 | 3 |
| | 89 | 1 | 1 | - | - | - | - | - | - | - | 1 | 1 | - | - | 66 | 16 | 18 | 2 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 8 | 28 | 1 |
| | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | 28 | 30 | 2 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | 20 | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | -60% | | | | | | | |
| '89 | | 50% | | | 00% | | | 00% | | | -39% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +33% | | | | | | | |
| '02 | | 00% | | | 00% | | | 33% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 166 | Dec: | 0% | | | | |
| | | | | | | | | | | | '89 | 66 | | 0% | | | | |
| | | | | | | | | | | | '97 | 40 | | 50% | | | | |
| | | | | | | | | | | | '02 | 60 | | 33% | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Chrysothamnus viscidiflorus viscidiflorus | | | | | | | | | | | | | | | | | | |
| S | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | 1 | - | - | 2 | - | - | 2 | - | - | 5 | - | - | - | 166 | | 5 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | '83 | 11 | - | - | - | - | - | - | - | - | 11 | - | - | - | 366 | | 11 | |
| | '89 | 10 | - | - | - | - | - | - | - | - | 10 | - | - | - | 333 | | 10 | |
| | '97 | 2 | - | - | 1 | - | - | - | - | - | 3 | - | - | - | 60 | | 3 | |
| | '02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| M | '83 | 90 | - | - | - | - | - | - | - | - | 90 | - | - | - | 3000 | 10 14 | 90 | |
| | '89 | 85 | 2 | 1 | 10 | - | - | 2 | - | - | 100 | - | - | - | 3333 | 14 17 | 100 | |
| | '97 | 83 | 1 | - | 14 | - | - | 1 | - | - | 99 | - | - | - | 1980 | 12 13 | 99 | |
| | '02 | 70 | - | 9 | 3 | - | - | 2 | - | - | 66 | - | 18 | - | 1680 | 10 15 | 84 | |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | 13 | 1 | - | - | - | - | - | - | - | 12 | - | 2 | - | 466 | | 14 | |
| | '97 | 3 | - | - | 2 | - | - | - | - | - | 4 | - | - | 1 | 100 | | 5 | |
| | '02 | 12 | 2 | 6 | - | 1 | - | - | - | - | 8 | - | 7 | 6 | 420 | | 21 | |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +19% | | | | | | | |
| '89 | | 02% | | | .80% | | | 02% | | | -48% | | | | | | | |
| '97 | | .93% | | | 00% | | | .93% | | | + 0% | | | | | | | |
| '02 | | 03% | | | 14% | | | 29% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 3366 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 4132 | | 11% | | | |
| | | | | | | | | | | | | '97 | 2140 | | 5% | | | |
| | | | | | | | | | | | | '02 | 2140 | | 20% | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|------|------|----|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Eriogonum microthecum | | | | | | | | | | | | | | | | | | |
| Y | 83 | 2 | - | - | - | - | - | - | - | - | 1 | 1 | - | - | 66 | | 2 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 83 | 18 | 11 | - | - | - | - | - | - | - | 9 | 20 | - | - | 966 | 8 | 13 | 29 |
| | 89 | 36 | 1 | 1 | 10 | - | - | 3 | - | - | 51 | - | - | - | 1700 | 11 | 16 | 51 |
| | 97 | 29 | - | - | 8 | - | - | - | - | - | 37 | - | - | - | 740 | 12 | 20 | 37 |
| | 02 | 37 | 1 | - | 2 | - | - | - | - | - | 40 | - | - | - | 800 | 9 | 17 | 40 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 4 | - | - | 1 | - | - | - | - | - | 5 | - | - | - | 166 | | 5 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| | '83 | 35% | | | 00% | | | 00% | | | +46% | | | | | | | |
| | '89 | 02% | | | 02% | | | 00% | | | -60% | | | | | | | |
| | '97 | 00% | | | 00% | | | 00% | | | +10% | | | | | | | |
| | '02 | 02% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 1032 | Dec: | 0% | | | | |
| | | | | | | | | | | | '89 | 1899 | | 9% | | | | |
| | | | | | | | | | | | '97 | 760 | | 0% | | | | |
| | | | | | | | | | | | '02 | 840 | | 2% | | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | | | | | |
|------------------------------------------------|----------------------------|---------------------|---|---|------------------|--------------------|--------------------------------|-------------------|-------|-----|----------------|------|----|------|---|----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | | | | | | |
| Gutierrezia sarothrae | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 2 | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | 2 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 3 | - | - | - | - | - | - | - | 3 | - | - | - | 100 | | 3 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - |
| | 89 | 42 | - | - | - | - | - | - | - | 42 | - | - | - | 1400 | 7 | 7 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - |
| | 02 | 3 | - | - | - | - | - | - | - | 2 | - | - | 1 | 60 | 8 | 14 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | |
| '02 | | 00% | | | 00% | | | 33% | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | '89 | 1533 | | 2% | | | |
| | | | | | | | | | | '97 | 0 | | 0% | | | |
| | | | | | | | | | | '02 | 60 | | 0% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | 1 | - | - | 1 | - | - | 2 | - | - | - | 66 | | 2 |
| | 97 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 80 | | 4 |
| | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 |
| M | 83 | 11 | - | - | - | - | - | - | - | - | 11 | - | - | - | 366 | 6 18 | 11 |
| | 89 | 6 | - | - | 2 | - | - | - | - | - | 7 | - | 1 | - | 266 | 8 32 | 8 |
| | 97 | 24 | - | - | 4 | - | - | - | - | - | 28 | - | - | - | 560 | 5 26 | 28 |
| | 02 | 31 | - | - | - | - | - | - | - | - | 31 | - | - | - | 620 | 5 16 | 31 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 4 | - | - | 1 | - | - | - | - | - | 3 | - | - | 2 | 100 | | 5 |
| | 02 | 9 | - | - | - | - | - | - | - | - | - | - | - | 9 | 180 | | 9 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 100 | | 5 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | - 9% | | | | | | |
| '89 | | 00% | | | 00% | | | 10% | | | +55% | | | | | | |
| '97 | | 00% | | | 00% | | | 05% | | | +12% | | | | | | |
| '02 | | 00% | | | 00% | | | 21% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 366 | Dec: | 0% | | |
| | | | | | | | | | | | | '89 | 332 | | 0% | | |
| | | | | | | | | | | | | '97 | 740 | | 14% | | |
| | | | | | | | | | | | | '02 | 840 | | 21% | | |
| Pinus monophylla | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 02 | 2 | - | - | 1 | - | - | - | - | - | 3 | - | - | - | 60 | | 3 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | |
| | | | | | | | | | | | | '89 | 0 | | - | | |
| | | | | | | | | | | | | '97 | 0 | | - | | |
| | | | | | | | | | | | | '02 | 60 | | - | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|----|------------------|---|----|-------------------|---|----|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Purshia tridentata | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 89 | - | - | - | - | - | 1 | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | - | - | 5 | - | - | - | - | - | 17 | 8 | - | 14 | - | 733 | 8 19 | 22 | |
| | 89 | - | - | 16 | 1 | 2 | - | - | - | - | 18 | - | 1 | - | 633 | 9 24 | 19 | |
| | 97 | 1 | 4 | 33 | - | 9 | 9 | 3 | - | - | 59 | - | - | - | 1180 | 11 59 | 59 | |
| | 02 | - | 2 | 17 | - | 4 | 19 | - | - | - | 42 | - | - | - | 840 | 10 44 | 42 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | |
| | 89 | - | 1 | 7 | - | - | - | - | - | - | 7 | - | 1 | - | 266 | | 8 | |
| | 97 | - | - | 3 | 1 | - | - | 1 | - | - | 4 | - | - | 1 | 100 | | 5 | |
| | 02 | - | 1 | 8 | - | - | 5 | - | - | - | 12 | - | - | 2 | 280 | | 14 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 80 | | 4 | | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 04% | | | 96% | | | 61% | | | +18% | | | | | | | |
| '89 | | 11% | | | 86% | | | 07% | | | +28% | | | | | | | |
| '97 | | 20% | | | 69% | | | 02% | | | -14% | | | | | | | |
| '02 | | 13% | | | 88% | | | 04% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 766 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 932 | | 29% | | | |
| | | | | | | | | | | | | '97 | 1300 | | 8% | | | |
| | | | | | | | | | | | | '02 | 1120 | | 25% | | | |
| Symphoricarpos oreophilus | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 | |
| | 97 | - | - | - | 2 | - | - | - | - | - | 2 | - | - | - | 40 | - | 2 | |
| | 02 | - | - | - | - | - | - | 1 | - | - | 1 | - | - | - | 20 | 12 17 | 1 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | | |
| | 97 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 33% | | | -67% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 0 | | 0% | | | |
| | | | | | | | | | | | | '97 | 60 | | 33% | | | |
| | | | | | | | | | | | | '02 | 20 | | 0% | | | |

Trend Study 19B-12-02

Study site name: Sunrise Canyon

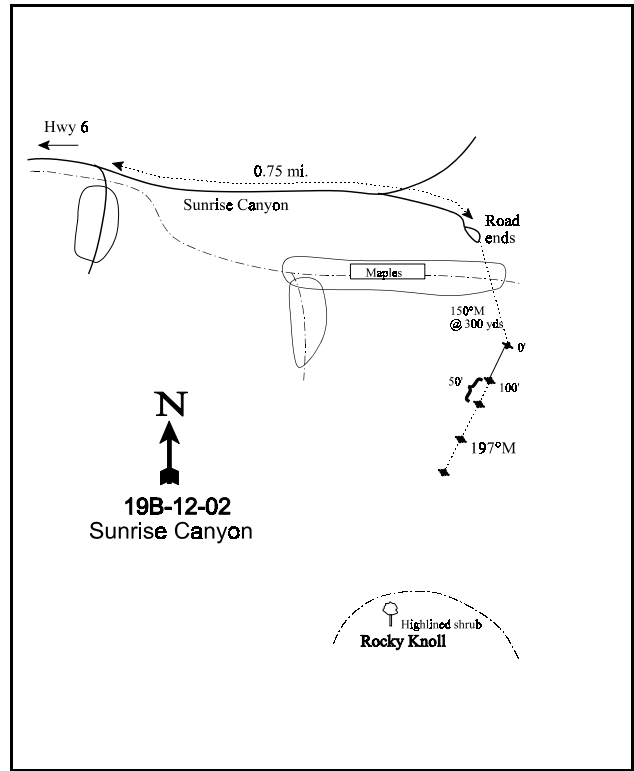
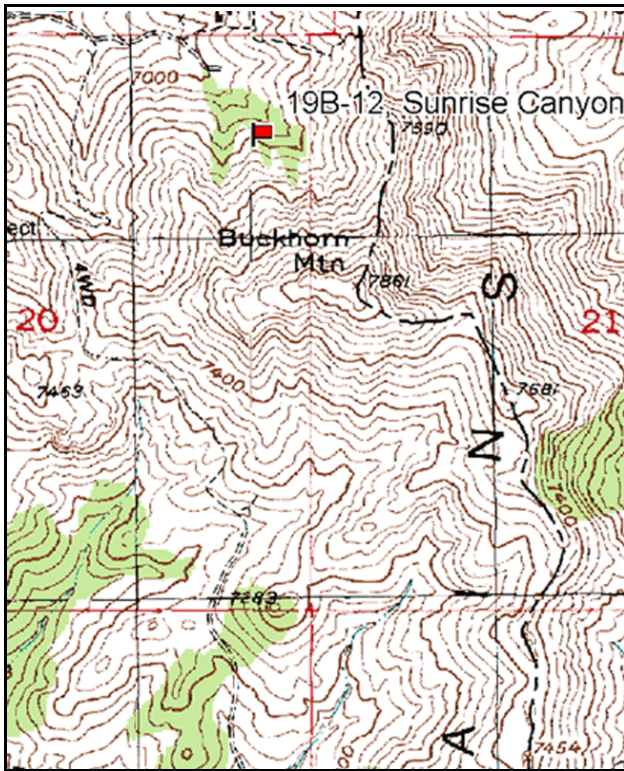
Vegetation type: Big Sagebrush-Grass

Compass bearing: frequency baseline 197 degrees magnetic.

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

LOCATION DESCRIPTION

From the junction of Highway U.S. 6 and U-36, proceed south on U.S. 6 for 6.30 miles to where the Sunrise Seeding road leads off to the east at mile marker 132. Proceed east on this road for 0.70 miles to a fork. Keep left for an additional 0.90 miles to an intersection. Turn right (east) up Sunrise Canyon for 0.85 miles to another fork. Stay left and go 0.75 miles to the end of the road in the bottom of Sunrise Canyon. From this point, the 0-foot mark of the baseline is located on a small ridge on an azimuth of 171 degrees on the opposite side of a maple clogged draw. Walk on the designated azimuth through the draw to the sagebrush grass ridge. The 0-foot mark, marked by a green steel fencepost with a red browse tag #437, is located approximately midway up the slope and in the middle of the ridge.



Map Name: Tintic Mountain

Diagrammatic Sketch

Township 11S, Range 2W, Section 20

GPS: NAD 27, UTM 12S 4412248 N 407341 E

DISCUSSION

Sunrise Canyon - Trend Study No. 19B-12

The Sunrise Canyon study is located on a northwest facing, moderately steep slope (25%) at an elevation of 7,200 feet. The area is deer summer range and is occupied by a sagebrush-grass type. Vegetatively, the area is typical of the higher ridges and slopes in this portion of the East Tintic Mountains. Escape and thermal cover are limited to narrow fingers of black chokecherry and bigtooth maple in the drainage bottoms. Deer favor the more mesic sites, such as this one, thus competing for succulent forage with livestock. In 1983, numerous does with fawns, as well as a brood of sage grouse, were flushed from the draw immediately below the study site. It was further noted that livestock grazing was especially intense in the draws, but much less on the slopes and ridges. In 1989, the shrub interspaces were nearly devoid of cover after spring sheep use. This is likely the case during most years. Deer pellet groups seem to be concentrated more in the chokecherry and maple bottoms below the site. A herd of sheep was grazing in the area when the site was read in 2002. A pellet group transect read on site in 2002, estimated only 7 deer days use/acre (17 ddu/ha) while domestic sheep use was estimated at 41 days use/acre (102 sdu/ha).

The soil is very shallow and rocky. Effective rooting depth is estimated at just over 7 inches with an average soil temperature of 55°F measured at 13 inches. Chemical and textural analysis indicates soils to be a sandy clay loam with a slightly acidic reactivity (pH of 6.1). Vegetative cover is moderate with over half being provided by shrubs. The slope is terraced by a network of livestock and game trails. Herbaceous vegetation cover was abundant at 27% in 2002 which adds important protective cover to the soil surface. The erosion condition class was estimated as slight in 2002.

Shrub composition is diverse but composed principally of low growing species due to the shallow, rocky nature of the soils. Sagebrush has been split into two species, low sage (*Artemisia arbuscula*) and mountain big sagebrush (*Artemisia tridentata* spp. *vaseyana*). It is likely that many of the plants are a hybrid between the two as they are known to hybridize (McArthur et al. 1979). The most abundant shrub is low sagebrush with an estimated density of 6,700 plants/acre in 1997, and 6,440 in 2002. Mature plants make up just over 80% of the population, with decadent plants representing most of the rest. The low sagebrush population has generally had good vigor except in 1989 when 60% of the population was classified as having poor vigor. Mountain big sagebrush is also present in moderately high densities, estimated at 3,000 plants/acre in 2002. Utilization is mostly light and vigor has improved since 1989. Percent decadence was moderate at 30% and 25% respectively in 1997 and 2002. With the combined densities of both sagebrush species at over 9,000 plants/acre, it is surprising that decadence and poor vigor are not higher for this browse, especially during the drought in 2002. Sagebrush should be thinned on this site to promote increased herbaceous production. Annual leader growth on sagebrush averaged less than one inch in 2002. Other browse species sampled on the site include Saskatoon serviceberry, true mountain mahogany, white-stemmed rubber rabbitbrush, slenderbush eriogonum, Oregon grape, pricklypear cactus, mountain lover, mountain snowberry, and grey horsebrush.

The herbaceous understory has been moderately low, due to the very high density and cover provided by low and mountain big sagebrush, as well as consistent spring grazing by sheep. Bluebunch wheatgrass and mutton bluegrass are the dominant grasses providing 95% of the grass cover in 2002. Both species decreased in nested frequency in 2002, but neither decline was significant. Individual grass plants that were in the open areas were grazed nearly to the ground in 2002, and identification of these particular plants was difficult.

The forb component provides a lot of cover, but composition is poor and dominated by silvery lupine which increased significantly in nested frequency and average cover in 2002. Other forbs sampled include sandwort, houndstongue, and Hood's phlox. Sum of nested frequency significantly increased in 2002 which was surprising due to drought conditions and the very dense sagebrush population. Nearly all of this increase came from the increase in silvery lupine.

1983 APPARENT TREND ASSESSMENT

Soil condition probably limits forage production on this site. The soil is thin and incapable of storing much moisture in the upper horizons. Also, the uniform shrub cover is highly competitive, thus inhibiting herbaceous understory growth. Although individual trend indicators suggest a slight decline in soil trend, the overall impression one gets is of stability, even though it is at a low level of condition. The soil surface appears almost "armored" against further erosion. The browse trend appears stable. Overall, utilization of forage is light, except for some nearby ravines, where it is quite heavy. From a management point of view, the principal problem would seem to be scarcity of cover and low production of succulent herbaceous forage.

1989 TREND ASSESSMENT

Rock and pavement still dominate the ground cover (32%). Bare ground is also moderately high at 18%. The soil trend is stable with little change since 1983. The browse trend is also stable with little change from the previous reading. Light to moderate utilization is occurring on the low sagebrush and mountain big sagebrush. Increaser species show no increase. The uncommon true mountain mahogany on the ridge above the site are extremely hedged. There is an overall decline in herbaceous understory sum of nested frequency since 1983. The herbaceous understory trend is slightly downward.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly down (2)

1997 TREND ASSESSMENT

The soil trend is stable, but in poor condition. Erosion continues to occur on the site and will likely do so until livestock grazing pressures are reduced and herbaceous understory production increases. The trend for the key browse is stable. The density of low sagebrush declined, but most of this is due to the greatly increased sample size used in 1997. The proportion of the population displaying poor vigor improved for both low sage and mountain big sagebrush. The proportion of the low sage and mountain big sagebrush populations classified as decadent and dying is high at 40% and 50% respectively. However, both occur in high densities and their respective populations are probably undergoing a period of thinning with prolonged drought. Utilization decreased for both species of sagebrush compared to 1989 levels. As reported in 1989, there is still little change in the browse composition. The herbaceous understory trend is stable. The sum of nested frequency value for perennial species has declined since 1989, but only slightly. Productivity is low, possibly due to the browse canopy cover.

TREND ASSESSMENT

soil - stable, poor condition (3)

browse - stable (3)

herbaceous understory - stable (3)

2002 TREND ASSESSMENT

Trend for soil is stable. The percentage of bare ground and combined rock and pavement cover remained similar to 1997 estimates. Herbaceous cover increased due to a significant increase of silvery lupine. Slight erosion is still occurring on the site, but with the steepness of the slope, this is likely to continue. Trend for browse is stable. Low sagebrush and mountain big sagebrush remain at relatively high densities, show mostly light use, generally good vigor, and decadence is within acceptable limits. Sagebrush could be thinned on this site to promote better herbaceous production. The herbaceous understory has a stable trend with an increase in nested frequency for lupine, and only a slight decline in sum of nested frequency for perennial grasses. Composition is poor and will remain so under the current management of spring sheep grazing and the overly abundant populations of low and mountain big sagebrush.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 12

| T y p e | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|-----------------------|-------------------|------------------|------------------|------------------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | Agropyron spicatum | _{ab} 103 | _a 64 | _b 138 | _b 116 | 42 | 33 | 56 | 55 | 2.02 | 2.60 |
| G | Bromus tectorum (a) | - | - | 15 | 7 | - | - | 8 | 3 | .04 | .01 |
| G | Carex spp. | 1 | - | - | 4 | 1 | - | - | 3 | - | .06 |
| G | Koeleria cristata | 3 | - | - | - | 1 | - | - | - | - | - |
| G | Melica bulbosa | _b 29 | _a - | _a - | _a 3 | 12 | - | - | 1 | - | .15 |
| G | Poa fendleriana | 237 | 254 | 157 | 131 | 96 | 107 | 55 | 51 | 3.25 | 4.26 |
| G | Poa secunda | _a 7 | _{ab} 23 | _b 29 | _{ab} 15 | 5 | 12 | 15 | 6 | .20 | .13 |
| G | Stipa columbiana | 3 | 8 | 8 | - | 1 | 3 | 4 | - | .44 | - |
| Total for Annual Grasses | | 0 | 0 | 15 | 7 | 0 | 0 | 8 | 3 | 0.04 | 0.01 |
| Total for Perennial Grasses | | 383 | 349 | 332 | 269 | 158 | 155 | 130 | 116 | 5.92 | 7.22 |
| Total for Grasses | | 383 | 349 | 347 | 276 | 158 | 155 | 138 | 119 | 5.97 | 7.23 |
| F | Antennaria rosea | - | - | 10 | 3 | - | - | 4 | 1 | .04 | .03 |
| F | Arabis spp. | _b 13 | _{ab} 9 | _{ab} 3 | _a - | 7 | 3 | 2 | - | .01 | - |
| F | Arenaria fendleri | _b 174 | _b 153 | _a 91 | _a 67 | 65 | 62 | 38 | 25 | 1.93 | 1.70 |
| F | Astragalus spp. | _a - | _b 11 | _a 3 | _{ab} 4 | - | 4 | 2 | 2 | .01 | .03 |
| F | Castilleja chromosa | 4 | - | - | - | 2 | - | - | - | - | - |
| F | Calochortus nuttallii | _b 6 | _a - | _a - | _a - | 5 | - | - | - | - | - |
| F | Chaenactis douglasii | 2 | 2 | - | - | 1 | 1 | - | - | - | - |
| F | Chenopodium spp. (a) | - | - | 1 | - | - | - | 1 | - | .00 | - |
| F | Collomia linearis (a) | - | - | 2 | 2 | - | - | 1 | 1 | .00 | .00 |
| F | Comandra pallida | - | - | - | 3 | - | - | - | 1 | - | .00 |

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|---------------------------|-----------------------------------|------------------|-----------------|------------------|------------------|-------------------|-----|-----|-----|-----------------|-------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| F | <i>Collinsia parviflora</i> (a) | - | - | 27 | 20 | - | - | 12 | 7 | .06 | .08 |
| F | <i>Cynoglossum officinale</i> | _a 1 | _a - | _b 37 | _b 34 | 1 | - | 20 | 16 | 1.76 | .23 |
| F | <i>Epilobium brachycarpum</i> (a) | - | - | _a - | _b 21 | - | - | - | 8 | - | .04 |
| F | <i>Erigeron</i> spp. | _b 12 | _c 28 | _a - | _{ab} 3 | 7 | 15 | - | 2 | - | .01 |
| F | <i>Eriogonum umbellatum</i> | 1 | 4 | - | - | 1 | 2 | - | - | - | - |
| F | <i>Galium</i> spp. | - | - | - | 3 | - | - | - | 1 | - | .00 |
| F | <i>Heuchera parvifolia</i> | 3 | - | - | - | 1 | - | - | - | - | - |
| F | <i>Lactuca serriola</i> | _a - | _a - | _b 7 | _a - | - | - | 5 | - | .02 | - |
| F | <i>Lithospermum ruderales</i> | 3 | 5 | 1 | - | 2 | 2 | 1 | - | .00 | - |
| F | <i>Lomatium</i> spp. | - | 2 | - | - | - | 2 | - | - | - | - |
| F | <i>Lupinus argenteus</i> | _a 55 | _b 84 | _c 120 | _d 154 | 25 | 40 | 57 | 61 | 6.30 | 16.26 |
| F | <i>Machaeranthera canescens</i> | 7 | 7 | 3 | 3 | 4 | 3 | 1 | 2 | .00 | .01 |
| F | <i>Petradoria pumila</i> | _b 25 | _a 4 | _a - | _a - | 12 | 2 | - | - | - | - |
| F | <i>Phlox hoodii</i> | _c 91 | _a 16 | _b 47 | _b 55 | 40 | 6 | 25 | 25 | .82 | 1.17 |
| F | <i>Phlox longifolia</i> | - | - | - | 4 | - | - | - | 2 | - | .01 |
| F | <i>Polygonum douglasii</i> (a) | - | - | _b 21 | _a 4 | - | - | 10 | 2 | .07 | .01 |
| F | <i>Senecio integerrimus</i> | _a - | _b 11 | _a - | _{ab} 5 | - | 5 | - | 3 | - | .04 |
| F | <i>Senecio multilobatus</i> | - | - | 2 | - | - | - | 1 | - | .00 | - |
| F | <i>Taraxacum officinale</i> | - | - | - | 3 | - | - | - | 2 | - | .01 |
| F | Unknown forb-perennial | 10 | - | - | 10 | 4 | - | - | 5 | - | .24 |
| F | <i>Zigadenus paniculatus</i> | 3 | 8 | 5 | - | 1 | 4 | 2 | - | .01 | - |
| Total for Annual Forbs | | 0 | 0 | 51 | 47 | 0 | 0 | 24 | 18 | 0.14 | 0.14 |
| Total for Perennial Forbs | | 410 | 344 | 329 | 351 | 178 | 151 | 158 | 148 | 10.93 | 19.78 |
| Total for Forbs | | 410 | 344 | 380 | 398 | 178 | 151 | 182 | 166 | 11.08 | 19.93 |

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

BROWSE TRENDS --
Herd unit 19B, Study no: 12

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|--------------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | <i>Acer grandidentatum</i> | 1 | 4 | - | .21 |
| B | <i>Amelanchier alnifolia</i> | 1 | 0 | - | - |
| B | <i>Artemisia arbuscula</i> | 61 | 57 | 14.27 | 12.99 |
| B | <i>Artemisia tridentata vaseyana</i> | 48 | 53 | 10.08 | 15.05 |
| B | <i>Cercocarpus montanus</i> | 1 | 0 | - | - |
| B | <i>Chrysothamnus nauseosus albicaulis</i> | 1 | 2 | - | - |
| B | <i>Chrysothamnus viscidiflorus viscidiflorus</i> | 36 | 38 | 1.12 | 2.57 |
| B | <i>Eriogonum microthecum</i> | 27 | 21 | .49 | .47 |
| B | <i>Mahonia repens</i> | 8 | 8 | .48 | .73 |
| B | <i>Opuntia spp.</i> | 2 | 4 | .63 | .63 |
| B | <i>Pachistima myrsinites</i> | 1 | 0 | - | - |
| B | <i>Symphoricarpos oreophilus</i> | 10 | 9 | .06 | .52 |
| B | <i>Tetradymia canescens</i> | 2 | 2 | .03 | .15 |
| Total for Browse | | 199 | 198 | 27.18 | 33.35 |

CANOPY COVER -- LINE INTERCEPT
Herd unit 19B, Study no: 12

| Species | Percent Cover | |
|--------------------------------------------------|---------------|-------|
| | '97 | '02 |
| <i>Artemisia arbuscula</i> | - | 22.00 |
| <i>Artemisia tridentata vaseyana</i> | - | 21.42 |
| <i>Chrysothamnus nauseosus albicaulis</i> | - | .67 |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | - | 3.50 |
| <i>Eriogonum microthecum</i> | - | .02 |
| <i>Mahonia repens</i> | - | 2.00 |
| <i>Opuntia spp.</i> | - | .58 |
| <i>Symphoricarpos oreophilus</i> | - | .33 |

Key Browse Annual Leader Growth
Herd unit 19B , Study no: 12

| Species | Average leader growth (in) |
|--------------------------------------|----------------------------|
| | '02 |
| <i>Artemisia tridentata vaseyana</i> | 0.7 |

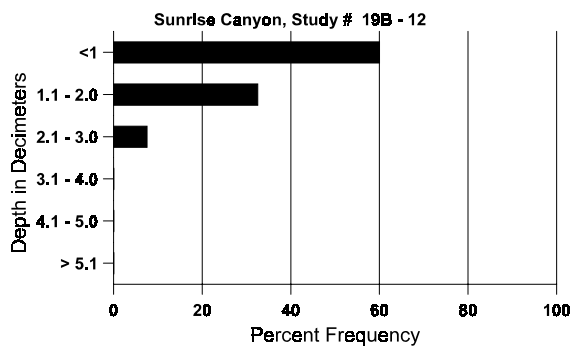
BASIC COVER --
Herd unit 19B, Study no: 12

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 302 | 317 | 2.75 | 9.25 | 39.82 | 52.60 |
| Rock | 301 | 277 | 28.50 | 24.75 | 20.16 | 21.08 |
| Pavement | 267 | 212 | 4.75 | 7.25 | 7.75 | 7.15 |
| Litter | 384 | 357 | 48.00 | 40.50 | 39.36 | 24.07 |
| Cryptogams | 28 | 4 | 0 | 0 | .16 | .18 |
| Bare Ground | 218 | 184 | 16.00 | 18.25 | 13.54 | 14.30 |

SOIL ANALYSIS DATA --
Herd Unit 19B, Study no: 12, Sunrise Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 7.5 | 55.0 (13.0) | 6.1 | 54.4 | 23.1 | 22.6 | 4.7 | 23.1 | 358.4 | 0.6 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 19B, Study no: 12

| Type | Quadrat Frequency | | Pellet Transect | |
|-------|-------------------|-----|------------------------|------------------------|
| | '97 | '02 | Pellet Groups per Acre | Days Use per Acre (ha) |
| Sheep | 6 | 13 | 02 | 02 |
| Deer | 10 | 4 | 539 | 41 (102) |
| | | | 87 | 7 (17) |

BROWSE CHARACTERISTICS --
Herd unit 19B, Study no: 12

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total |
|------------------------------------------------|----------------------------|---------------------|------------------|-------------------|----------------|--------------------|--------------------------------|-------|
| | | 1 | 2 | 3 | 4 | | | |
| Acer grandidentatum | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - |
| | 89 | - | - | - | - | - | - | - |
| | 97 | - | - | - | - | - | - | - |
| | 02 | - | - | - | - | 1 | - | - |
| Y | 83 | - | - | - | - | - | - | - |
| | 89 | - | - | - | - | - | - | - |
| | 97 | 1 | - | - | - | - | - | - |
| | 02 | 4 | - | - | 1 | - | - | - |
| M | 83 | - | - | - | - | - | - | - |
| | 89 | - | - | - | - | - | - | - |
| | 97 | - | - | - | - | - | - | - |
| | 02 | 1 | - | - | - | - | - | - |
| % Plants Showing | | <u>Moderate Use</u> | <u>Heavy Use</u> | <u>Poor Vigor</u> | <u>%Change</u> | | | |
| '83 | | 00% | 00% | 00% | | | | |
| '89 | | 00% | 00% | 00% | | | | |
| '97 | | 00% | 00% | 00% | +83% | | | |
| '02 | | 00% | 00% | 00% | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | '83 | 0 | Dec: | - |
| | | | | | '89 | 0 | | - |
| | | | | | '97 | 20 | | - |
| | | | | | '02 | 120 | | - |
| Amelanchier alnifolia | | | | | | | | |
| Y | 83 | 1 | - | - | - | - | - | - |
| | 89 | 1 | - | - | - | - | - | - |
| | 97 | - | - | - | - | - | - | - |
| | 02 | - | - | - | - | - | - | - |
| M | 83 | - | - | - | - | - | - | - |
| | 89 | - | - | - | - | - | - | - |
| | 97 | - | - | - | 1 | - | - | - |
| | 02 | - | - | - | - | - | - | - |
| % Plants Showing | | <u>Moderate Use</u> | <u>Heavy Use</u> | <u>Poor Vigor</u> | <u>%Change</u> | | | |
| '83 | | 00% | 00% | 00% | + 0% | | | |
| '89 | | 00% | 00% | 00% | -70% | | | |
| '97 | | 00% | 00% | 00% | | | | |
| '02 | | 00% | 00% | 00% | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | '83 | 66 | Dec: | - |
| | | | | | '89 | 66 | | - |
| | | | | | '97 | 20 | | - |
| | | | | | '02 | 0 | | - |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|----|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Artemisia arbuscula | | | | | | | | | | | | | | | | | | |
| S | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 333 | | 5 | |
| | '97 | 10 | - | - | - | - | - | - | - | - | 10 | - | - | - | 200 | | 10 | |
| | '02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| Y | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | 7 | 4 | - | - | - | - | - | - | - | 5 | - | 6 | - | 733 | | 11 | |
| | '97 | 16 | - | - | 1 | - | - | - | - | - | 17 | - | - | - | 340 | | 17 | |
| | '02 | 9 | - | - | - | - | - | - | - | - | 9 | - | - | - | 180 | | 9 | |
| M | '83 | 106 | - | - | - | - | - | - | - | - | 106 | - | - | - | 7066 | 10 18 | 106 | |
| | '89 | 50 | 53 | - | - | - | - | - | - | - | 43 | 1 | 59 | - | 6866 | 15 21 | 103 | |
| | '97 | 213 | 60 | 3 | - | - | - | - | - | - | 259 | 5 | 12 | - | 5520 | 12 22 | 276 | |
| | '02 | 224 | 9 | 27 | - | - | - | - | - | - | 260 | - | - | - | 5200 | 11 22 | 260 | |
| D | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | 7 | 6 | - | - | - | - | - | - | - | 2 | - | 11 | - | 866 | | 13 | |
| | '97 | 33 | 8 | 1 | - | - | - | - | - | - | 23 | 2 | - | 17 | 840 | | 42 | |
| | '02 | 44 | 4 | - | - | 1 | 2 | 2 | - | - | 26 | - | - | 27 | 1060 | | 53 | |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 360 | | 18 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 300 | | 15 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +17% | | | | | | | |
| '89 | | 50% | | | 00% | | | 60% | | | -21% | | | | | | | |
| '97 | | 20% | | | 01% | | | 09% | | | -4% | | | | | | | |
| '02 | | 04% | | | 09% | | | 08% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 7066 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 8465 | | 10% | | | |
| | | | | | | | | | | | | '97 | 6700 | | 13% | | | |
| | | | | | | | | | | | | '02 | 6440 | | 16% | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|---|--------------------|--------------------------------|----------------|-------|-------|----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 1 | - | - | - | - | - | - | 66 | | 1 |
| | 97 | 11 | - | - | - | - | - | - | 220 | | 11 |
| | 02 | 6 | - | - | - | - | - | - | 120 | | 6 |
| Y | 83 | 4 | - | - | - | - | - | - | 266 | | 4 |
| | 89 | 2 | - | - | - | - | - | - | 133 | | 2 |
| | 97 | 6 | - | - | - | - | - | - | 120 | | 6 |
| | 02 | 21 | - | 2 | - | - | - | - | 460 | | 23 |
| M | 83 | 17 | - | - | - | - | - | - | 1133 | 24 34 | 17 |
| | 89 | 12 | 9 | 1 | - | - | - | - | 1466 | 22 32 | 22 |
| | 97 | 44 | 5 | 4 | 1 | - | - | - | 1080 | 26 38 | 54 |
| | 02 | 72 | 5 | 13 | - | - | - | - | 1800 | 26 39 | 90 |
| D | 83 | 3 | 1 | - | - | - | - | - | 266 | | 4 |
| | 89 | 4 | - | - | - | - | - | - | 266 | | 4 |
| | 97 | 24 | 2 | - | - | - | - | - | 520 | | 26 |
| | 02 | 29 | 1 | 5 | 1 | 2 | - | - | 760 | | 38 |
| X | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | - | - | - | - | - | - | - | 840 | | 42 |
| | 02 | - | - | - | - | - | - | - | 480 | | 24 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 04% | | 00% | | 00% | | +11% | | | |
| '89 | | 32% | | 04% | | 46% | | - 8% | | | |
| '97 | | 08% | | 05% | | 20% | | +43% | | | |
| '02 | | 05% | | 13% | | 17% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 1665 | Dec: | 16% | | |
| | | | | | | '89 | 1865 | | 14% | | |
| | | | | | | '97 | 1720 | | 30% | | |
| | | | | | | '02 | 3020 | | 25% | | |
| <i>Cercocarpus montanus</i> | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 1 | - | - | - | - | - | - | 20 | | 1 |
| | 02 | - | - | - | - | - | - | - | 0 | | 0 |
| M | 83 | - | - | - | - | - | - | - | 0 | - - | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | - - | 0 |
| | 97 | - | - | - | - | - | - | - | 0 | 14 2 | 0 |
| | 02 | - | - | - | - | - | - | - | 0 | - - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 00% | | 00% | | 00% | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | |
| '97 | | 00% | | 00% | | 00% | | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 0 | Dec: | - | | |
| | | | | | | '89 | 0 | | - | | |
| | | | | | | '97 | 20 | | - | | |
| | | | | | | '02 | 0 | | - | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Chrysothamnus nauseosus albicaulis | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 38 | 26 | 1 |
| | 02 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | 21 | 20 | 3 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +67% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |
| | | | | | | | | | | | | '02 | 60 | | - | | | |
| Chrysothamnus viscidiflorus viscidiflorus | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | 11 | - | - | - | - | - | - | - | - | 10 | - | - | 1 | 733 | | | 11 |
| | 97 | 15 | - | - | 7 | - | - | 1 | - | - | 23 | - | - | - | 460 | | | 23 |
| | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | | 2 |
| M | 83 | 20 | - | - | - | - | - | - | - | - | 20 | - | - | - | 1333 | 11 | 9 | 20 |
| | 89 | 9 | 1 | - | 2 | - | - | - | - | - | 11 | - | 1 | - | 800 | 5 | 7 | 12 |
| | 97 | 63 | 15 | 5 | 28 | - | - | 9 | - | - | 120 | - | - | - | 2400 | 11 | 11 | 120 |
| | 02 | 87 | 7 | - | 3 | - | - | - | - | - | 97 | - | - | - | 1940 | 11 | 15 | 97 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | | 2 |
| | 02 | 3 | - | - | - | - | - | - | - | - | 2 | - | - | 1 | 60 | | | 3 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +13% | | | | | | | |
| '89 | | 04% | | | 00% | | | 09% | | | +47% | | | | | | | |
| '97 | | 10% | | | 03% | | | 00% | | | -30% | | | | | | | |
| '02 | | 07% | | | 00% | | | .98% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 1333 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 1533 | | 0% | | | |
| | | | | | | | | | | | | '97 | 2900 | | 1% | | | |
| | | | | | | | | | | | | '02 | 2040 | | 3% | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|---|--------------------|--------------------------------|----------------|-------|---|----|----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | | |
| Eriogonum microthecum | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | 66 | | 1 | |
| | 97 | 2 | - | - | - | - | - | - | 40 | | 2 | |
| | 02 | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 13 | - | - | - | - | - | - | 866 | | 13 | |
| | 97 | 4 | - | - | 1 | - | - | - | 100 | | 5 | |
| | 02 | 3 | - | - | - | - | - | - | 60 | | 3 | |
| M | 83 | 31 | - | - | - | - | - | - | 2066 | 9 | 8 | 31 |
| | 89 | 11 | 1 | - | 3 | - | - | - | 1000 | 7 | 5 | 15 |
| | 97 | 36 | 1 | - | 6 | - | - | 3 | 920 | 5 | 7 | 46 |
| | 02 | 14 | 1 | 3 | 2 | - | - | - | 400 | 4 | 8 | 20 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | |
| '83 | | 00% | | 00% | | 00% | | -10% | | | | |
| '89 | | 04% | | 00% | | 00% | | -45% | | | | |
| '97 | | 02% | | 00% | | 00% | | -55% | | | | |
| '02 | | 04% | | 13% | | 00% | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 2066 | Dec: | - | | | |
| | | | | | | '89 | 1866 | | - | | | |
| | | | | | | '97 | 1020 | | - | | | |
| | | | | | | '02 | 460 | | - | | | |
| Mahonia repens | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 3 | - | - | - | - | - | - | 60 | | 3 | |
| | 02 | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 27 | - | - | 3 | - | - | - | 600 | 5 | 7 | 30 |
| | 02 | 36 | - | - | - | - | 3 | - | 780 | 5 | 8 | 39 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | |
| '83 | | 00% | | 00% | | 00% | | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | | |
| '97 | | 00% | | 00% | | 00% | | +15% | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | '89 | 0 | | - | | | |
| | | | | | | '97 | 660 | | - | | | |
| | | | | | | '02 | 780 | | - | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | | |
| Y | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 9 | 52 | 1 |
| | '02 | 34 | - | - | - | - | - | - | - | - | 34 | - | - | - | 680 | 6 | 13 | 34 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +91% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 60 | | - | | | |
| | | | | | | | | | | | | '02 | 680 | | - | | | |
| Pachistima myrsinites | | | | | | | | | | | | | | | | | | |
| M | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '97 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | - | - | 1 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|---|--------------------|--------------------------------|----------------|-------|----|----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | |
| Symphoricarpos oreophilus | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 2 | - | - | - | - | - | - | 40 | | 2 |
| | 02 | - | - | - | 2 | - | - | - | 40 | | 2 |
| Y | 83 | 1 | 1 | 1 | - | - | - | - | 200 | | 3 |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | - | - | - | - | - | - | - | 0 | | 0 |
| | 02 | 1 | - | - | - | - | 1 | - | 40 | | 2 |
| M | 83 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 89 | - | - | - | 1 | - | - | - | 66 | 6 | 2 |
| | 97 | 7 | 1 | 1 | 2 | - | - | 3 | 280 | 9 | 11 |
| | 02 | 7 | - | - | - | - | - | - | 140 | 18 | 26 |
| D | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | - | - | - | - | - | - | - | 0 | | 0 |
| | 02 | 1 | - | - | - | - | - | - | 20 | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 33% | | 33% | | 00% | | -67% | | | |
| '89 | | 00% | | 00% | | 00% | | +76% | | | |
| '97 | | 07% | | 07% | | 07% | | -29% | | | |
| '02 | | 00% | | 00% | | 10% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 200 | Dec: | 0% | | |
| | | | | | | '89 | 66 | | 0% | | |
| | | | | | | '97 | 280 | | 0% | | |
| | | | | | | '02 | 200 | | 10% | | |
| Tetradymia canescens | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | - | 0 |
| | 97 | 3 | - | - | - | - | - | - | 60 | 9 | 9 |
| | 02 | 2 | - | - | - | - | - | - | 40 | 10 | 11 |
| D | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | - | - | - | - | - | - | - | 0 | | 0 |
| | 02 | 1 | - | - | - | - | - | - | 20 | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 00% | | 00% | | 00% | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | |
| '97 | | 00% | | 00% | | 00% | | + 0% | | | |
| '02 | | 00% | | 00% | | 33% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 0 | Dec: | 0% | | |
| | | | | | | '89 | 0 | | 0% | | |
| | | | | | | '97 | 60 | | 0% | | |
| | | | | | | '02 | 60 | | 33% | | |

Trend Study 19B-13-02

Study site name: Dennis Spring.

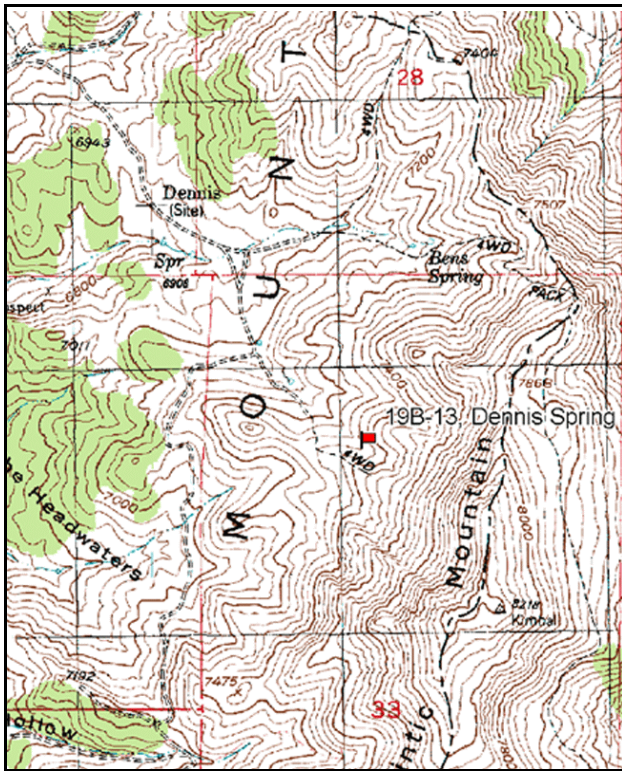
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 117 degrees magnetic.

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

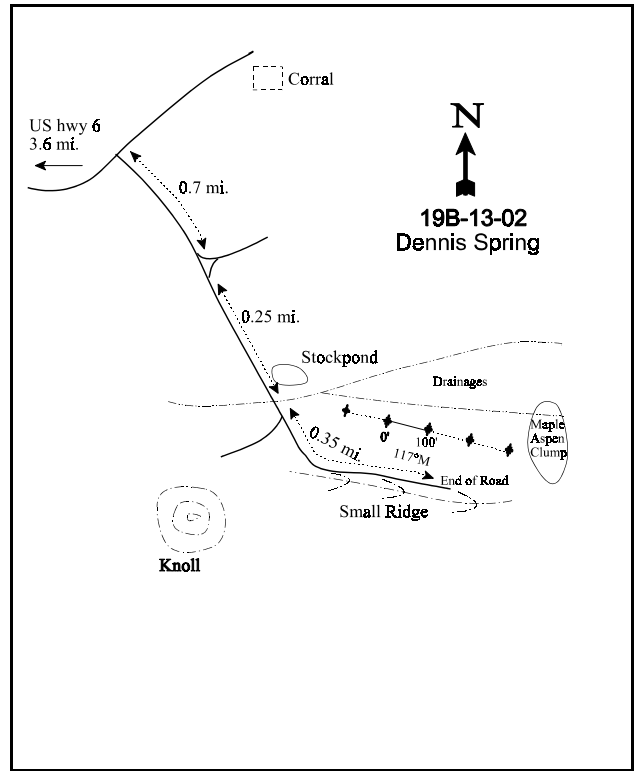
LOCATION DESCRIPTION

From mile marker 130 on Highway U.S. 6, proceed east for 1.6 miles to a fork and go left. Proceed 2.0 miles on the "Dennis Road" up Copperpolis Creek to a fork. Turn right (to the southeast) and travel uphill for 0.70 miles to another fork. Turn right again for 0.25 miles to where there is a fork turning off sharply to the right and a stockpond on the left. Continue straight ahead (on the left fork) for an additional 0.35 miles to where the road ends on top of a small ridge. At this point, there will be an aspen-maple stand to your immediate left-front at the head of a small drainage. Just behind you, there should be a knoll. From the front-rightmost maple tree of the clump to your front, walk 13 paces on an azimuth of 8 degrees to the number 300-foot stake. The 0-foot marker of the baseline is marked by a red browse tag, number 3945, is located in the approximate middle of a triangle formed by three boulders. All plot markers consists of steel fenceposts 15" to 20" in height.



Map Name: Tintic Mountain

Township 11S, Range 2W, Section 33



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4408688 N 408082 E

DISCUSSION

Dennis Spring - Trend Study No. 19B-13

The Dennis Spring trend study samples a summer range site near the bottom of a moderate sloping (20%), north facing swale. Elevation is approximately 7,200 feet. Dennis Spring is located one-quarter mile further up the swale from the study site. Prior to 2001, the plant community was dominated by a moderately tall mountain big sagebrush population with an understory of lower growing shrubs, forbs, and grasses. Estimated mountain big sagebrush cover was high in 1997 at 32%. A wildfire burned through the site in 2001, greatly reducing the browse component. Prior to the burn, the area received moderate use by deer and sheep, and light use by cattle and elk. A pellet group transect read on site in 2002 estimated 7 deer days use/acre (18 ddu/ha) and 13 sheep days use/acre (33 sdu/ha). Mormon crickets were abundant on the site in 2002 and appeared to have utilized many of the herbaceous plants. Except for a few isolated aspen clones and patches of bigtooth maple, the area is devoid of tree cover.

The effective rooting depth of the soil was almost 12 inches, with an average soil temperature of 52°F measured almost 14 inches in depth in 1997. Soil textural and chemical analysis indicates a sandy clay loam with a moderately acidic pH (5.9). Soil erosion was minimal both before and after the burn. The rate of sedimentation from the upper slope likely exceeds the rate of erosion. Bare ground was moderate before the burn at 17% in 1997, increasing significantly in 2002 to 50%. Although bare soil is high, herbaceous vegetative cover increased following the burn. The erosion condition class was determined as stable in 2002.

Mountain big sagebrush provided nearly 80% of the browse cover in 1997, while the density was estimated at just under 5,000 plants/acre. Use was light, decadence low, and vigor generally good. Following the burn, mountain big sagebrush density was estimated at 7,120 plants/acre in 2002, all of which were young plants. In 2002, vigor was normal throughout the entire population and the plants displayed light use. With the abundance of young, especially during drought, the sagebrush population should rebound quickly. Snowberry, Oregon grape, and low rabbitbrush were also abundant in 2002 following the burn. These species have nearly the same densities after the fire compared to the pre-burn community. With an abundance of open spaces on this site due to the burn, all of these species will likely increase dramatically. Total browse cover was estimated at 41% in 1997, decreasing to 6% in 2002.

The herbaceous understory will benefit the most from the burn. Perennial grasses declined by nearly half in sum of nested frequency in 2002, but with drought conditions following a wildfire, the decline could have been worse. The grass component is diverse. The perennial species will do well with normal precipitation patterns in the future. The most abundant grasses before and after the burn are bluebunch wheatgrass and subalpine needlegrass. Other less abundant perennials include slender wheatgrass, smooth brome, mutton bluegrass, Sandberg bluegrass, bottlebrush squirreltail, and Letterman needlegrass. Cheatgrass brome significantly increased in nested frequency in 2002, but this species does not yet dominate the site. Perennial forbs increased in average cover and sum of nested frequency following the burn. This is a very positive change, especially in light of harsh drought conditions in 2002. Mormon crickets were abundant in 2002 and had utilized many of the forbs on the site. It would be interesting to see what the site would have looked like without heavy cricket use. Most of the other sites in this unit showed a decline in sum of nested frequency values for perennial forbs in 2002 due in part to drought but more likely due to cricket use. The most abundant perennial forbs on the site include longleaf phlox, prickly lettuce, ballhead waterleaf, and silvery lupine. Annual forbs were also moderately abundant in 2002, primarily lambsquarters goosefoot and Douglas knotweed. It will be critical for the desirable native perennials, both grasses and forbs, to get well established on this site in the next few years so cheatgrass does not become dominate. The health of the understory, and ultimately the site as a whole, will depend upon how well perennial grasses and forbs become established and persist. Management of this site, primarily the grazing regime, will play an important role in the recovery of the vegetation community in the future.

1983 APPARENT TREND ASSESSMENT

Soil trend appears stable. There is some erosion apparent, but it is not excessive at this time. The area has a demonstrated potential to produce abundant forage. The browse composition is becoming progressively less favorable with the most obvious indicator being a rapidly increasing population of stickyleaf low rabbitbrush. Grass production is depressed and undesirable forbs, or those of only moderate value, far outnumber desirable species. The herbaceous understory trend appears stable but in poor condition.

1989 TREND ASSESSMENT

The heavily disturbed soil lacks stable cover and has high erosion potential. Percent bare ground has changed little since 1983 and erosion appears to be occurring at the same rate as before. The soil trend is stable. The density of mountain big sagebrush has increased from 1,199 plants/acre to 8,532 plants/acre. The increase is due to a highly abundant young age class in 1989. This population shows good vigor and light utilization. The browse trend is up. A negative aspect to the increase in sagebrush is it may have a detrimental effect on the production and diversity of the understory. This will need to be watched closely in future readings. For now, the herbaceous understory trend is stable. Sum of nested frequency for perennial grasses and forbs slightly increased since 1983.

TREND ASSESSMENT

soil - stable (3)

browse - up (5)

herbaceous understory - stable (3)

1997 TREND ASSESSMENT

The soil trend continues to be stable. Percent bare ground cover has declined, but there is still high potential for erosion in the shrub interspaces. The browse condition is stable, but this is a summer range not a winter range, and as long as sagebrush cover continues to be this high, a productive herbaceous understory will never develop. A decrease in canopy cover is needed for a healthier herbaceous understory. The herbaceous understory trend is stable but depleted. Production is below potential and there are many undesirable forbs present.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable, but poorly developed and depleted (3)

2002 TREND ASSESSMENT

Trend for soil is down due to fire and drought. Bare soil increased to 50%, and the site has a very high erosion potential at the present time. It will take the vegetative community several years to develop, and until it does, soils are susceptible to erosion. The erosion condition class was rated as stable in 2002, but only because of very low precipitation. Trend for browse is slightly up. The mountain big sagebrush population has been converted from an overly mature, dense canopied community to one with an open canopy composed totally of young, vigorous plants. Density of young sagebrush plants is high at over 7,000 plants/acre, so the sagebrush component should develop rather quickly. Because this site lies above 7,000 feet in elevation, the most important vegetation component on this site is the understory, and this decrease in sagebrush canopy should greatly benefit grasses and forbs in the future if livestock use is minimal. Trend for the herbaceous understory is slightly down due a decline in sum of nested frequency for perennial grasses. However, as was stated before, the decline in sagebrush canopy should be a positive change for the understory. The increase in frequency of perennial forbs in 2002, with drought is very positive and would undoubtedly have been greater without the heavy use by Mormon crickets.

TREND ASSESSMENT

soil - down (1)

browse - slightly up (4)

herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 13

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|-------------------------|------------------|-----------------|------------------|------------------|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | Agropyron cristatum | - | - | 4 | 1 | - | - | 1 | 1 | .00 | .15 |
| G | Agropyron spicatum | _b 72 | _b 80 | _a 47 | _a 31 | 33 | 35 | 16 | 15 | .32 | .54 |
| G | Agropyron trachycaulum | - | - | - | 8 | - | - | - | 3 | - | .21 |
| G | Bromus inermis | - | - | 3 | 2 | - | - | 1 | 1 | .00 | .15 |
| G | Bromus japonicus (a) | - | - | - | - | - | - | - | - | .00 | - |
| G | Bromus tectorum (a) | - | - | _a 26 | _b 129 | - | - | 10 | 48 | .41 | .71 |
| G | Poa fendleriana | - | 3 | 9 | 8 | - | 1 | 3 | 6 | .21 | .27 |
| G | Poa secunda | _b 45 | _b 32 | _a 6 | _a 1 | 19 | 13 | 3 | 1 | .04 | .00 |
| G | Sitanion hystrix | _a 12 | _a 23 | _b 43 | _a 3 | 7 | 10 | 19 | 2 | .59 | .20 |
| G | Stipa columbiana | _a - | _b 19 | _c 105 | _b 64 | - | 7 | 41 | 27 | 1.50 | 2.38 |
| G | Stipa lettermani | - | - | - | 2 | - | - | - | 1 | - | .01 |
| Total for Annual Grasses | | 0 | 0 | 26 | 129 | 0 | 0 | 10 | 48 | 0.42 | 0.70 |
| Total for Perennial Grasses | | 129 | 157 | 217 | 120 | 59 | 66 | 84 | 57 | 2.69 | 3.94 |
| Total for Grasses | | 129 | 157 | 243 | 249 | 59 | 66 | 94 | 105 | 3.11 | 4.65 |
| F | Agoseris glauca | 5 | - | 2 | 3 | 2 | - | 1 | 3 | .00 | .04 |
| F | Arabis spp. | _{ab} 7 | _b 9 | _a - | _a - | 4 | 6 | - | - | - | - |
| F | Arenaria fendleri | 2 | 1 | - | - | 1 | 1 | - | - | - | - |
| F | Astragalus convallarius | _b 18 | _{ab} 7 | _a 3 | _{ab} 12 | 10 | 6 | 2 | 8 | .01 | .31 |
| F | Aster spp. | _a 2 | _b 33 | _a - | _a 1 | 2 | 13 | - | 1 | - | .00 |
| F | Astragalus spp. | - | - | 3 | - | - | - | 1 | - | .00 | - |

| Type | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|---------------------------|------------------------------------|------------------|------------------|------------------|------------------|-------------------|-----|-----|-----|-----------------|-------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| F | <i>Calochortus nuttallii</i> | 1 | - | 1 | 1 | 1 | - | 1 | 1 | .00 | .00 |
| F | <i>Chenopodium album</i> (a) | - | - | _a 83 | _b 142 | - | - | 31 | 53 | .40 | 1.41 |
| F | <i>Cirsium</i> spp. | 3 | 3 | 2 | 2 | 3 | 2 | 1 | 1 | .00 | .03 |
| F | <i>Collomia linearis</i> (a) | - | - | 5 | - | - | - | 2 | - | .01 | - |
| F | <i>Comandra pallida</i> | - | 2 | 2 | - | - | 1 | 1 | - | .00 | - |
| F | <i>Collinsia parviflora</i> (a) | - | - | _b 190 | _a 19 | - | - | 67 | 7 | 1.08 | .06 |
| F | <i>Crepis acuminata</i> | _b 23 | _c 142 | _b 33 | _a - | 13 | 64 | 21 | - | .25 | .00 |
| F | <i>Cymopterus</i> spp. | - | - | 2 | - | - | - | 1 | - | .00 | - |
| F | <i>Cynoglossum officinale</i> | _b 34 | _b 32 | _b 39 | _a 10 | 20 | 16 | 23 | 5 | .76 | .19 |
| F | <i>Epilobium brachycarpum</i> (a) | - | - | - | 3 | - | - | - | 1 | - | .00 |
| F | <i>Erigeron</i> spp. | - | - | 3 | 3 | - | - | 1 | 1 | .03 | .00 |
| F | <i>Eriogonum racemosum</i> | _b 14 | _{ab} 10 | _a - | _a 2 | 8 | 4 | - | 1 | - | .00 |
| F | <i>Gayophytum ramosissimum</i> (a) | - | - | _a - | _b 28 | - | - | - | 10 | - | .25 |
| F | <i>Geranium</i> spp. | 3 | 3 | - | - | 2 | 1 | - | - | - | - |
| F | <i>Hackelia patens</i> | 7 | - | - | - | 4 | - | - | - | - | - |
| F | <i>Hydrophyllum capitatum</i> | _a - | _a - | _a - | _b 62 | - | - | - | 30 | - | 3.67 |
| F | <i>Lathyrus brachycalyx</i> | 18 | 15 | 18 | 17 | 9 | 5 | 10 | 7 | .25 | .46 |
| F | <i>Lactuca serriola</i> | _a - | _a - | _a 4 | _b 122 | - | - | 2 | 49 | .01 | 1.11 |
| F | <i>Lupinus argenteus</i> | _c 208 | _b 147 | _b 140 | _a 47 | 84 | 71 | 63 | 21 | 7.32 | 1.29 |
| F | <i>Machaeranthera canescens</i> | - | 2 | 2 | - | - | 1 | 1 | - | .00 | - |
| F | <i>Microsteris gracilis</i> (a) | - | - | 32 | 14 | - | - | 13 | 5 | .09 | .22 |
| F | <i>Penstemon</i> spp. | - | - | - | 3 | - | - | - | 2 | - | .01 |
| F | <i>Phlox longifolia</i> | _a 79 | _{ab} 96 | _a 76 | _c 133 | 40 | 46 | 31 | 53 | .22 | 2.54 |
| F | <i>Polygonum douglasii</i> (a) | - | - | _a 20 | _b 83 | - | - | 12 | 29 | .06 | .81 |
| F | <i>Senecio integerrimus</i> | _a - | _a - | _a - | _b 29 | - | - | - | 16 | - | .32 |
| F | <i>Senecio multilobatus</i> | _a - | _a - | _b 44 | _a - | - | - | 26 | - | .45 | - |
| F | <i>Solidago</i> spp. | _b 56 | _a - | _a - | _a - | 26 | - | - | - | - | - |
| F | <i>Streptanthus cordatus</i> | - | - | 5 | - | - | - | 2 | - | .03 | - |
| F | <i>Taraxacum officinale</i> | 3 | 6 | 15 | 2 | 1 | 3 | 6 | 1 | .05 | .03 |
| F | <i>Trifolium</i> spp. | _a 14 | _{ab} 23 | _b 37 | _{ab} 22 | 6 | 11 | 16 | 11 | .10 | .22 |
| F | <i>Viguiera multiflora</i> | - | - | 1 | - | - | - | 1 | - | .00 | - |
| F | <i>Viola</i> spp. | - | 1 | - | - | - | 1 | - | - | - | - |
| Total for Annual Forbs | | 0 | 0 | 330 | 289 | 0 | 0 | 125 | 105 | 1.65 | 2.76 |
| Total for Perennial Forbs | | 497 | 532 | 432 | 471 | 236 | 252 | 211 | 211 | 9.56 | 10.28 |
| Total for Forbs | | 497 | 532 | 762 | 760 | 236 | 252 | 336 | 316 | 11.21 | 13.05 |

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

BROWSE TRENDS --
Herd unit 19B, Study no: 13

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|--------------------------------------------------|-----------------|-----|-----------------|------|
| | | '97 | '02 | '97 | '02 |
| B | <i>Acer grandidentatum</i> | 1 | 0 | - | - |
| B | <i>Amelanchier alnifolia</i> | 2 | 0 | - | - |
| B | <i>Artemisia tridentata vaseyana</i> | 91 | 70 | 32.23 | 1.43 |
| B | <i>Chrysothamnus nauseosus albicaulis</i> | 7 | 1 | .69 | - |
| B | <i>Chrysothamnus viscidiflorus viscidiflorus</i> | 80 | 83 | 2.67 | 2.71 |
| B | <i>Juniperus osteosperma</i> | 2 | 0 | 1.12 | - |
| B | <i>Mahonia repens</i> | 29 | 28 | 1.33 | .86 |
| B | <i>Pachistima myrsinites</i> | 0 | 0 | - | .03 |
| B | <i>Purshia tridentata</i> | 0 | 0 | .03 | - |
| B | <i>Rosa woodsii</i> | 5 | 8 | .06 | .09 |
| B | <i>Symphoricarpos oreophilus</i> | 55 | 29 | 2.23 | .43 |
| B | <i>Tetradymia canescens</i> | 6 | 11 | .21 | .53 |
| B | Unknown browse | 1 | 0 | - | - |
| Total for Browse | | 279 | 230 | 40.60 | 6.10 |

CANOPY COVER -- LINE INTERCEPT
Herd unit 19B, Study no: 13

| Species | Percent Cover | |
|--------------------------------------------------|---------------|------|
| | '97 | '02 |
| <i>Artemisia tridentata vaseyana</i> | - | 1.42 |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | - | 2.50 |
| <i>Mahonia repens</i> | - | .50 |
| <i>Rosa woodsii</i> | - | .03 |
| <i>Symphoricarpos oreophilus</i> | - | 1.17 |
| <i>Tetradymia canescens</i> | - | .17 |

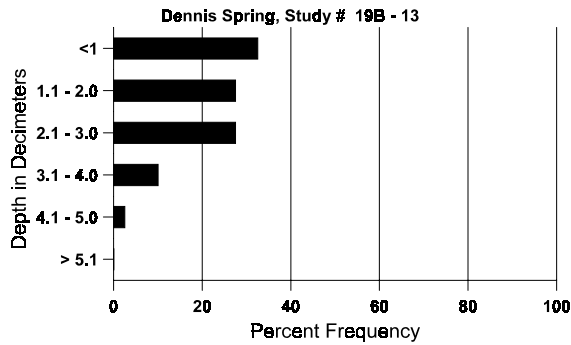
BASIC COVER --
Herd unit 19B, Study no: 13

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 327 | 337 | 1.00 | 10.75 | 47.86 | 28.06 |
| Rock | 114 | 188 | 6.00 | 7.25 | 3.45 | 6.38 |
| Pavement | 104 | 274 | .50 | 0 | 1.26 | 3.86 |
| Litter | 386 | 348 | 68.50 | 57.50 | 54.12 | 22.89 |
| Cryptogams | 9 | 3 | 0 | 0 | .04 | .85 |
| Bare Ground | 204 | 352 | 24.00 | 24.50 | 17.09 | 50.06 |

SOIL ANALYSIS DATA --
Herd Unit 19B, Study no: 13, Dennis Spring

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 11.5 | 52.3 (13.7) | 5.9 | 48.4 | 27.1 | 24.6 | 5.2 | 52.0 | 553.6 | 0.5 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 19B, Study no: 13

| Type | Quadrat Frequency | | Pellet Transect | |
|--------|-------------------|-----|------------------------------|------------------------------|
| | '97 | '02 | Pellet Groups per Acre 02 | Days Use per Acre (ha) 02 |
| Sheep | 8 | 6 | 174 | 13 (33) |
| Rabbit | 3 | 1 | - | - |
| Elk | 4 | - | - | - |
| Deer | 14 | 4 | 96 | 7 (18) |
| Cattle | 1 | - | - | - |

BROWSE CHARACTERISTICS --
Herd unit 19B, Study no: 13

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | | | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | | |
|------------------------------------------------|----------------------------|---------------------|---|---|------------------|---|---|-------------------|---|---|-----------------|--------------------------|-------|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | | | |
| Acer grandidentatum | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 3 | - | - | - | - | - | - | - | - | - | - | 200 | | 3 |
| | 97 | 1 | - | - | - | - | - | - | - | - | - | - | 20 | | 1 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -90% | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 0 | Dec: | - | |
| | | | | | | | | | | | '89 | 200 | | - | |
| | | | | | | | | | | | '97 | 20 | | - | |
| | | | | | | | | | | | '02 | 0 | | - | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|------|------|------|--------------------|--------------------------------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | |
| <i>Amelanchier alnifolia</i> | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | 1 | - | - | 1 | - | - | - | - | - | 2 | - | - | - | 40 | | 2 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | 1 | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '89 | | 00% | | | 100% | | | 00% | | | -39% | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | '89 | 66 | | 100% | | | |
| | | | | | | | | | | | '97 | 40 | | 0% | | | |
| | | | | | | | | | | | '02 | 0 | | 0% | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 23 | - | - | - | - | - | - | - | - | 23 | - | - | - | 1533 | | 23 |
| | 97 | 1 | - | - | 1 | - | - | - | - | - | 2 | - | - | - | 40 | | 2 |
| | 02 | 51 | - | - | - | - | - | - | - | - | 51 | - | - | - | 1020 | | 51 |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 |
| | 89 | 77 | - | - | 1 | - | - | - | - | - | 75 | 3 | - | - | 5200 | | 78 |
| | 97 | 2 | 1 | - | - | - | - | - | - | - | 3 | - | - | - | 60 | | 3 |
| | 02 | 356 | - | - | - | - | - | - | - | - | 356 | - | - | - | 7120 | | 356 |
| M | 83 | 11 | 3 | - | - | - | - | - | - | - | 14 | - | - | - | 933 | 32 29 | 14 |
| | 89 | 49 | - | - | - | - | - | - | - | - | 41 | 8 | - | - | 3266 | 17 20 | 49 |
| | 97 | 210 | 1 | - | 5 | - | - | - | - | - | 207 | - | 9 | - | 4320 | 34 36 | 216 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 8 11 | 0 |
| D | 83 | 1 | 2 | - | - | - | - | - | - | - | 3 | - | - | - | 200 | | 3 |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 |
| | 97 | 27 | - | - | - | - | - | - | - | - | 17 | - | - | 10 | 540 | | 27 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 380 | | 19 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 100 | | 5 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 28% | | | 00% | | | 00% | | | +86% | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -42% | | | | | | |
| '97 | | .81% | | | 00% | | | 08% | | | +31% | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 1199 | Dec: | 17% | | | |
| | | | | | | | | | | | '89 | 8532 | | 1% | | | |
| | | | | | | | | | | | '97 | 4920 | | 11% | | | |
| | | | | | | | | | | | '02 | 7120 | | 0% | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Chrysothamnus nauseosus albicaulis | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | - | - | 1 | - | - | - | - | - | - | - | 1 | - | - | 20 | | 1 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 2 | 2 | - | - | 1 | - | - | - | - | 5 | - | - | - | 100 | 44 | 38 | 5 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | 4 | - | - | - | - | - | - | - | 1 | - | - | 3 | 80 | | 4 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 70% | | | 00% | | | 30% | | | -90% | | | | | | | |
| '02 | | 00% | | | 100% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 0 | | 0% | | | |
| | | | | | | | | | | | | '97 | 200 | | 40% | | | |
| | | | | | | | | | | | | '02 | 20 | | 0% | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | | | | | |
|------------------------------------------------|----------------------------|---------------------|----|------------------|----|--------------------|--------------------------------|----------------|---|-----|-------|------|-----|
| | | 1 | 2 | 3 | 4 | | | | | | | | |
| Chrysothamnus viscidiflorus viscidiflorus | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 2 | - | - | - | - | - | - | - | 2 | - | 2 | |
| | 97 | 4 | - | - | 1 | - | - | - | - | 5 | - | 5 | |
| | 02 | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| Y | 83 | 27 | - | - | - | - | - | - | - | 27 | - | 27 | |
| | 89 | 16 | 2 | - | 6 | - | - | - | - | 24 | - | 24 | |
| | 97 | 39 | - | - | 2 | - | - | - | - | 41 | - | 41 | |
| | 02 | 48 | - | - | - | - | - | - | - | 48 | - | 48 | |
| M | 83 | 202 | - | - | - | - | - | - | - | 202 | - | 202 | |
| | 89 | 1 | 15 | 10 | 9 | 3 | - | - | - | 34 | 4 | 38 | |
| | 97 | 142 | 32 | 2 | 51 | - | 2 | 6 | - | 231 | 4 | 235 | |
| | 02 | 171 | 13 | 2 | - | - | - | - | - | 184 | 2 | 186 | |
| D | 83 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 2 | 15 | 55 | - | 9 | - | - | - | 73 | 7 | 81 | |
| | 97 | 1 | 1 | - | - | - | - | - | - | - | - | 2 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | - | 1 | |
| X | 83 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | |
| '83 | | 00% | | 00% | | 00% | | -38% | | | | | |
| '89 | | 31% | | 45% | | .69% | | -42% | | | | | |
| '97 | | 12% | | 01% | | .71% | | -15% | | | | | |
| '02 | | 06% | | .85% | | .42% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 15266 | Dec: | 0% |
| | | | | | | | | | | '89 | 9533 | | 57% |
| | | | | | | | | | | '97 | 5560 | | 1% |
| | | | | | | | | | | '02 | 4700 | | 0% |
| Juniperus osteosperma | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 2 | - | - | - | - | - | - | - | 2 | - | 2 | |
| | 02 | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | |
| '83 | | 00% | | 00% | | 00% | | | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | | | |
| '97 | | 00% | | 00% | | 00% | | | | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 0 | Dec: | - |
| | | | | | | | | | | '89 | 0 | | - |
| | | | | | | | | | | '97 | 40 | | - |
| | | | | | | | | | | '02 | 0 | | - |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | | | | | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|----|--------------------|--------------------------------|----------------|-------|-----|------|------|----|------|---|----|-----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | | | | | | | |
| Mahonia repens | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 6 | - | - | - | - | - | - | - | 6 | - | - | - | 400 | | 6 | |
| | 97 | 17 | - | - | - | - | - | - | - | 17 | - | - | - | 340 | | 17 | |
| | 02 | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 83 | 5 | - | - | - | - | - | - | - | 5 | - | - | - | 333 | 4 | 6 | 5 |
| | 89 | - | 2 | - | - | - | - | - | - | 2 | - | - | - | 133 | 5 | 3 | 2 |
| | 97 | 188 | - | - | 13 | - | - | 9 | - | 210 | - | - | - | 4200 | 4 | 5 | 210 |
| | 02 | 312 | - | - | - | - | - | - | - | 298 | - | 14 | - | 6240 | 3 | 5 | 312 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | 4 | - | - | - | - | - | - | - | 1 | - | - | 3 | 80 | | 4 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 100 | | 5 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | | | | | |
| '83 | | 00% | | 00% | | 00% | | +38% | | | | | | | | | |
| '89 | | 25% | | 00% | | 00% | | +88% | | | | | | | | | |
| '97 | | 00% | | 00% | | 00% | | +28% | | | | | | | | | |
| '02 | | 00% | | 00% | | 05% | | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 333 | Dec: | 0% | | | | |
| | | | | | | | | | | '89 | 533 | | 0% | | | | |
| | | | | | | | | | | '97 | 4540 | | 0% | | | | |
| | | | | | | | | | | '02 | 6340 | | 1% | | | | |
| Pachistima myrsinites | | | | | | | | | | | | | | | | | |
| Y | 83 | 2 | - | - | - | - | - | - | - | 2 | - | - | - | 133 | | 2 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | | | | | |
| '83 | | 00% | | 00% | | 00% | | | | | | | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | | | | | | | |
| '97 | | 00% | | 00% | | 00% | | | | | | | | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 133 | Dec: | - | | | | |
| | | | | | | | | | | '89 | 0 | | - | | | | |
| | | | | | | | | | | '97 | 0 | | - | | | | |
| | | | | | | | | | | '02 | 0 | | - | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Rosa woodsii | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 266 | | 4 | |
| | 97 | 6 | - | - | 1 | - | - | - | - | - | 7 | - | - | - | 140 | | 7 | |
| | 02 | 12 | - | - | - | - | - | 1 | - | - | 12 | - | 1 | - | 260 | | 13 | |
| M | 83 | 8 | - | - | - | - | - | - | - | - | 8 | - | - | - | 533 | 12 | 3 | 8 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 1 | - | - | - | - | - | 1 | - | - | 2 | - | - | - | 40 | - | - | 2 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | 1 | 1 | - | - | - | - | - | - | 2 | - | - | - | 133 | | 2 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | -25% | | | | | | | |
| '89 | | 17% | | | 17% | | | 00% | | | -55% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +31% | | | | | | | |
| '02 | | 00% | | | 00% | | | 08% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 533 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 399 | | 33% | | | |
| | | | | | | | | | | | | '97 | 180 | | 0% | | | |
| | | | | | | | | | | | | '02 | 260 | | 0% | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|----|--------------------|--------------------------------|----------------|-------|----|----|-----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | | |
| Symphoricarpos oreophilus | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | 20 | | 1 | |
| | 02 | 1 | - | - | - | - | - | - | 20 | | 1 | |
| Y | 83 | 1 | - | - | - | - | - | - | 66 | | 1 | |
| | 89 | - | - | 2 | - | - | - | - | 133 | | 2 | |
| | 97 | 10 | 3 | - | 3 | - | - | - | 320 | | 16 | |
| | 02 | 38 | 1 | 1 | - | - | - | - | 800 | | 40 | |
| M | 83 | 6 | 3 | 2 | - | - | - | - | 733 | 23 | 21 | 11 |
| | 89 | - | - | 1 | - | - | - | - | 66 | 17 | 14 | 1 |
| | 97 | 79 | 3 | - | 25 | - | - | 3 | 2200 | 12 | 20 | 110 |
| | 02 | 18 | - | - | - | - | - | - | 360 | 11 | 24 | 18 |
| D | 83 | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | 13 | - | 3 | - | - | 1066 | | 16 | |
| | 97 | - | - | 1 | - | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | |
| '83 | | 25% | | 17% | | 08% | | +37% | | | | |
| '89 | | 16% | | 84% | | 00% | | +50% | | | | |
| '97 | | 05% | | .78% | | .78% | | -54% | | | | |
| '02 | | 02% | | 02% | | 00% | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 799 | Dec: | 0% | | | |
| | | | | | | '89 | 1265 | | 84% | | | |
| | | | | | | '97 | 2540 | | 1% | | | |
| | | | | | | '02 | 1160 | | 0% | | | |
| Tetradymia canescens | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | 1 | - | - | - | 40 | | 2 | |
| | 02 | 5 | - | - | - | - | - | - | 100 | | 5 | |
| M | 83 | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 5 | - | - | 4 | - | - | - | 180 | 15 | 16 | 9 |
| | 02 | 15 | - | - | - | - | - | - | 300 | 9 | 14 | 15 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | |
| '83 | | 00% | | 00% | | 00% | | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | | |
| '97 | | 00% | | 00% | | 00% | | +45% | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | '89 | 0 | | - | | | |
| | | | | | | '97 | 220 | | - | | | |
| | | | | | | '02 | 400 | | - | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|----|------|--------------------|--------------------------------|-------|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Unknown browse | | | | | | | | | | | | | | | | | | |
| M | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | - | - | 1 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |

Trend Study 19B-15-02

Study site name: Upper Broad Canyon.

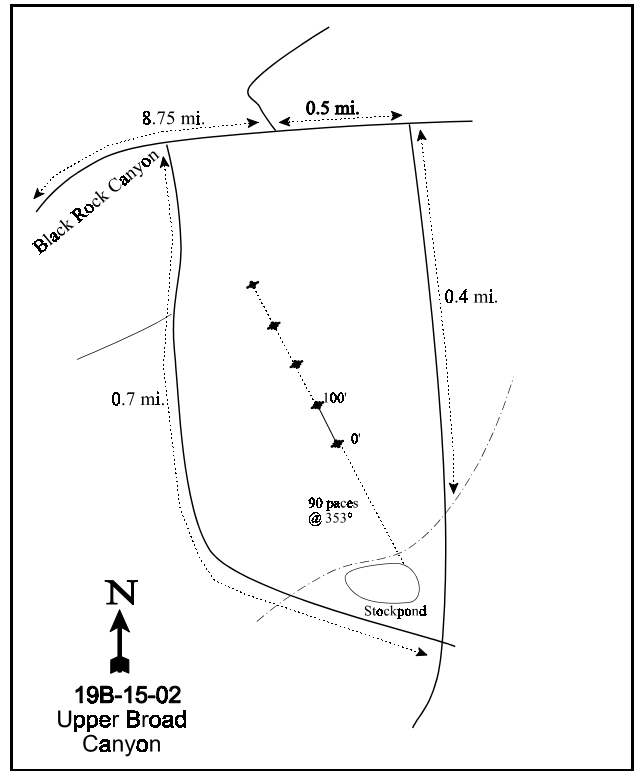
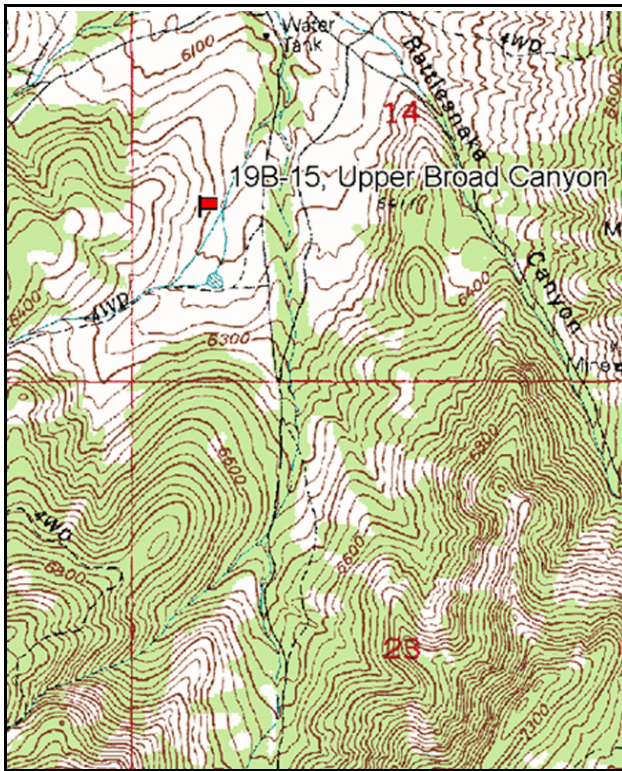
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 331 degrees magnetic.

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

LOCATION DESCRIPTION

From Highway U-36 between Vernon and Tintic Junction, proceed east on the Black Rock Canyon Road for 8.75 miles, to the road junction in Broad Canyon within Utah County. At this point, take the right fork (east) and travel an additional 0.50 miles to another fork. Turn right and travel 0.40 miles to another fork. Turn left and travel approximately 0.10 miles to where there is a stock pond surrounded by a fence on the west side of the road. From the northwest corner of the stock pond, walk 90 paces at 353 degrees magnetic toward a large juniper at the base of the hill. At this point, there will be a green steel fencepost, 15 inches high with a red browse tag, number 3935, attached, which marks the 0-foot end of the frequency baseline.



Map Name: Boulder Peak

Diagrammatic Sketch

Township 9S, Range 3W, Section 14

GPS: NAD 27, UTM 12S 4431762 N 401665 E

DISCUSSION

Upper Broad Canyon - Trend Study No. 19B-15

The Upper Broad Canyon trend study is located on a 15%-20% slope with a south to southeast facing aspect. The area constitutes transitional deer range at an elevation of 6,250 feet. The range type is mountain big sagebrush-grass intermixed with smaller amounts of antelope bitterbrush. A wildfire burned through the area in either 2000 or 2001, and although the site itself was not burned, the entire surrounding area was. This transect now samples a small sagebrush island surrounded by a burned rangeland. Pellet groups are frequent and the principal browse species are moderately to heavily hedged. In 1983, the presence of two antler sheds indicated that some winter use occurs. Spring sheep grazing is evident on this BLM spring sheep allotment and there is obvious signs of trailing to a nearby stock pond. The pond usually contains water year round and is located about 200 yards south of the study. While driving to the site in 2002, four bucks and a couple of does were seen just north of the site. A pellet group transect read on site in 2002 estimated 22 deer days use/acre (55 ddu/ha) and 19 sheep days use/acre (48 sdu/ha).

Soil is fine textured, but contains many variable sized granite rocks, both on and below the soil surface. Soil analysis indicates a clay loam texture with a neutral reactivity (pH of 7.1). The effective rooting depth is almost 10 inches and average soil temperature is 64°F at 11 inches in depth. Phosphorous levels were measured at 7.1 ppm which is considered low and could limit plant growth and development. Vegetative cover is fair and litter cover is poor. There are significant amounts of surface rock, erosion pavement, and bare soil that contribute to a noticeable, but not excessive rate of erosion. The erosion condition class was determined as stable to slight in 2002.

The key browse species is mountain big sagebrush which contributed to about 70% of the browse cover in 1997 and 2002. Density was estimated at about 2,100 plants/acre in 1997 and 2002. In 1983 and 1989, this population experienced moderate to heavy hedging, poor vigor, and moderately high decadence. In 1997 and 2002, use declined and vigor was somewhat improved, but decadence remained moderate to high. Decadent sagebrush were most abundant in 1989 and 2002, both drought years. The number of dead sagebrush plants has been stable at about 900 plants/acre in 1997 and 2002, which represents 30% loss of the population. Annual leader growth for sagebrush averaged just under two inches of growth in 2002. Antelope bitterbrush had an estimated density of just under 400 plants/acre in 1997 and 2002. Although bitterbrush has been moderately to heavily utilized in all readings, the population has maintained generally good vigor and low decadence. Individual plants have acquired a prostrate growth form due to elevated levels of use for many years. Annual bitterbrush leaders averaged 2.7 inches of growth in 2002.

Pinyon and juniper are scattered throughout the site in moderate densities. Point-center quarter data taken in 2002 estimated 73 pinyon and 32 juniper trees/acre on the site. The broom snakeweed density has fluctuated between years, and was estimated at 6,760 plants/acre in 1997. Snakeweed density decreased in 2002 to 2,500 plants/acre due to drought conditions. Snakeweed density can fluctuate dramatically with precipitation patterns.

Grasses are the dominant component of the understory. This site has a good stand of bluebunch wheatgrass which has remained stable in frequency since 1983. Sandberg bluegrass is also abundant and has remained stable in nested frequency in 2002. Cheatgrass brome was moderately abundant in 1997, but declined significantly in nested frequency with drought in 2002. Less abundant perennials include crested wheatgrass and bottlebrush squirreltail. Utilization on grasses was minimal on most plants in 2002.

Annuals dominated the forb component in 1997, primarily pale alyssum and bur buttercup. With drought in 2002, annual forbs nearly disappeared from the site. Perennial forbs have been sparse in all readings with pussytoes being the most abundant.

1983 APPARENT TREND ASSESSMENT

Soil trend appears stable. The rate of erosion is noticeable, but not of great magnitude. The gentle slope is helpful in this regard, as is a slowly improving herbaceous understory cover. The browse trend appears stable, although mountain big sagebrush and antelope bitterbrush are receiving heavy utilization. The herbaceous understory appears stable and will not likely improve under the current grazing system.

1989 TREND ASSESSMENT

The soil trend remains relatively stable. However, the soil condition remains poor with some soil loss continuing. Age and form class of the key browse species indicate a slightly downward trend. Percent decadency and the percentage of mountain big sagebrush plants displaying poor vigor has increased since 1983. The herbaceous understory trend is stable with little change in sum of nested frequency values since 1983.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - stable (3)

1997 TREND ASSESSMENT

The soil trend is slightly down with decreases in litter cover and an increase in percent bare soil. Percent bare ground has slowly been increasing since 1983. Some erosion is evident, yet it does not appear to have accelerated over the years. The browse trend is stable overall. Mountain big sagebrush shows improvements in decadence and vigor, although the percentage of young plants is not adequate to replace the dead plants lost from the population. The proportion of decadent plants classified as dying is also high at 70%. Trend will decline in the future without increased reproduction. The antelope bitterbrush population is still heavily utilized, but retains good vigor and low decadence. The herbaceous understory trend is stable. There is little change in perennial herbaceous understory sum of nested frequency over all years. The forb component is dominated by annual species and any upward trend will likely be demonstrated in the forbs first.

TREND ASSESSMENT

soil - slightly down (2)

browse - stable (3)

herbaceous understory - stable (3)

2002 TREND ASSESSMENT

Trend for soils is stable. Ground cover estimates remain stable on the site even with drought in 2002. Trend for browse is stable. The density of mountain big sagebrush remains stable even without an improvement in reproduction. Decadence increased to 47% which is not a positive change. However, vigor improved and use decreased. The proportion of the sagebrush population classified as decadent and dying declined from 70% in 1997 to 37% in 2002. Increased decadence and low reproduction are indicative of drought, and both of these key parameters should improve with better precipitation. Bitterbrush also has a stable density. Although use remains moderate to heavy, vigor is generally good, and decadence is moderately low at 22%. Trend for the herbaceous understory is stable. Perennial grasses are maintaining themselves on the site. Bluebunch wheatgrass and Sandberg bluegrass are the most abundant species and both remained at stable frequencies. Perennial forbs remain insignificant on the site and will likely remain so without some type of intervention to promote their increase.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 19B, Study no: 15

| T y p e | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|------------------------------------|------------------|------|------|------|-------------------|-----|-----|-----|-----------------|-------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | <i>Agropyron cristatum</i> | a12 | b83 | a40 | 16 | 9 | 33 | 16 | 6 | .79 | 1.12 |
| G | <i>Agropyron spicatum</i> | ab189 | a147 | b202 | b204 | 70 | 60 | 79 | 88 | 14.03 | 12.96 |
| G | <i>Bromus tectorum</i> (a) | - | - | b212 | a17 | - | - | 76 | 10 | 1.23 | .05 |
| G | <i>Oryzopsis hymenoides</i> | c30 | b10 | ab1 | a- | 14 | 6 | 1 | - | .00 | - |
| G | <i>Poa fendleriana</i> | - | - | 4 | - | - | - | 2 | - | .01 | - |
| G | <i>Poa secunda</i> | a212 | b259 | b261 | b282 | 84 | 91 | 94 | 95 | 5.13 | 4.10 |
| G | <i>Sitanion hystrix</i> | b34 | a17 | a3 | a3 | 16 | 8 | 1 | 1 | .03 | .00 |
| Total for Annual Grasses | | 0 | 0 | 212 | 17 | 0 | 0 | 76 | 10 | 1.23 | 0.05 |
| Total for Perennial Grasses | | 477 | 516 | 511 | 505 | 193 | 198 | 193 | 190 | 19.99 | 18.20 |
| Total for Grasses | | 477 | 516 | 723 | 522 | 193 | 198 | 269 | 200 | 21.23 | 18.25 |
| F | <i>Agoseris glauca</i> | - | - | 2 | 1 | - | - | 1 | 1 | .00 | .00 |
| F | <i>Alyssum alyssoides</i> (a) | - | - | b328 | a11 | - | - | 99 | 5 | 1.34 | .02 |
| F | <i>Antennaria rosea</i> | 13 | 33 | 19 | 29 | 6 | 15 | 9 | 14 | .12 | .31 |
| F | <i>Arabis</i> spp. | 4 | 3 | 5 | - | 2 | 1 | 3 | - | .01 | - |
| F | <i>Calochortus nuttallii</i> | b11 | b7 | a- | a- | 5 | 5 | - | - | - | - |
| F | <i>Chaenactis douglasii</i> | 12 | 6 | - | - | 4 | 2 | - | - | - | - |
| F | <i>Cirsium</i> spp. | - | - | 1 | - | - | - | 1 | - | .00 | - |
| F | <i>Collinsia parviflora</i> (a) | - | - | b16 | a- | - | - | 7 | - | .03 | - |
| F | <i>Delphinium nuttallianum</i> | 4 | - | - | - | 2 | - | - | - | - | - |
| F | <i>Epilobium brachycarpum</i> (a) | - | - | b14 | a- | - | - | 6 | - | .03 | - |
| F | <i>Holosteum umbellatum</i> (a) | - | - | - | 1 | - | - | - | 1 | - | .00 |
| F | <i>Lomatium</i> spp. | a- | a- | b12 | a- | - | - | 6 | - | .03 | - |
| F | <i>Microsteris gracilis</i> (a) | - | - | b59 | a- | - | - | 25 | - | .12 | - |
| F | <i>Phlox longifolia</i> | - | - | - | 1 | - | - | - | 1 | - | .00 |
| F | <i>Ranunculus testiculatus</i> (a) | - | - | b135 | a12 | - | - | 51 | 5 | .70 | .02 |
| F | <i>Tragopogon dubius</i> | 6 | 1 | - | - | 3 | 1 | - | - | - | - |
| F | Unknown forb-perennial | 4 | - | - | - | 1 | - | - | - | - | - |
| F | <i>Zigadenus paniculatus</i> | 3 | 13 | 6 | 1 | 2 | 5 | 2 | 1 | .01 | .03 |
| Total for Annual Forbs | | 0 | 0 | 552 | 24 | 0 | 0 | 188 | 11 | 2.24 | 0.05 |
| Total for Perennial Forbs | | 57 | 63 | 45 | 32 | 25 | 29 | 22 | 17 | 0.18 | 0.35 |
| Total for Forbs | | 57 | 63 | 597 | 56 | 25 | 29 | 210 | 28 | 2.42 | 0.40 |

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

BROWSE TRENDS --
Herd unit 19B, Study no: 15

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|-------------------------------|-----------------|-----|-----------------|------|
| | | '97 | '02 | '97 | '02 |
| B | Amelanchier alnifolia | 2 | 2 | - | - |
| B | Artemisia tridentata vaseyana | 69 | 68 | 8.61 | 7.26 |
| B | Eriogonum microthecum | 1 | 1 | - | - |
| B | Gutierrezia sarothrae | 86 | 57 | 1.20 | .68 |
| B | Juniperus osteosperma | 0 | 1 | .00 | - |
| B | Pinus monophylla | 0 | 0 | .85 | .00 |
| B | Purshia tridentata | 12 | 11 | 1.91 | 1.92 |
| Total for Browse | | 170 | 140 | 12.58 | 9.88 |

CANOPY COVER -- LINE INTERCEPT
Herd unit 19B, Study no: 15

| Species | Percent Cover | |
|-------------------------------|---------------|------|
| | '97 | '02 |
| Artemisia tridentata vaseyana | - | 6.17 |
| Gutierrezia sarothrae | - | .83 |
| Pinus monophylla | - | .83 |
| Purshia tridentata | - | 2.58 |

Key Browse Annual Leader Growth
Herd unit 19B , Study no: 15

| Species | Average leader growth (in) |
|-------------------------------|----------------------------|
| | '02 |
| Artemisia tridentata vaseyana | 1.8 |
| Purshia tridentata | 2.7 |

Point-Quarter Tree Data
Herd unit 19B , Study no: 15

| Species | Trees per Acre | | Average diameter (in) | |
|-----------------------|----------------|-----|-----------------------|-----|
| | '97 | '02 | '97 | '02 |
| Juniperus osteosperma | 14 | 32 | 2.0 | 1.8 |
| Pinus monophylla | 26 | 73 | 1.9 | 1.8 |

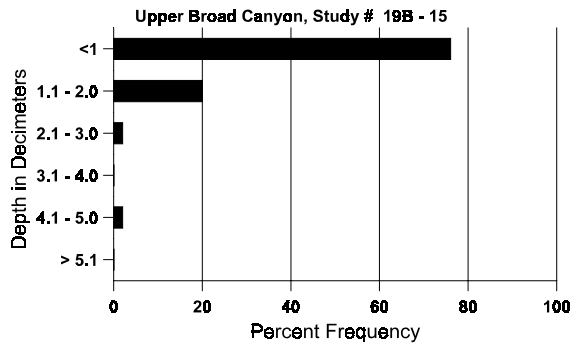
BASIC COVER --
Herd unit 19B, Study no: 15

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 359 | 333 | 0 | 5.25 | 34.31 | 27.71 |
| Rock | 293 | 310 | 11.75 | 17.25 | 19.31 | 19.66 |
| Pavement | 272 | 321 | 28.00 | 24.75 | 12.09 | 13.53 |
| Litter | 370 | 364 | 49.50 | 38.50 | 28.56 | 28.13 |
| Cryptogams | 158 | 213 | .50 | 2.50 | 3.05 | 4.07 |
| Bare Ground | 290 | 291 | 10.25 | 11.75 | 14.59 | 16.81 |

SOIL ANALYSIS DATA --
Herd Unit 19B, Study no: 15, Upper Broad Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 9.6 | 64.2 (11.3) | 7.1 | 42.4 | 29.1 | 28.6 | 3.0 | 7.1 | 166.4 | 0.6 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 19B, Study no: 15

| Type | Quadrat Frequency | | Pellet Transect | |
|--------|-------------------|-----|------------------------------|------------------------------|
| | '97 | '02 | Pellet Groups per Acre 02 | Days Use per Acre (ha) 02 |
| Sheep | 12 | 3 | 252 | 19 (48) |
| Rabbit | 7 | 3 | - | - |
| Elk | - | 3 | - | - |
| Deer | 17 | 15 | 287 | 22 (55) |
| Cattle | - | 3 | - | - |

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 15

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | |
|------------------------------------------------|----------------------------|---------------------|----|------------------|---|--------------------|--------------------------------|----------------|-------|----|----|----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | | |
| <i>Amelanchier alnifolia</i> | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | 1 | - | - | - | 1 | - | 40 | 12 | 12 | 2 |
| | 02 | - | 1 | - | - | 1 | - | - | 40 | 11 | 16 | 2 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | |
| '83 | | 00% | | 00% | | 00% | | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | | |
| '97 | | 50% | | 00% | | 00% | | + 0% | | | | |
| '02 | | 100% | | 00% | | 00% | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | '89 | 0 | | - | | | |
| | | | | | | '97 | 40 | | - | | | |
| | | | | | | '02 | 40 | | - | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 3 | - | - | - | - | - | - | 100 | | 3 | |
| | 97 | 1 | - | - | - | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | 5 | 3 | - | - | - | - | - | 266 | | 8 | |
| | 89 | 3 | 1 | - | - | - | - | - | 133 | | 4 | |
| | 97 | 7 | - | - | - | - | 1 | - | 160 | | 8 | |
| | 02 | 3 | - | - | - | - | - | - | 60 | | 3 | |
| M | 83 | 8 | 4 | 29 | - | - | - | - | 1366 | 24 | 23 | 41 |
| | 89 | 13 | 12 | 12 | - | - | - | - | 1233 | 16 | 23 | 37 |
| | 97 | 31 | 26 | 8 | - | - | - | - | 1300 | 22 | 35 | 65 |
| | 02 | 43 | 8 | - | 2 | - | - | - | 1060 | 21 | 34 | 53 |
| D | 83 | 1 | - | 17 | - | - | - | - | 600 | | | 18 |
| | 89 | 10 | 15 | 7 | - | - | - | - | 1066 | | | 32 |
| | 97 | 9 | 17 | 1 | 3 | - | - | - | 600 | | | 30 |
| | 02 | 36 | 9 | - | 2 | 1 | - | 1 | 980 | | | 49 |
| X | 83 | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | 920 | | | 46 |
| | 02 | - | - | - | - | - | - | - | 900 | | | 45 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | |
| '83 | | 10% | | 69% | | 25% | | + 8% | | | | |
| '89 | | 38% | | 26% | | 93% | | -15% | | | | |
| '97 | | 42% | | 09% | | 34% | | + 2% | | | | |
| '02 | | 17% | | 00% | | 18% | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 2232 | Dec: | 27% | | | |
| | | | | | | '89 | 2432 | | 44% | | | |
| | | | | | | '97 | 2060 | | 29% | | | |
| | | | | | | '02 | 2100 | | 47% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Eriogonum microthecum</i> | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 5 | 8 | 1 |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 4 | 5 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |
| | | | | | | | | | | | | '02 | 20 | | - | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | | |
| S | 83 | 62 | - | - | - | - | - | - | - | - | 62 | - | - | - | 2066 | | | 62 |
| | 89 | 24 | - | - | - | - | - | - | - | - | 24 | - | - | - | 800 | | | 24 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| Y | 83 | 37 | - | - | - | - | - | - | - | - | 37 | - | - | - | 1233 | | | 37 |
| | 89 | 66 | - | - | - | - | - | - | - | - | 66 | - | - | - | 2200 | | | 66 |
| | 97 | 65 | - | - | 2 | - | - | - | - | - | 67 | - | - | - | 1340 | | | 67 |
| | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | | 2 |
| M | 83 | 118 | - | - | - | - | - | - | - | - | 118 | - | - | - | 3933 | 8 | 8 | 118 |
| | 89 | 167 | - | - | - | - | - | - | - | - | 167 | - | - | - | 5566 | 8 | 12 | 167 |
| | 97 | 266 | - | - | 3 | - | - | - | - | - | 269 | - | - | - | 5380 | 7 | 7 | 269 |
| | 02 | 92 | - | - | 1 | - | - | - | - | - | 89 | 3 | 1 | - | 1860 | 5 | 8 | 93 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 233 | | | 7 |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | | 2 |
| | 02 | 28 | 1 | - | - | - | - | 1 | - | - | 18 | - | 1 | 11 | 600 | | | 30 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 2520 | | | 126 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +35% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -15% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | -63% | | | | | | | |
| '02 | | .80% | | | 00% | | | 10% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 5166 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 7999 | | 3% | | | |
| | | | | | | | | | | | | '97 | 6760 | | 1% | | | |
| | | | | | | | | | | | | '02 | 2500 | | 24% | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|----|------|--------------------|--------------------------------|-------|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| M | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | - | - | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 20 | | - | | | |
| Pinus monophylla | | | | | | | | | | | | | | | | | | |
| S | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '02 | 2 | - | - | 2 | - | - | - | - | - | 4 | - | - | - | 80 | | | 4 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | | | | | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|---|--------------------|--------------------------------|----------------|-------|-----|-----|------|-----|-----|-------|----|---|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | | | | | | | |
| Purshia tridentata | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 2 | 2 | - | - | - | - | - | - | 4 | - | - | - | 133 | | 4 | |
| | 97 | - | 1 | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | - | - | 8 | - | - | - | - | - | 8 | - | - | - | 266 | 11 29 | 8 | |
| | 89 | - | - | 5 | - | - | - | - | - | 5 | - | - | - | 166 | 10 18 | 5 | |
| | 97 | 3 | 1 | 12 | - | - | - | - | - | 16 | - | - | - | 320 | 18 34 | 16 | |
| | 02 | 5 | 5 | 4 | - | - | - | - | - | 14 | - | - | - | 280 | 20 46 | 14 | |
| D | 83 | - | - | 1 | - | - | - | - | - | - | - | 1 | - | 33 | | 1 | |
| | 89 | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | 97 | - | - | - | - | 1 | - | - | - | 2 | - | - | - | 40 | | 2 | |
| | 02 | 1 | - | 3 | - | - | - | - | - | 2 | - | - | 2 | 80 | | 4 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | 2 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | | | | | |
| '83 | | 00% | | 100% | | 11% | | +10% | | | | | | | | | |
| '89 | | 20% | | 60% | | 00% | | +13% | | | | | | | | | |
| '97 | | 16% | | 68% | | 00% | | - 5% | | | | | | | | | |
| '02 | | 28% | | 39% | | 11% | | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 299 | Dec: | 11% | | | | |
| | | | | | | | | | | '89 | 332 | | 10% | | | | |
| | | | | | | | | | | '97 | 380 | | 11% | | | | |
| | | | | | | | | | | '02 | 360 | | 22% | | | | |
| Ribes spp. | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 14 33 | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | | | | | |
| '83 | | 00% | | 00% | | 00% | | | | | | | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | | | | | | | |
| '97 | | 00% | | 00% | | 00% | | | | | | | | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 0 | Dec: | - | | | | |
| | | | | | | | | | | '89 | 0 | | - | | | | |
| | | | | | | | | | | '97 | 0 | | - | | | | |
| | | | | | | | | | | '02 | 0 | | - | | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|---|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Symphoricarpos oreophilus | | | | | | | | | | | | | | | | | | |
| M | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 14 | 65 | 0 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| | '83 | 00% | | | 00% | | | 00% | | | | | | | | | | |
| | '89 | 00% | | | 00% | | | 00% | | | | | | | | | | |
| | '97 | 00% | | | 00% | | | 00% | | | | | | | | | | |
| | '02 | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |

Trend Study 19B-16-02

Study site name: Nephi Dump.

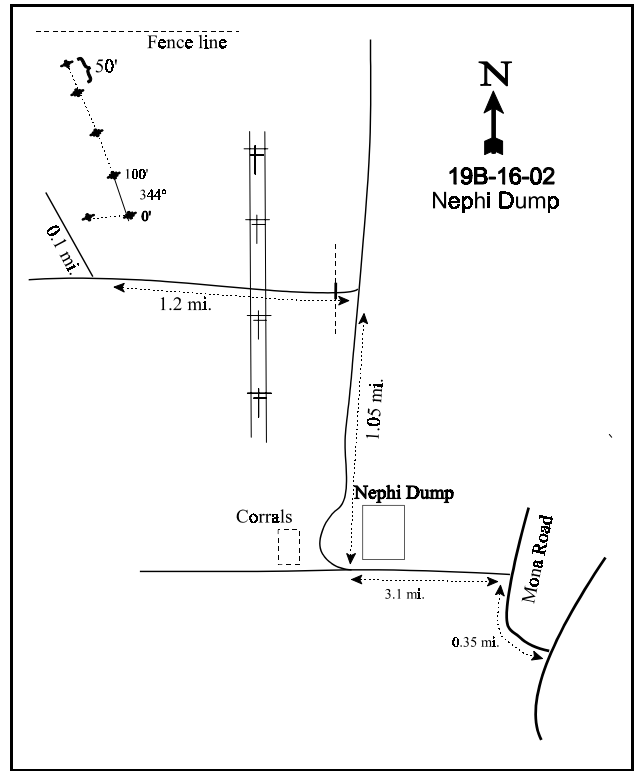
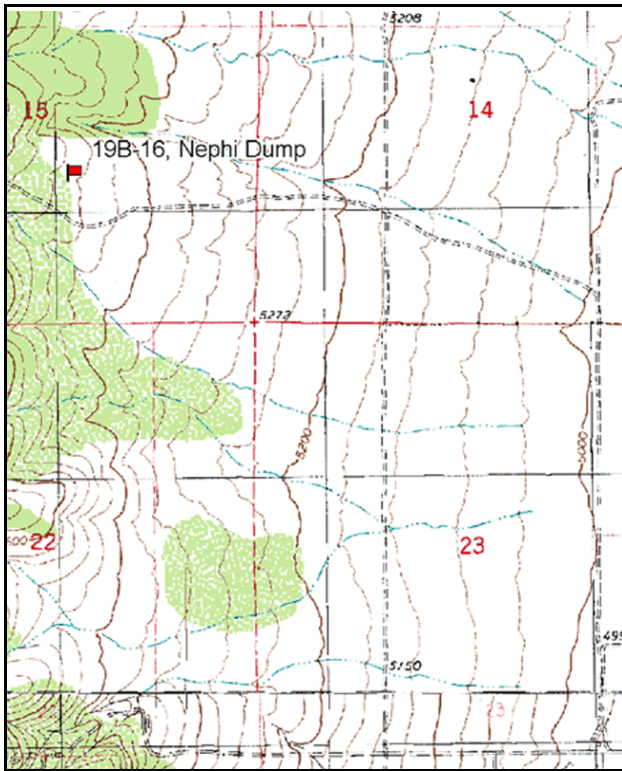
Vegetation type: Stansbury Cliffrose.

Compass bearing: frequency baseline 344 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (29ft).

LOCATION DESCRIPTION

From the Nephi City Dump, travel north on a gravel road for 1.05 miles and then turn left (west) just after passing through a cattle guard. Travel west for 1.25 miles and turn right (north) onto a faint road and go 0.1mile. At this point, there is a small stockpile and a short red steel stake. From here, walk east a short distance to the 0-foot mark of the frequency baseline, marked by a steel fencepost with a red browse tag, number 3942, attached.



Map Name: Slate Jack Canyon

Diagrammatic Sketch

Township 12S, Range 1W, Section 15

GPS: NAD 27, UTM 12S 4402117 N 421042 E

DISCUSSION

Nephi Dump - Trend Study No. 19B-16

The Nephi Dump trend study samples deer winter range located northwest of Nephi on the east side of Long Ridge. The site has a slope that varies from relatively level to 5%. Aspect is south to southeast at an elevation of 5,600 feet. The range type is mountain big sagebrush, interspersed with Utah juniper and Stansbury cliffrose. The site is located within an area of about 40 acres that was not burned by the extensive fires of 1996. Much of the surrounding vegetation has been burned in 1986 and 1996. It was reported in the past that use may be concentrated in this unburned area, but deer use in both readings since the burn (1997 and 2002) has been rather light. Cattle also use the area, but at lower rates compared to wildlife. A pellet group transect read on site in 2002 estimated 31 deer days use/acre (76 ddu/ha) and 7 cow days use/acre (16 cdu/ha).

The soil is light brown in color with rock and pavement scattered on the surface. Soil textural analysis indicates a clay loam, and chemical analysis reveals soils to be neutral in reactivity (pH of 6.9). The effective rooting depth was estimated at 9 inches. Average soil temperature was 71°F measured at 11 inches in depth in 1997. Vegetation and litter cover have been adequate to protect against most erosion, although the major deterrent to erosion on this site is the gentle slope. Due to drought conditions in 2002, bare ground increased and litter decreased, but the erosion condition class was still determined as stable.

The key browse species is mountain big sagebrush, which provided 60% of the browse cover in 2002. Identification of this species has been problematic in the past due to differing growth forms. It is likely that a minor component of basin big sagebrush also exists on the site. Population density was estimated at 1,920 plants/acre in 1997, increasing to 2,220 plants/acre in 2002. The sagebrush population has generally shown light to moderate use in all years. Percent decadence has been moderate, ranging from a low of 20% in 1997 to a high of 44% in 2002. The proportion of the population expressing poor vigor has ranged from 8% in 1983 to 28% in 1997. Recruitment has been low in all sampling years, although the population appears to have stabilized at its present density. Annual leader growth averaged 2.2 inches in 2002. Stansbury cliffrose also provides some palatable forage, but it occurs infrequently on the site. Utilization is heavy on available plants. Other browse on the site include stickyleaf low rabbitbrush, white-stemmed rubber rabbitbrush, and broom snakeweed. Point-centered quarter data estimated 52 juniper trees/acre in 2002.

Perennial herbaceous species have steadily increased in sum of nested frequency since site establishment in 1983. Crested wheatgrass and Sandberg bluegrass are the dominant grasses. Together they provided 74% of the grass cover in 2002. Both have remained at stable nested frequency values. Bluebunch wheatgrass is also fairly abundant. Cheatgrass and Japanese brome are scattered throughout the site, but appear to have stabilized with the understory community as they have remained at similar levels in 1997 and 2002. Forbs contribute little to forage or ground cover. Perennial species have been infrequent since the site was established in 1983. Annual forbs were moderately abundant in 1997 and 2002, primarily pale alyssum and bur buttercup.

1983 APPARENT TREND ASSESSMENT

This is a poor condition site characterized by a lack of effective ground cover and excessive erosion. Plant composition consists of a declining population of mountain big sagebrush and increasing populations of broom snakeweed and stickyleaf low rabbitbrush. The Stansbury cliffrose population is stable to declining and there is an overabundance of cheatgrass in the understory. Utah juniper is present but not rapidly increasing. The overall trend appears to be declining.

1989 TREND ASSESSMENT

Shrub interspaces remain relatively bare as there is little vegetation ground cover present. Percent bare ground has declined, while percent pavement and rock cover combined have increased. Erosion is still occurring, but the level slope keeps erosion to a minimum. The soil trend is stable. Mountain big sagebrush shows a decline in density, increased percent of plants in poor vigor, and an increase in decadence. Reproduction is also poor with no seedling or young plants encountered. The increasers, stickyleaf low rabbitbrush and broom snakeweed, have also increased in density. The browse trend is slightly down. Both Sandberg bluegrass and bluebunch wheatgrass have significantly increased in sum of nested frequency since 1983. Herbaceous understory sum of nested frequency has increased since 1983 as well. The herbaceous understory trend is slightly upward.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - slightly up (4)

1997 TREND ASSESSMENT

The soil trend continues to be stable. Some erosion is still apparent, but it does not appear excessive. Percent cover for bare ground is slowly declining, but so is percent litter cover. The browse trend is slightly downward with a declining mountain big sagebrush density and an increase in the percent of plants with poor vigor. The dead to live ratio is currently 1:3, with few seedling or young plants encountered. The stickyleaf low rabbitbrush density has increased again, while the broom snakeweed population appears to have stabilized. The herbaceous understory trend is upward with a large increase in perennial herbaceous understory sum of nested frequency. More desirable grasses such as bluebunch wheatgrass, crested wheatgrass, and Sandberg bluegrass are slowly increasing in abundance on the site.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - up (5)

2002 TREND ASSESSMENT

Soil trend is stable. Litter cover continues to progressively decline on the site, and bare ground increased to 17%. However, herbaceous cover remains high and sum of nested frequency for perennial grasses and forbs increased. Erosion remains minimal. Trend for browse is stable. Mountain big sagebrush slightly increased in density and vigor improved. Decadence increased from 20% to 44% which is not surprising with drought. Reproduction remains limited with only 20 young plants/acre being sampled. The increasers, stickyleaf low rabbitbrush and broom snakeweed have stable to declining populations in 2002. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses and forbs slightly increased. Crested wheatgrass and Sandberg bluegrass remain the dominant species.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 19B, Study no: 16

| T y p e | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|-----------------------------|------------------|------|------|------|-------------------|-----|-----|-----|-----------------|-------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | Agropyron cristatum | a7 | a17 | b143 | b133 | 3 | 7 | 51 | 47 | 9.05 | 8.84 |
| G | Agropyron intermedium | - | - | - | 2 | - | - | - | 1 | - | .03 |
| G | Agropyron spicatum | a10 | ab30 | ab33 | b38 | 4 | 15 | 13 | 16 | 1.42 | 1.89 |
| G | Bromus japonicus (a) | - | - | 22 | 15 | - | - | 8 | 6 | .12 | .05 |
| G | Bromus tectorum (a) | - | - | 183 | 163 | - | - | 63 | 63 | 4.46 | 2.77 |
| G | Oryzopsis hymenoides | 1 | 5 | - | 4 | 1 | 2 | - | 2 | - | .03 |
| G | Poa pratensis | 3 | - | - | - | 1 | - | - | - | - | - |
| G | Poa secunda | a103 | b149 | b161 | b182 | 42 | 51 | 57 | 62 | 4.20 | 5.09 |
| G | Sitanion hystrix | 9 | 8 | 8 | 4 | 5 | 5 | 4 | 3 | .07 | .21 |
| Total for Annual Grasses | | 0 | 0 | 205 | 178 | 0 | 0 | 71 | 69 | 4.58 | 2.83 |
| Total for Perennial Grasses | | 133 | 209 | 345 | 363 | 56 | 80 | 125 | 131 | 14.75 | 16.11 |
| Total for Grasses | | 133 | 209 | 550 | 541 | 56 | 80 | 196 | 200 | 19.34 | 18.94 |
| F | Agoseris glauca | - | - | - | 1 | - | - | - | 1 | - | .00 |
| F | Alyssum alyssoides (a) | - | - | b264 | a151 | - | - | 90 | 60 | 3.04 | .37 |
| F | Astragalus calycosus | - | 3 | - | - | - | 1 | - | - | - | - |
| F | Astragalus eurekensis | a- | ab2 | b10 | c31 | - | 1 | 5 | 14 | .07 | 1.23 |
| F | Castilleja linariaefolia | - | 1 | 1 | 1 | - | 1 | 1 | 1 | .01 | .00 |
| F | Camelina microcarpa (a) | - | - | 10 | - | - | - | 4 | - | .02 | - |
| F | Calochortus nuttallii | a2 | a6 | b18 | a1 | 1 | 2 | 10 | 1 | .10 | .00 |
| F | Chorispora tenella (a) | - | - | 4 | 6 | - | - | 1 | 2 | .03 | .30 |
| F | Comandra pallida | 2 | 1 | - | - | 1 | 1 | - | - | - | - |
| F | Collinsia parviflora (a) | - | - | - | 6 | - | - | - | 3 | - | .01 |
| F | Cymopterus spp. | - | - | - | 6 | - | - | - | 2 | - | .03 |
| F | Lactuca serriola | a- | ab2 | b9 | a- | - | 1 | 5 | - | .02 | - |
| F | Microsteris gracilis (a) | - | - | 3 | 2 | - | - | 1 | 2 | .00 | .01 |
| F | Phlox austromontana | - | 2 | 1 | 1 | - | 1 | 1 | 1 | .00 | .03 |
| F | Phlox longifolia | a- | b13 | b17 | c40 | - | 7 | 9 | 20 | .04 | .27 |
| F | Ranunculus testiculatus (a) | - | - | 189 | 199 | - | - | 65 | 68 | 1.19 | 2.71 |
| F | Senecio multilobatus | - | - | 5 | 1 | - | - | 2 | 1 | .01 | .00 |
| F | Sisymbrium altissimum (a) | - | - | - | 1 | - | - | - | 1 | - | .00 |
| F | Sphaeralcea coccinea | - | 1 | 1 | - | - | 1 | 1 | - | .00 | - |
| F | Tragopogon dubius | - | 3 | 2 | - | - | 1 | 1 | - | .03 | - |
| F | Unknown forb-annual (a) | - | - | 4 | - | - | - | 2 | - | .01 | - |
| F | Unknown forb-perennial | 2 | - | - | - | 1 | - | - | - | - | - |
| F | Vicia americana | - | - | 2 | - | - | - | 1 | - | .03 | - |
| F | Zigadenus paniculatus | - | 1 | 4 | - | - | 1 | 2 | - | .01 | - |

| T y p e | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|------------------|---------------------------|------------------|-----|-----|-----|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| | Total for Annual Forbs | 0 | 0 | 474 | 365 | 0 | 0 | 163 | 136 | 4.30 | 3.41 |
| | Total for Perennial Forbs | 6 | 35 | 70 | 82 | 3 | 18 | 38 | 41 | 0.34 | 1.59 |
| | Total for Forbs | 6 | 35 | 544 | 447 | 3 | 18 | 201 | 177 | 4.65 | 5.01 |

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

BROWSE TRENDS --

Herd unit 19B, Study no: 16

| T y p e | Species | Strip Frequency | | Average Cover % | |
|------------------|-------------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | <i>Artemisia tridentata vaseyana</i> | 65 | 71 | 10.92 | 9.01 |
| B | <i>Cercocarpus montanus</i> | 0 | 1 | - | - |
| B | <i>Chrysothamnus nauseosus</i> | 2 | 1 | .79 | .98 |
| B | <i>Chrysothamnus viscidiflorus stenophyllus</i> | 40 | 46 | 5.49 | 4.12 |
| B | <i>Cowania mexicana stansburiana</i> | 2 | 0 | .78 | - |
| B | <i>Gutierrezia sarothrae</i> | 34 | 19 | .69 | .15 |
| B | <i>Juniperus osteosperma</i> | 1 | 1 | 3.40 | .68 |
| | Total for Browse | 144 | 139 | 22.08 | 14.94 |

CANOPY COVER --

Herd unit 19B, Study no: 16

| Species | Percent Cover | |
|------------------------------|---------------|-----|
| | '97 | '02 |
| <i>Juniperus osteosperma</i> | - | 7 |

Key Browse Annual Leader Growth

Herd unit 19B, Study no: 16

| Species | Average leader growth (in) |
|------------------------------------------|----------------------------|
| | '02 |
| <i>Artemisia tridentata wyomingensis</i> | 2.2 |

Point-Quarter Tree Data

Herd unit 19B, Study no: 16

| Species | Trees per Acre | Average diameter (in) |
|------------------------------|----------------|-----------------------|
| | '02 | |
| <i>Juniperus osteosperma</i> | 52 | 3.9 |

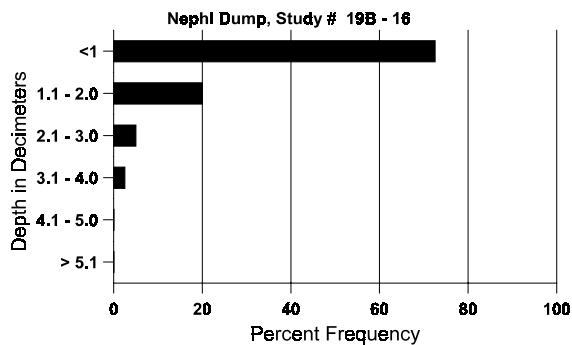
BASIC COVER --
Herd unit 19B, Study no: 16

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 372 | 353 | .25 | 5.00 | 38.75 | 41.17 |
| Rock | 247 | 267 | 13.25 | 13.00 | 9.50 | 10.58 |
| Pavement | 287 | 282 | 10.00 | 16.75 | 18.19 | 12.17 |
| Litter | 374 | 374 | 59.00 | 50.75 | 39.46 | 30.07 |
| Cryptogams | 135 | 231 | 4.00 | 4.50 | 3.96 | 14.77 |
| Bare Ground | 247 | 277 | 13.50 | 10.00 | 7.75 | 16.69 |

SOIL ANALYSIS DATA --
Herd Unit 19B, Study no: 16, Nephi Dump

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 9.1 | 71.0 (10.7) | 6.9 | 42.0 | 27.4 | 30.6 | 2.9 | 7.7 | 284.8 | 0.7 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 19B, Study no: 16

| Type | Quadrat Frequency | | Pellet Transect | |
|--------|-------------------|-----|------------------------|------------------------|
| | '97 | '02 | Pellet Groups per Acre | Days Use per Acre (ha) |
| Rabbit | 22 | 5 | 0 | - |
| Deer | 17 | 12 | 400 | 31 (76) |
| Cattle | 8 | 1 | 78 | 7 (16) |

BROWSE CHARACTERISTICS --
Herd unit 19B, Study no: 16

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | |
|------------------------------------------------|----------------------------|---------------------|----|------------------|---|--------------------|--------------------------------|----------------|-------|-------|----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | 0 | 0 | |
| | 89 | - | - | - | - | - | - | - | 0 | 0 | |
| | 97 | 3 | - | - | - | - | - | - | 60 | 3 | |
| | 02 | - | - | - | - | - | - | - | 0 | 0 | |
| Y | 83 | 9 | - | - | - | - | - | - | 300 | 9 | |
| | 89 | - | - | - | - | - | - | - | 0 | 0 | |
| | 97 | 5 | - | - | - | - | - | - | 100 | 5 | |
| | 02 | 1 | - | - | - | - | - | - | 20 | 1 | |
| M | 83 | 39 | 27 | - | - | - | - | - | 2200 | 22 24 | 66 |
| | 89 | 28 | 18 | 5 | - | - | - | - | 1700 | 34 30 | 51 |
| | 97 | 45 | 27 | - | - | - | - | - | 1440 | 24 33 | 72 |
| | 02 | 36 | 19 | 6 | - | - | - | - | 1220 | 24 31 | 61 |
| D | 83 | 17 | 10 | - | - | - | - | - | 900 | | 27 |
| | 89 | 14 | 11 | 7 | - | - | - | - | 1066 | | 32 |
| | 97 | 9 | 9 | - | 1 | - | - | - | 380 | | 19 |
| | 02 | 29 | 16 | 4 | - | - | - | - | 980 | | 49 |
| X | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | - | - | - | - | - | - | - | 540 | | 27 |
| | 02 | - | - | - | - | - | - | - | 420 | | 21 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 36% | | 00% | | 08% | | -19% | | | |
| '89 | | 35% | | 14% | | 18% | | -31% | | | |
| '97 | | 38% | | 00% | | 28% | | +14% | | | |
| '02 | | 32% | | 09% | | 15% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | '83 | 3400 | Dec: | 26% | |
| | | | | | | | '89 | 2766 | | 39% | |
| | | | | | | | '97 | 1920 | | 20% | |
| | | | | | | | '02 | 2220 | | 44% | |
| <i>Cercocarpus montanus</i> | | | | | | | | | | | |
| D | 83 | - | - | - | - | - | - | - | 0 | 0 | |
| | 89 | - | - | - | - | - | - | - | 0 | 0 | |
| | 97 | - | - | - | - | - | - | - | 0 | 0 | |
| | 02 | - | - | - | - | - | 1 | - | 20 | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 00% | | 00% | | 00% | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | |
| '97 | | 00% | | 00% | | 00% | | | | | |
| '02 | | 00% | | 00% | | 100% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | '83 | 0 | Dec: | 0% | |
| | | | | | | | '89 | 0 | | 0% | |
| | | | | | | | '97 | 0 | | 0% | |
| | | | | | | | '02 | 20 | | 100% | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|---|--------------------|--------------------------------|----------------|-------|------|------|------|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | | |
| Chrysothamnus nauseosus | | | | | | | | | | | | |
| M | 83 | 3 | - | - | - | - | - | - | 3 | 26 | 27 | 3 |
| | 89 | 2 | 1 | - | - | - | - | - | 3 | 19 | 22 | 3 |
| | 97 | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | 0 | 42 | 74 | 0 |
| D | 83 | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 2 | - | - | - | - | - | - | 40 | | | 2 |
| | 02 | 1 | - | - | - | - | - | - | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | |
| '83 | | 00% | | 00% | | 00% | | + 0% | | | | |
| '89 | | 33% | | 00% | | 00% | | -60% | | | | |
| '97 | | 00% | | 00% | | 00% | | -50% | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | '83 | 100 | Dec: | 0% |
| | | | | | | | | | '89 | 100 | | 0% |
| | | | | | | | | | '97 | 40 | | 100% |
| | | | | | | | | | '02 | 20 | | 100% |
| Chrysothamnus viscidiflorus stenophyllus | | | | | | | | | | | | |
| Y | 83 | 1 | - | - | - | - | - | - | 1 | - | - | 1 |
| | 89 | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 2 | - | - | - | - | - | - | 40 | - | - | 2 |
| | 02 | 3 | - | - | - | - | - | - | 60 | - | - | 3 |
| M | 83 | 9 | - | - | - | - | - | - | 300 | 18 | 20 | 9 |
| | 89 | 21 | - | - | - | - | - | - | 700 | 13 | 14 | 21 |
| | 97 | 79 | - | - | - | - | - | - | 1580 | 17 | 18 | 79 |
| | 02 | 89 | - | - | - | - | - | - | 1780 | 16 | 22 | 89 |
| D | 83 | 2 | - | - | - | - | - | - | 66 | | | 2 |
| | 89 | 1 | - | - | - | - | - | - | 33 | | | 1 |
| | 97 | 8 | - | - | - | - | - | - | 160 | | | 8 |
| | 02 | 27 | - | - | - | - | - | - | 540 | | | 27 |
| X | 83 | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | 20 | | | 1 |
| | 02 | - | - | - | - | - | - | - | 100 | | | 5 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | |
| '83 | | 00% | | 00% | | 00% | | +46% | | | | |
| '89 | | 00% | | 00% | | 05% | | +59% | | | | |
| '97 | | 00% | | 00% | | 02% | | +25% | | | | |
| '02 | | 00% | | 00% | | 07% | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | '83 | 399 | Dec: | 17% |
| | | | | | | | | | '89 | 733 | | 5% |
| | | | | | | | | | '97 | 1780 | | 9% |
| | | | | | | | | | '02 | 2380 | | 23% |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | | | | | | | |
|------------------------------------------------|----------------------------|---------------------|---|---|------------------|--------------------|--------------------------------|-------------------|-------|-----|----------------|------|-----|------|----|----|----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | | | | | | | |
| <i>Cowania mexicana stansburiana</i> | | | | | | | | | | | | | | | | | |
| M | 83 | 3 | 2 | - | - | - | - | - | - | 5 | - | - | - | 166 | 27 | 25 | 5 |
| | 89 | - | - | 3 | - | - | - | - | - | 3 | - | - | - | 100 | 22 | 25 | 3 |
| | 97 | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | 64 | 66 | 1 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 58 | 37 | 0 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | 1 | - | - | - | - | - | - | - | 1 | - | 33 | | | 1 |
| | 97 | - | - | - | - | - | 1 | - | - | 1 | - | - | - | 20 | | | 1 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 40% | | | 00% | | | 00% | | | -20% | | | | | | |
| '89 | | 00% | | | 100% | | | 25% | | | -70% | | | | | | |
| '97 | | 00% | | | 100% | | | 00% | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 166 | Dec: | 0% | | | | |
| | | | | | | | | | | '89 | 133 | | 25% | | | | |
| | | | | | | | | | | '97 | 40 | | 50% | | | | |
| | | | | | | | | | | '02 | 0 | | 0% | | | | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 6 | - | - | - | - | - | - | - | 6 | - | - | - | 120 | | | 6 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| Y | 83 | 10 | - | - | - | - | - | - | - | 10 | - | - | - | 333 | | | 10 |
| | 89 | 4 | - | - | - | - | - | - | - | 4 | - | - | - | 133 | | | 4 |
| | 97 | 20 | - | - | - | - | - | - | - | 20 | - | - | - | 400 | | | 20 |
| | 02 | - | - | - | - | - | - | 1 | - | 1 | - | - | - | 20 | | | 1 |
| M | 83 | 25 | - | - | - | - | - | - | - | 25 | - | - | - | 833 | 15 | 15 | 25 |
| | 89 | 68 | - | - | - | - | - | - | - | 68 | - | - | - | 2266 | 10 | 9 | 68 |
| | 97 | 75 | - | - | - | - | - | - | - | 70 | - | - | - | 1500 | 11 | 11 | 75 |
| | 02 | 20 | - | - | - | - | - | - | - | 19 | 1 | - | - | 400 | 7 | 8 | 20 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | 4 | - | - | - | - | - | - | - | 2 | - | - | 2 | 133 | | | 4 |
| | 97 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | 20 | | | 1 |
| | 02 | 13 | - | - | - | - | - | - | - | - | - | - | 13 | 260 | | | 13 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 660 | | | 33 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +54% | | | | | | |
| '89 | | 00% | | | 00% | | | 03% | | | -24% | | | | | | |
| '97 | | 00% | | | 00% | | | 01% | | | -65% | | | | | | |
| '02 | | 00% | | | 00% | | | 38% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | '83 | 1166 | Dec: | 0% | | | | |
| | | | | | | | | | | '89 | 2532 | | 5% | | | | |
| | | | | | | | | | | '97 | 1920 | | 1% | | | | |
| | | | | | | | | | | '02 | 680 | | 38% | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | | 1 |
| | 89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | | 2 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | - | - | 1 |
| | 02 | - | - | - | - | - | - | - | 1 | - | 1 | - | - | - | 20 | - | - | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +50% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -70% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 33 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 66 | | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |
| | | | | | | | | | | | | '02 | 20 | | - | | | |
| Purshia tridentata | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 11 | 16 | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |

Trend Study 19B-18-02

Study site name: Furner Valley.

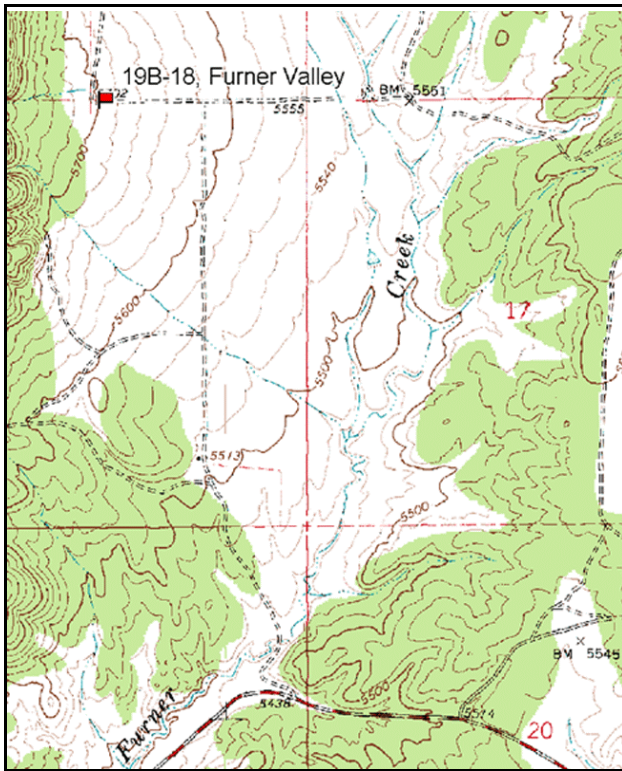
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 188 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 1 on 1ft and belt 4 on 1ft.

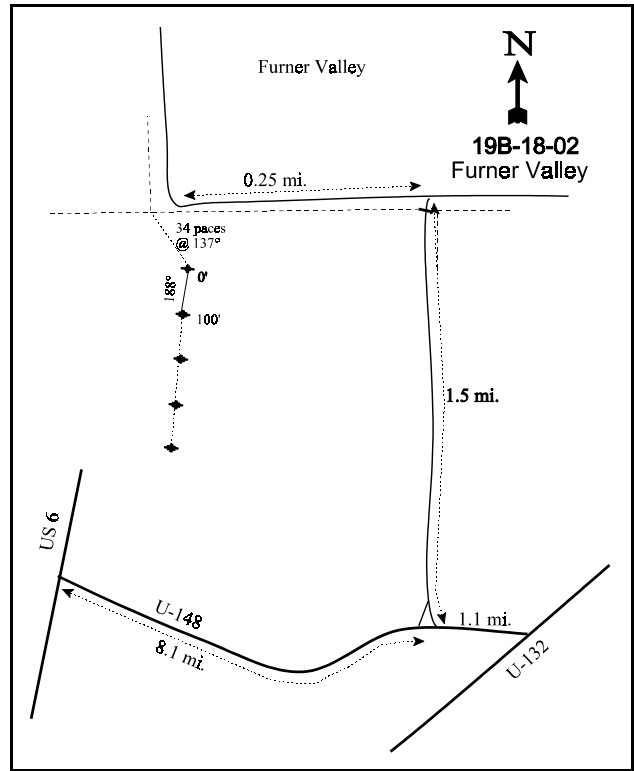
LOCATION DESCRIPTION

From a point on Highway U-148, located 8.1 miles east of the junction of Highway U-148 and U.S. 6, proceed north on the dirt road to Furner Valley for 1.50 miles. At this point, there is a "T" intersection with cropland immediately to the north. Turn left (west) for 0.25 miles, to where the road turns north again at a right angle. Stop! From the corner of the fence, walk 34 paces at an azimuth of 137 degrees M to the 0-foot marker of the frequency baseline, a green steel fencepost 15 inches high with a red browse tag, number 3936, attached.



Map Name: Furner Ridge

Township 13S, Range 2W, Section 18



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4393400 N 406634 E

DISCUSSION

Furner Valley - Trend Study No. 19B-18

The Furner Valley trend study samples deer winter range on the west side of Furner Valley. The study area has a gentle slope to the east at an elevation of 5,700 feet. The range type is mountain big sagebrush-grass with antelope bitterbrush as a sub-dominant shrub. Immediately west of the study site is a mature stand of juniper-pinyon which provides escape and thermal cover. Deer use has been moderate to heavy in the past, and there is evidence of cattle and sheep use as well. It was observed in 1989 under dry conditions, that cattle had already (July 20th) made considerable use of the bitterbrush's current years growth. The area is in close proximity to a large dryland farm which may attract deer in the spring. A pellet group transect read on site in 2002 estimated 36 deer days use/acre (89 ddu/ha). Remnants of old cattle, horse, and sheep droppings were also sampled in 2002.

The soil is light in color with rock and pavement scattered across the soil surface and throughout the profile. Soil textural and chemical analysis indicates a sandy clay loam with a neutral pH (7.1). The effective rooting depth is almost 11 inches with a temperature of 67°F measured at about 14 inches. A moderate amount of bare soil is exposed, but erosion is light because of the nearly level terrain. Vegetation and litter are abundant and adequately protect the surface. The erosion condition class was determined as stable in 2002.

Mountain big sagebrush and antelope bitterbrush comprise the key browse species. Together they account for nearly 80% of the browse cover, or 40% of the total vegetation cover on the site. The mountain big sagebrush population numbered about 2,000 plants/acre with a moderately abundant young age class in 1997 and 2002. Vigor was poor and decadence high in 1983 and 1989, but both have improved greatly. Utilization was moderate to heavy during the initial reading in 1983, but has been mostly light since. The proportion of the decadent age class classified as dying was high in 1997. It was reported that the density may decline in the future. The population density did slightly decline in 2002 with an increase in the number of dead plants, but due to an increasing number of young plants in 2002, the density appears to be stabilizing. Annual leader growth on sagebrush averaged 2.6 inches in 2002. Antelope bitterbrush numbers over 500 plants/acre on the site. This population is highly mature with low recruitment in all years. Even with moderate to heavy use, bitterbrush vigor has been normal in all years and decadence low. Annual leader growth averaged 1.4 inches in 2002, although this measurement was determined in May so additional growth was likely.

Broom snakeweed increased in density in 1997 to 5,000 plants/acre, declining somewhat in 2002. This is a mostly mature population, but may have the ability to increase with suitable climatic conditions. Broom snakeweed density can fluctuate dramatically depending upon the amount and timing of precipitation. Stickyleaf low rabbitbrush and pricklypear cactus were encountered on the site but in very low abundance. Point-center quarter data estimates juniper density at 35 trees/acre.

Perennial grasses are common in the understory and provide about one-third of the total vegetative cover on the site. Needle-and-thread grass is the most abundant species with bottlebrush squirreltail, Sandberg bluegrass, bluebunch wheatgrass, and Indian ricegrass being present but in much lower densities. With drought in 2002, the sum of nested frequency value for perennial grasses remained nearly stable. Individual species changes include a significant decline in squirreltail, but slight increases in needle-and-thread, Sandberg bluegrass, bluebunch wheatgrass, and Indian ricegrass. Cheatgrass slightly increased on the site as well. Slight increases in both the nested and quadrat frequencies of cheatgrass occurred in 2002 even with drought. In 1997, cheatgrass was dense in localized patches.

The diversity and composition of the forb component is moderate, but plants are very scattered in their distribution. Perennial forbs declined in sum of nested frequency in 2002 with drought. The most abundant perennials include Torrey milkvetch, longleaf phlox, and Lewis flax. Pale alyssum, an annual, has the highest nested frequency of any single species. It provided 87% of the forb cover in 2002.

1983 APPARENT TREND ASSESSMENT

Soil trend appears stable due to the gentle terrain. Perennial cover is lacking and soils are potentially erodible. Litter cover comes primarily from dead cheatgrass. The browse trend appears downward because of poor condition within the mountain big sagebrush stand. In addition, other shrubs and grasses do not appear to be filling the gaps left by dead sagebrush. The site is capable of supporting a much better bitterbrush population.

1989 TREND ASSESSMENT

The soil trend is slightly improved, but still poor. Percent bare ground cover is still high, although it is lower than estimated in 1983. Percent pavement cover has increased greatly indicating erosion has occurred. The browse trend is slightly downward. Both mountain big sagebrush and antelope bitterbrush show increased decadence since 1983 due most likely to the current drought. The decadence rate in sagebrush is currently extremely high at 75%. Over half of the sagebrush population displays poor vigor as well. The herbaceous understory trend is slightly upward with an increase in the sum of nested frequency of perennial grasses and forbs.

TREND ASSESSMENT

soil - slightly up (4)

browse - down (2)

herbaceous understory - slightly up (4)

1997 TREND ASSESSMENT

The soil trend is stable with only slight erosion apparent. Percent bare ground is similar to that of 1989 and cover of pavement has declined. The browse trend is slightly downward. Decadence and poor vigor in the mountain big sagebrush population have improved; however, the proportion of decadent plants that are classified as dying is increasing. It is likely that a further die-off (about 15%) of sagebrush may occur in the future. Antelope bitterbrush percent decadency has improved. The herbaceous understory trend is stable. The perennial herbaceous understory sum of nested frequency is only slightly lower than that reported in 1989.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - stable (3)

2002 TREND ASSESSMENT

The soil trend is stable. Bare ground continues to decline, and important protective cover provided by the perennial grass component slightly increased. Litter cover declined in 2002, but the erosion condition class was stable. Trend for browse is stable. As was reported in 1997, the density of mountain big sagebrush did slightly decline. However, young plants are abundant (24% of the population) in 2002, and the proportion of the decadent age class classified as dying is declining. It appears that the population is stabilizing. Decadence remained at about the same level as reported in 1997, and vigor improved. Bitterbrush remains at a stable density, decadence is low, vigor good, and use mostly moderate. Trend for the herbaceous understory is slightly down in 2002 with a decline in sum of nested frequency for perennial species, primarily forbs.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --
Herd unit 19B, Study no: 18

| T y p e | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|-----------------------------|---------------------------------|------------------|------|-------|------|-------------------|-----|-----|-----|-----------------|-------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| G | <i>Agropyron cristatum</i> | - | - | 2 | 1 | - | - | 2 | 1 | .15 | .03 |
| G | <i>Agropyron smithii</i> | - | - | - | 8 | - | - | - | 3 | - | .04 |
| G | <i>Agropyron spicatum</i> | ab10 | ab12 | a4 | b19 | 4 | 5 | 2 | 7 | .06 | 1.00 |
| G | <i>Bromus japonicus</i> (a) | - | - | - | 4 | - | - | - | 2 | - | .01 |
| G | <i>Bromus tectorum</i> (a) | - | - | 219 | 241 | - | - | 69 | 81 | 5.28 | 2.36 |
| G | <i>Oryzopsis hymenoides</i> | ab40 | b58 | a20 | ab38 | 20 | 27 | 10 | 18 | .82 | 1.77 |
| G | <i>Poa fendleriana</i> | - | 2 | - | - | - | 1 | - | - | - | - |
| G | <i>Poa pratensis</i> | 3 | 4 | - | - | 1 | 2 | - | - | - | - |
| G | <i>Poa secunda</i> | a7 | a6 | b37 | a41 | 3 | 3 | 17 | 17 | .47 | 1.11 |
| G | <i>Sitanion hystrix</i> | c107 | b70 | bc82 | a25 | 48 | 31 | 38 | 13 | 1.28 | .49 |
| G | <i>Sporobolus cryptandrus</i> | - | - | 4 | 2 | - | - | 1 | 1 | .15 | .00 |
| G | <i>Stipa comata</i> | a111 | b178 | ab172 | b180 | 47 | 71 | 69 | 70 | 5.96 | 9.34 |
| G | Unknown grass - perennial | - | - | 3 | - | - | - | 1 | - | .15 | - |
| Total for Annual Grasses | | 0 | 0 | 219 | 245 | 0 | 0 | 69 | 83 | 5.28 | 2.37 |
| Total for Perennial Grasses | | 278 | 330 | 324 | 314 | 123 | 140 | 140 | 130 | 9.06 | 13.80 |
| Total for Grasses | | 278 | 330 | 543 | 559 | 123 | 140 | 209 | 213 | 14.34 | 16.18 |
| F | <i>Alyssum alyssoides</i> (a) | - | - | a305 | b333 | - | - | 93 | 95 | 2.28 | 5.83 |
| F | <i>Antennaria rosea</i> | - | - | 2 | - | - | - | 1 | - | .00 | - |
| F | <i>Arabis</i> spp. | 5 | - | - | - | 3 | - | - | - | - | - |
| F | <i>Astragalus calycosus</i> | a5 | ab13 | c30 | bc23 | 3 | 8 | 17 | 11 | .40 | .30 |
| F | <i>Astragalus</i> spp. | - | - | 7 | 4 | - | - | 3 | 2 | .09 | .03 |
| F | <i>Caulanthus crassicaulis</i> | b34 | b20 | a- | a- | 15 | 10 | - | - | - | - |
| F | <i>Carduus nutans</i> (a) | - | - | 2 | - | - | - | 1 | - | .00 | - |
| F | <i>Calochortus nuttallii</i> | 6 | - | 3 | 3 | 3 | - | 2 | 1 | .04 | .00 |
| F | <i>Castilleja</i> spp. | a- | a- | b9 | a1 | - | - | 4 | 1 | .17 | .03 |
| F | <i>Chaenactis douglasii</i> | 2 | 4 | 10 | - | 1 | 3 | 4 | - | .04 | - |
| F | <i>Crepis acuminata</i> | - | - | 2 | - | - | - | 1 | - | .03 | - |
| F | <i>Ipomopsis aggregata</i> | 2 | - | - | - | 2 | - | - | - | - | - |
| F | <i>Lithospermum incisum</i> | 11 | 8 | 1 | 2 | 6 | 5 | 1 | 1 | .01 | .00 |
| F | <i>Linum lewisii</i> | b33 | b52 | b31 | a3 | 19 | 25 | 15 | 2 | .16 | .04 |
| F | <i>Lygodesmia grandiflora</i> | 5 | 8 | - | 8 | 3 | 4 | - | 3 | - | .04 |
| F | <i>Machaeranthera canescens</i> | - | 1 | - | - | - | 1 | - | - | - | - |
| F | <i>Oenothera</i> spp. | 1 | 5 | 6 | 3 | 1 | 2 | 2 | 1 | .01 | .03 |
| F | <i>Phlox austromontana</i> | a3 | b19 | a6 | a6 | 2 | 9 | 3 | 3 | .19 | .18 |
| F | <i>Phlox longifolia</i> | a10 | b36 | ab36 | ab25 | 4 | 18 | 16 | 12 | .13 | .10 |
| F | <i>Senecio multilobatus</i> | a4 | a16 | b44 | a1 | 3 | 9 | 22 | 1 | .39 | .00 |
| F | <i>Sphaeralcea coccinea</i> | - | - | - | 3 | - | - | - | 1 | - | .00 |

| T y p e | Species | Nested Frequency | | | | Quadrat Frequency | | | | Average Cover % | |
|---------------------------|------------------------|------------------|-----|-----|-----|-------------------|-----|-----|-----|-----------------|------|
| | | '83 | '89 | '97 | '02 | '83 | '89 | '97 | '02 | '97 | '02 |
| F | Streptanthus cordatus | a- | b13 | b14 | ab1 | - | 6 | 7 | 1 | .11 | .00 |
| F | Tragopogon dubius | 17 | 7 | 7 | 6 | 9 | 3 | 4 | 4 | .09 | .05 |
| F | Unknown forb-perennial | - | 3 | - | - | - | 1 | - | - | - | - |
| F | Zigadenus paniculatus | a- | b21 | a3 | a2 | - | 13 | 1 | 2 | .00 | .01 |
| Total for Annual Forbs | | 0 | 0 | 307 | 333 | 0 | 0 | 94 | 95 | 2.29 | 5.83 |
| Total for Perennial Forbs | | 138 | 226 | 211 | 91 | 74 | 117 | 103 | 46 | 1.89 | 0.85 |
| Total for Forbs | | 138 | 226 | 518 | 424 | 74 | 117 | 197 | 141 | 4.18 | 6.69 |

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

BROWSE TRENDS --

Herd unit 19B, Study no: 18

| T y p e | Species | Strip Frequency | | Average Cover % | |
|------------------|-------------------------------------------|-----------------|-----|-----------------|-------|
| | | '97 | '02 | '97 | '02 |
| B | Artemisia tridentata vaseyana | 66 | 60 | 11.05 | 9.38 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 1 | 2 | - | - |
| B | Gutierrezia sarothrae | 59 | 55 | 1.29 | .96 |
| B | Juniperus osteosperma | 4 | 5 | 2.74 | 4.59 |
| B | Leptodactylon pungens | 0 | 1 | - | .00 |
| B | Opuntia spp. | 1 | 1 | .00 | .03 |
| B | Purshia tridentata | 25 | 23 | 4.83 | 8.89 |
| Total for Browse | | 156 | 147 | 19.93 | 23.88 |

CANOPY COVER --

Herd unit 19B, Study no: 18

| Species | Percent Cover | |
|-----------------------|---------------|-----|
| | '97 | '02 |
| Juniperus osteosperma | - | 2 |

Key Browse Annual Leader Growth

Herd unit 19B, Study no: 18

| Species | Average leader growth (in) '02 |
|-------------------------------|-----------------------------------|
| Artemisia tridentata vaseyana | 2.6 |
| Purshia tridentata | 1.4 |

Point-Quarter Tree Data
Herd unit 19B , Study no: 18

| Species | Trees per Acre | | Average diameter (in) | |
|-----------------------|----------------|-----|-----------------------|-----|
| | '97 | '02 | '97 | '02 |
| Juniperus osteosperma | 29 | 35 | 4.3 | 3.4 |

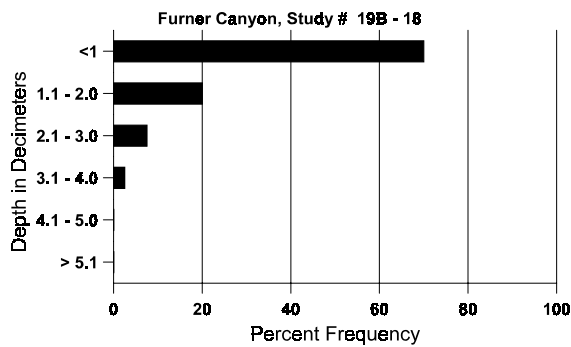
BASIC COVER --
Herd unit 19B, Study no: 18

| Cover Type | Nested Frequency | | Average Cover % | | | |
|-------------|------------------|-----|-----------------|-------|-------|-------|
| | '97 | '02 | '83 | '89 | '97 | '02 |
| Vegetation | 354 | 373 | 2.00 | 7.25 | 34.52 | 46.75 |
| Rock | 121 | 129 | 1.75 | 1.50 | 1.52 | 2.01 |
| Pavement | 267 | 259 | 1.00 | 20.50 | 8.73 | 7.61 |
| Litter | 379 | 380 | 52.25 | 41.25 | 40.31 | 36.43 |
| Cryptogams | 79 | 186 | 0 | 3.75 | 1.25 | 11.40 |
| Bare Ground | 266 | 249 | 43.00 | 25.75 | 22.77 | 20.70 |

SOIL ANALYSIS DATA --
Herd Unit 19B, Study no: 18, Furner Valley

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 10.7 | 66.8 (13.8) | 7.1 | 54.4 | 23.1 | 22.6 | 2.4 | 10.5 | 160.0 | 0.6 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 19B, Study no: 18

| Type | Quadrat Frequency | | Pellet Transect | |
|--------|-------------------|-----|------------------------------|------------------------------|
| | '97 | '02 | Pellet Groups per Acre 02 | Days Use per Acre (ha) 02 |
| Sheep | 2 | 2 | 52 | 4 (10) |
| Rabbit | 12 | 21 | - | - |
| Horse | - | 2 | 78 | N/A |
| Elk | 1 | - | - | - |
| Deer | 11 | 12 | 470 | 36 (89) |
| Cattle | 2 | 2 | 70 | 6 (14) |

BROWSE CHARACTERISTICS --
Herd unit 19B, Study no: 18

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | | |
|--------------------------------------------------|----------------------------|---------------------|----|------------------|----|--------------------|--------------------------------|----------------|-------|-------|----|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | 10 | - | - | - | - | - | - | 333 | | 10 |
| | 97 | 3 | - | - | - | - | - | - | 60 | | 3 |
| | 02 | 6 | - | - | - | - | - | - | 120 | | 6 |
| Y | 83 | 3 | - | - | - | - | - | - | 100 | | 3 |
| | 89 | 2 | - | - | 1 | - | - | - | 100 | | 3 |
| | 97 | 17 | - | - | - | - | - | - | 340 | | 17 |
| | 02 | 23 | - | 1 | - | - | - | - | 480 | | 24 |
| M | 83 | 2 | 20 | 19 | - | - | - | - | 1366 | 24 31 | 41 |
| | 89 | 12 | 4 | - | - | - | - | - | 533 | 24 28 | 16 |
| | 97 | 44 | 5 | - | 10 | - | - | 1 | 1200 | 33 48 | 60 |
| | 02 | 37 | 8 | 3 | 2 | - | - | - | 1000 | 31 43 | 50 |
| D | 83 | - | 12 | 28 | - | - | - | - | 1333 | | 40 |
| | 89 | 46 | 12 | - | - | - | - | - | 1933 | | 58 |
| | 97 | 20 | 5 | - | 3 | - | - | - | 560 | | 28 |
| | 02 | 17 | 5 | - | 2 | 1 | - | - | 500 | | 25 |
| X | 83 | - | - | - | - | - | - | - | 0 | | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | | 0 |
| | 97 | - | - | - | - | - | - | - | 380 | | 19 |
| | 02 | - | - | - | - | - | - | - | 780 | | 39 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 38% | | 56% | | 06% | | - 8% | | | |
| '89 | | 21% | | 00% | | 52% | | -18% | | | |
| '97 | | 10% | | 00% | | 24% | | - 6% | | | |
| '02 | | 14% | | 04% | | 10% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 2799 | Dec: | 48% | | |
| | | | | | | '89 | 2566 | | 75% | | |
| | | | | | | '97 | 2100 | | 27% | | |
| | | | | | | '02 | 1980 | | 25% | | |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | 0 | - - | 0 |
| | 89 | - | - | - | - | - | - | - | 0 | - - | 0 |
| | 97 | 1 | - | - | - | - | - | - | 20 | 16 26 | 1 |
| | 02 | 2 | - | - | - | - | - | - | 40 | 7 14 | 2 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| '83 | | 00% | | 00% | | 00% | | | | | |
| '89 | | 00% | | 00% | | 00% | | | | | |
| '97 | | 00% | | 00% | | 00% | | +50% | | | |
| '02 | | 00% | | 00% | | 00% | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '83 | 0 | Dec: | - | | |
| | | | | | | '89 | 0 | | - | | |
| | | | | | | '97 | 20 | | - | | |
| | | | | | | '02 | 40 | | - | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Gutierrezia sarothrae | | | | | | | | | | | | | | | | | | |
| S | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 66 | | 2 | |
| | '97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | 3 | - | - | 2 | - | - | - | - | - | 5 | - | - | - | 166 | | 5 | |
| | '97 | 54 | - | - | 7 | - | - | - | - | - | 61 | - | - | - | 1220 | | 61 | |
| | '02 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | | 5 | |
| M | '83 | 15 | 2 | 2 | - | - | - | - | - | - | 10 | - | 9 | - | 633 | 7 6 | 19 | |
| | '89 | 37 | - | - | 1 | - | - | - | - | - | 38 | - | - | - | 1266 | 9 8 | 38 | |
| | '97 | 183 | - | - | 6 | - | - | - | - | - | 189 | - | - | - | 3780 | 10 10 | 189 | |
| | '02 | 152 | - | - | 8 | - | - | - | - | - | 160 | - | - | - | 3200 | 7 10 | 160 | |
| D | '83 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | - | 66 | | 2 | |
| | '89 | 4 | - | - | - | - | - | - | - | - | 3 | - | 1 | - | 133 | | 4 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | 26 | - | - | - | - | - | - | - | - | 9 | - | - | 17 | 520 | | 26 | |
| X | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1420 | | 71 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| | | '83 10% | | | '83 10% | | | '83 52% | | | +55% | | | | | | | |
| | | '89 00% | | | '89 00% | | | '89 02% | | | +69% | | | | | | | |
| | | '97 00% | | | '97 00% | | | '97 00% | | | -24% | | | | | | | |
| | | '02 00% | | | '02 00% | | | '02 09% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 699 | Dec: | 9% | | | |
| | | | | | | | | | | | | '89 | 1565 | | 8% | | | |
| | | | | | | | | | | | | '97 | 5000 | | 0% | | | |
| | | | | | | | | | | | | '02 | 3820 | | 14% | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|---|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| S | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| Y | '83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | '89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | 1 | |
| | '97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | '97 | 2 | - | - | 1 | - | - | - | - | - | 3 | - | - | - | 60 | - | 3 | |
| | '02 | 4 | - | - | - | - | - | - | 1 | - | 5 | - | - | - | 100 | - | 5 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +59% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | +20% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 33 | Dec: | - | | | | |
| | | | | | | | | | | | '89 | 33 | | - | | | | |
| | | | | | | | | | | | '97 | 80 | | - | | | | |
| | | | | | | | | | | | '02 | 100 | | - | | | | |
| Leptodactylon pungens | | | | | | | | | | | | | | | | | | |
| M | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | '89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 9 | 16 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 0 | Dec: | - | | | | |
| | | | | | | | | | | | '89 | 0 | | - | | | | |
| | | | | | | | | | | | '97 | 0 | | - | | | | |
| | | | | | | | | | | | '02 | 20 | | - | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 3 | 3 | 1 |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 5 | 7 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |
| | | | | | | | | | | | | '02 | 20 | | - | | | |
| Purshia tridentata | | | | | | | | | | | | | | | | | | |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | | 1 |
| | 89 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 33 | | | 1 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| M | 83 | 5 | 6 | - | - | - | - | - | - | - | 11 | - | - | - | 366 | 29 | 42 | 11 |
| | 89 | - | 4 | 1 | - | - | - | - | - | - | 5 | - | - | - | 166 | 23 | 37 | 5 |
| | 97 | 6 | 11 | 5 | - | 3 | - | - | - | - | 25 | - | - | - | 500 | 34 | 58 | 25 |
| | 02 | 5 | 11 | 4 | - | 2 | - | 2 | - | - | 24 | - | - | - | 480 | 46 | 81 | 24 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | 1 | 1 | 1 | - | - | - | - | - | - | 3 | - | - | - | 100 | | | 3 |
| | 97 | - | 2 | - | - | 1 | - | - | - | - | 2 | - | - | 1 | 60 | | | 3 |
| | 02 | - | 2 | - | - | - | - | - | - | - | 1 | - | - | 1 | 40 | | | 2 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 80 | | | 4 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 50% | | | 00% | | | 00% | | | -25% | | | | | | | |
| '89 | | 67% | | | 22% | | | 00% | | | +48% | | | | | | | |
| '97 | | 59% | | | 17% | | | 03% | | | -10% | | | | | | | |
| '02 | | 58% | | | 15% | | | 04% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 399 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 299 | | 33% | | | |
| | | | | | | | | | | | | '97 | 580 | | 10% | | | |
| | | | | | | | | | | | | '02 | 520 | | 8% | | | |

SUSPENDED TREND STUDIES

Trend Study 19B-9-97

Study site name: North Oak Brush Canyon.

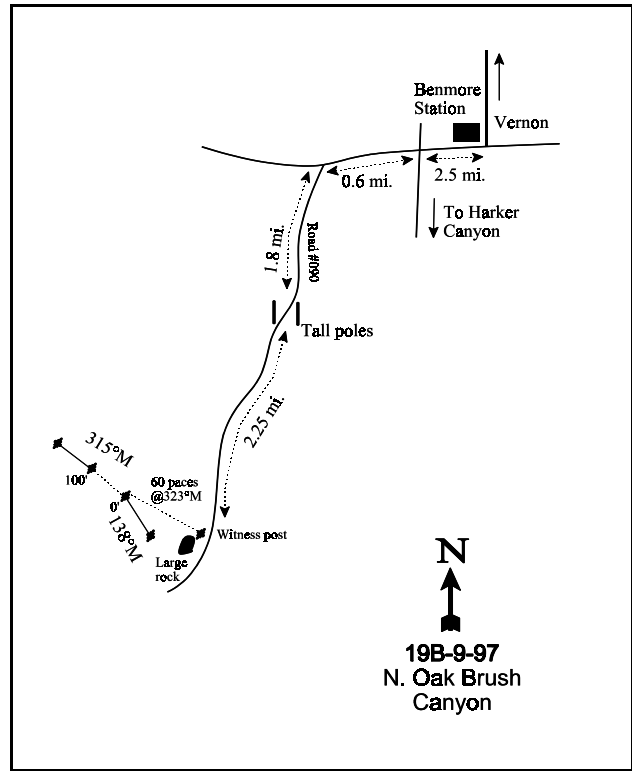
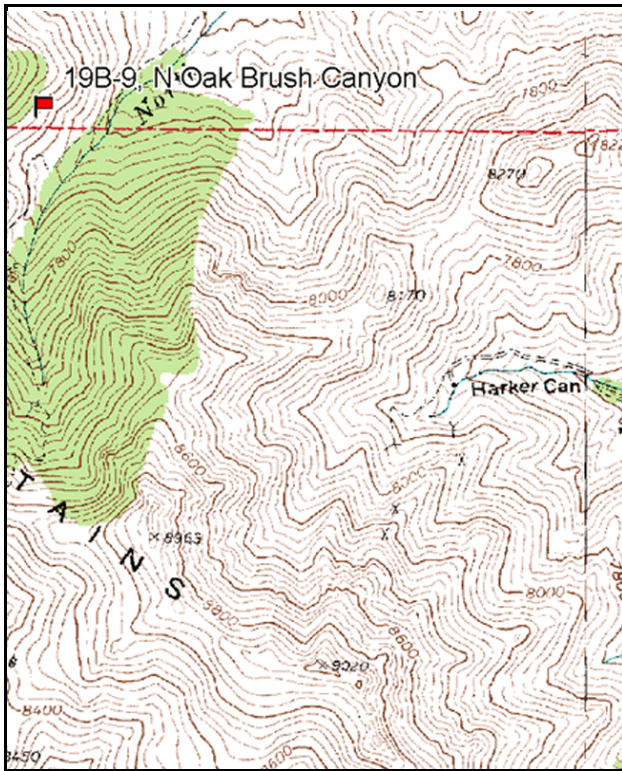
Vegetation type: Mixed Oak-Sagebrush.

Compass bearing: frequency baseline 315 degrees magnetic (Line 3 @ 138°M).

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

LOCATION DESCRIPTION

From the Forest Service Benmore Work Station, go west 2.5 miles to a fork where the main road bends to the left. Bear left on the main road, Forest Service road #090, and go up North Oak Brush Canyon for 1.8 miles to a gate. Continue up the canyon on the 4WD road 2.25 miles to a large rock with a half-high witness post next to it on the right side of the road. From the rock, walk 60 paces at 323 degrees magnetic up to the 0-foot baseline stake. This stake is marked by browse tag #3980.



Map Name: Erickson Knoll

Diagrammatic Sketch

Township 9S, Range 6W, Section unsurveyed

GPS: NAD 27, UTM 12S 4426799 N 370299 E

DISCUSSION

North Oak Brush Canyon - Trend Study No. 19B-9

***SUSPENDED - This site was suspended in 2002. The narrative and data tables from the 1997 report are included below.

The North Oak Brush Canyon study samples deer summer range near the head of North Oak Brush Canyon. This site has an elevation of 7,700 feet, an easterly aspect, and a moderately steep slope of 53%. Low growing Gambel oakbrush is the most prevalent browse species in this area with a moderate number of mountain big sagebrush plants intermixed. During two visits to the area in 1983, range crew personnel observed in excess of 50 deer, all but one of which were does and fawns. Currently, it does not appear there is much deer use judging from the low number of pellet groups and generally light utilization of browse. A perennial water source is located about 300 yards from the study site.

The soil is moderately deep with an effective rooting depth of 12 inches. The soil temperature averaged 50°F measured at a depth of 13 inches. Soil textural analysis indicates a loam with a slightly acidic pH (6.3). Percent vegetation and litter cover are relatively high, while rocks are a prominent feature on the soil surface and in the soil profile. There are steep rocky outcrops and cliffs above the site. Soil erosion is barely detectable in spite of the steep slope.

The dominant browse species on the site are Gambel oak and mountain big sagebrush. Almost all individuals of the Gambel oak population are low growing averaging just under four feet in height. With the greatly increased sample size used in 1997, the estimated density of Gambel oak was only 10,880 plants/acre. This population is currently a balanced one between young and mature plants. In 1983, it was reported that the vigor was somewhat inhibited by what appeared to be insect damage. Utilization was also reported as moderate at that time. Utilization in 1997 was light and the plants exhibit good vigor. Mountain big sagebrush density has increased slightly from about 1,000 plants/acre in 1983 and 1989 to 1,560 plants/acre in 1997. Utilization was mostly moderate in 1983 and light to moderate in 1989 and 1997. The percentage of the plants classified in poor vigor has slowly increased from none reported in 1983 to 12% in 1997. Percent decadency has also increased from 7% in 1983 and 1989 to 19% in 1997. Other browse species encountered in 1997 in low abundance include Saskatoon serviceberry, slenderbush eriogonum, pricklypear cactus, mountain snowberry, and Wood's rose. It should be noted that by increasing the sample size, and sampling the browse density along the same line that the herbaceous understory data is collected, no mountain lover plants were encountered in 1997. The density data was previously collected about 125 feet to the north in an area with a slightly different topographical characteristics that enable mountain lover to survive in this area. It should be noted that the greatly increased sample size changed many of the browse population estimates. However, most all of the differences were caused by greater accuracy of sampling for browse populations with clumped and/or aggregated distributions.

Perennial grass sum of nested frequency has increased slightly since 1989. Grasses are not especially diverse and account for 15% of the total vegetation cover. Spike fescue and muttongrass currently provide the bulk of the grass cover at 93%. Muttongrass and Sandberg bluegrass have both significantly increased in sum of nested frequency values since 1989. Cheatgrass is present, but in very low numbers.

Considering the dominate browse overstory, forb diversity is quite high, although, perennial forb sum of nested frequency is lower then that reported in 1983 and 1989. Wild onion is the most abundant perennial forb followed by arrowleaf balsamroot, longleaf phlox, desert parsley, and tailcup lupine.

1983 APPARENT REND ASSESSMENT

Soil trend appears stable. The rate of soil formation currently exceeds the rate of loss. The herbaceous understory and browse components also appear stable. Although forage production is currently high and of a diverse nature, a rapidly increasing oak stand may eventually crowd out other desirable plants.

1989 TREND ASSESSMENT

The soil trend is stable as erosion appears to be limited at this time. Percent bare ground decreased and percent vegetation cover increased. The browse trend is stable. The dominant browse populations are relatively stable and exhibit good vigor. The other browse species also appear to have stable to slightly increasing populations. The herbaceous understory trend is stable with a slight increase in herbaceous understory sum of nested frequency.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

1997 TREND ASSESSMENT

The soil trend is slightly upward with a decrease in percent bare ground and good cover values for vegetation and litter. Soil erosion is not apparent at this time. The Gambel oakbrush population could expand when considering the number of young and seedling plants encountered in 1997. The mountain big sagebrush population is mostly mature with increases in both percent decadency and plants classified with poor vigor. The browse trend is stable for the time being, although the Gambel oakbrush could increase in density resulting in a decrease in herbaceous understory production. The herbaceous understory trend is stable. Perennial herbaceous understory sum of nested frequency declined only slightly since 1989. Grass sum of nested frequency slightly increased, while forb sum of nested frequency slightly decreased.

TREND ASSESSMENT

soil - slightly up (4)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 9

| T y p e | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|------------------|---------------------|------------------|------------------|-------------------|-------------------|-----|-----|--------------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | |
| G | Bromus tectorum (a) | - | - | 11 | - | - | 4 | .02 |
| G | Leucopoa kingii | _a 82 | _b 118 | _{ab} 113 | 40 | 47 | 46 | 4.65 |
| G | Melica bulbosa | _b 19 | _a - | _a - | 8 | - | - | - |
| G | Poa fendleriana | _a 42 | _b 80 | _b 101 | 20 | 33 | 36 | 4.19 |
| G | Poa pratensis | - | - | 3 | - | - | 1 | .03 |
| G | Poa secunda | - | 6 | 16 | - | 2 | 7 | .67 |

| Type | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|------|---------------------------------|------------------|------------------|------------------|-------------------|-----|-----|-----------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | '97 |
| | Total for Annual Grasses | 0 | 0 | 11 | 0 | 0 | 4 | 0.01 |
| | Total for Perennial Grasses | 143 | 204 | 233 | 68 | 82 | 90 | 9.55 |
| | Total for Grasses | 143 | 204 | 244 | 68 | 82 | 94 | 9.57 |
| F | <i>Agoseris glauca</i> | _b 17 | _a 5 | _a 4 | 9 | 2 | 2 | .01 |
| F | <i>Allium</i> spp. | _b 204 | _a 135 | _a 139 | 75 | 57 | 61 | .93 |
| F | <i>Arabis</i> spp. | 9 | 14 | 4 | 4 | 7 | 2 | .01 |
| F | <i>Artemisia ludoviciana</i> | 15 | 20 | 10 | 7 | 6 | 4 | .36 |
| F | <i>Aster chilensis</i> | _a 2 | _{ab} 9 | _b 15 | 1 | 3 | 6 | .51 |
| F | <i>Astragalus cibaricus</i> | 3 | 12 | 1 | 2 | 4 | 1 | .00 |
| F | <i>Balsamorhiza sagittata</i> | _a - | _b 20 | _b 8 | - | 10 | 4 | .63 |
| F | <i>Calochortus nuttallii</i> | - | 3 | 1 | - | 1 | 1 | .00 |
| F | <i>Cirsium neomexicanum</i> | 1 | - | 1 | 1 | - | 1 | .01 |
| F | <i>Collomia linearis</i> (a) | - | - | 30 | - | - | 14 | .12 |
| F | <i>Collinsia parviflora</i> (a) | - | - | 36 | - | - | 16 | .10 |
| F | <i>Crepis acuminata</i> | _a 10 | _b 30 | _{ab} 22 | 7 | 17 | 11 | .13 |
| F | <i>Delphinium nuttallianum</i> | - | - | 2 | - | - | 1 | .00 |
| F | <i>Fritillaria</i> spp. | 2 | - | - | 1 | - | - | - |
| F | <i>Hydrophyllum capitatum</i> | _c 47 | _b 9 | _a - | 24 | 4 | - | - |
| F | <i>Lomatium</i> spp. | _b 91 | _b 95 | _a 48 | 48 | 43 | 22 | .31 |
| F | <i>Lupinus caudatus</i> | _a 21 | _{ab} 34 | _b 44 | 9 | 18 | 22 | 1.81 |
| F | <i>Machaeranthera canescens</i> | 5 | - | 1 | 3 | - | 1 | .00 |
| F | <i>Microsteris gracilis</i> (a) | - | - | 3 | - | - | 1 | .00 |
| F | <i>Phlox longifolia</i> | _a 13 | _b 58 | _b 49 | 6 | 26 | 26 | .38 |
| F | <i>Polygonum douglasii</i> (a) | - | - | 82 | - | - | 32 | .41 |
| F | <i>Senecio multilobatus</i> | - | - | 2 | - | - | 1 | .00 |
| F | <i>Tragopogon dubius</i> | - | 3 | - | - | 1 | - | - |
| F | Unknown forb-perennial | - | - | 3 | - | - | 1 | .00 |
| F | <i>Viola</i> spp. | 1 | 5 | - | 1 | 2 | - | - |
| F | <i>Wyethia amplexicaulis</i> | 46 | 49 | 53 | 22 | 24 | 27 | 4.66 |
| F | <i>Zigadenus paniculatus</i> | 8 | 6 | 14 | 4 | 2 | 6 | .58 |
| | Total for Annual Forbs | 0 | 0 | 151 | 0 | 0 | 63 | 0.63 |
| | Total for Perennial Forbs | 495 | 507 | 421 | 224 | 227 | 200 | 10.39 |
| | Total for Forbs | 495 | 507 | 572 | 224 | 227 | 263 | 11.03 |

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

BROWSE TRENDS --

Herd unit 19B, Study no: 9

| Type | Species | Strip Frequency | Average Cover % |
|------------------|-------------------------------|-----------------|-----------------|
| | | '97 | '97 |
| B | Amelanchier alnifolia | 14 | .78 |
| B | Artemisia tridentata vaseyana | 57 | 11.48 |
| B | Cercocarpus ledifolius | 3 | .00 |
| B | Eriogonum microthecum | 3 | - |
| B | Opuntia spp. | 1 | - |
| B | Quercus gambelii | 92 | 30.82 |
| B | Rosa woodsii | 22 | 2.04 |
| B | Symphoricarpos oreophilus | 3 | .03 |
| Total for Browse | | 195 | 45.18 |

CANOPY COVER --

Herd unit 19B, Study no: 9

| Species | Percent Cover |
|------------------|---------------|
| | '97 |
| Quercus gambelii | 5 |

BASIC COVER --

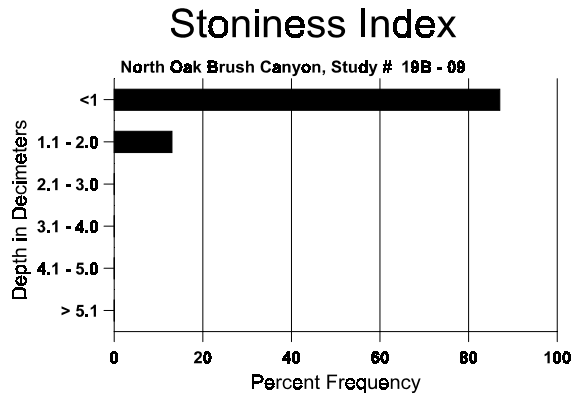
Herd unit 19B, Study no: 9

| Cover Type | Nested Frequency | Average Cover % | | |
|-------------|------------------|-----------------|-------|-------|
| | | '83 | '89 | '97 |
| Vegetation | 325 | 2.25 | 10.25 | 58.98 |
| Rock | 138 | 9.50 | 12.25 | 5.97 |
| Pavement | 138 | 6.50 | 5.50 | 2.76 |
| Litter | 388 | 67.00 | 61.75 | 62.47 |
| Cryptogams | 3 | 0 | 0 | .00 |
| Bare Ground | 131 | 14.75 | 10.25 | 4.62 |

SOIL ANALYSIS DATA --

Herd Unit 19B, Study no: 9, North Oak Brush Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %0M | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 11.8 | 50.0 (12.9) | 6.3 | 42.3 | 33.2 | 24.6 | 4.9 | 16.0 | 172.8 | 1.2 |



PELLET GROUP FREQUENCY --

Herd unit 19B, Study no: 9

| Type | Quadrat Frequency '97 |
|------|-----------------------|
| Deer | 5 |

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 9

| A G R E | Y | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) | | Total | | | |
|------------------------------------------------|----|----------------------------|------------------|-------------------|---|---|---|---|---|---|-------------|-----|------|------|-----------------|------------------|---|-------|----------------|----|----|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | Ht. Cr. | | | | | |
| Amelanchier alnifolia | | | | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | | | |
| | 89 | 5 | - | - | - | - | - | - | - | - | - | - | - | 5 | - | - | - | 333 | 5 | | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | | | |
| | 89 | 12 | 9 | - | - | - | - | - | - | - | - | - | - | 21 | - | - | - | 1400 | 21 | | |
| | 97 | 1 | 1 | - | - | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | 2 | | |
| M | 83 | - | - | 4 | - | - | - | - | - | - | - | - | - | - | 266 | 28 | 8 | 4 | | | |
| | 89 | - | 1 | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | 55 | 21 | 1 |
| | 97 | 4 | 3 | - | 4 | 1 | - | - | - | - | - | - | - | 11 | 1 | - | - | 240 | 32 | 27 | 12 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | | | |
| | 89 | - | 1 | 1 | - | - | - | - | - | - | - | - | - | 2 | - | - | - | 133 | | | 2 |
| | 97 | - | - | - | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | <u>Heavy Use</u> | <u>Poor Vigor</u> | | | | | | | | | | | | | | | <u>%Change</u> | | |
| '83 | | 00% | 100% | 100% | | | | | | | | | | | | | | | +83% | | |
| '89 | | 46% | 04% | 00% | | | | | | | | | | | | | | | -81% | | |
| '97 | | 33% | 00% | 00% | | | | | | | | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 266 | Dec: | 0% | | | | | | |
| | | | | | | | | | | | | '89 | 1599 | | 8% | | | | | | |
| | | | | | | | | | | | | '97 | 300 | | 7% | | | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| Y | 83 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 133 | | 2 | |
| | 89 | 2 | 1 | - | 1 | - | - | - | - | - | 3 | - | 1 | - | 266 | | 4 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 4 | 6 | 2 | - | - | - | - | - | - | 9 | 3 | - | - | 800 | 28 | 33 | 12 |
| | 89 | 8 | 2 | - | - | - | - | - | - | - | 9 | 1 | - | - | 666 | 23 | 24 | 10 |
| | 97 | 31 | 13 | 5 | 9 | 5 | - | - | - | - | 58 | 2 | 3 | - | 1260 | 24 | 34 | 63 |
| D | 83 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 89 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 97 | 4 | 7 | 1 | 2 | 1 | - | - | - | - | 9 | - | - | 6 | 300 | | 15 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 180 | | 9 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 47% | | | 13% | | | 00% | | | - 0% | | | | | | | |
| '89 | | 27% | | | 00% | | | 07% | | | +36% | | | | | | | |
| '97 | | 33% | | | 08% | | | 12% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 999 | Dec: | 7% | | | |
| | | | | | | | | | | | | '89 | 998 | | 7% | | | |
| | | | | | | | | | | | | '97 | 1560 | | 19% | | | |
| <i>Cercocarpus ledifolius</i> | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 133 | | 2 | |
| | 97 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 200 | | 3 | |
| | 97 | 1 | - | - | 1 | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 47 | 41 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -70% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 200 | | - | | | |
| | | | | | | | | | | | | '97 | 60 | | - | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|-----|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Ceanothus martinii | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 133 | 17 | 12 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 25% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 0 | Dec: | 0% | | | | |
| | | | | | | | | | | | '89 | 265 | | 25% | | | | |
| | | | | | | | | | | | '97 | 0 | | 0% | | | | |
| Cercocarpus montanus | | | | | | | | | | | | | | | | | | |
| M | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | 31 | 43 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 66 | Dec: | - | | | | |
| | | | | | | | | | | | '89 | 0 | | - | | | | |
| | | | | | | | | | | | '97 | 0 | | - | | | | |
| Eriogonum microthecum | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 97 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 80 | 11 | 11 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 0 | Dec: | - | | | | |
| | | | | | | | | | | | '89 | 0 | | - | | | | |
| | | | | | | | | | | | '97 | 100 | | - | | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 5 | 13 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |
| Pachistima myrsinites | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | 48 | - | - | - | - | - | - | - | - | 48 | - | - | - | 3200 | | | 48 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| Y | 83 | 59 | - | - | - | - | - | - | - | - | 59 | - | - | - | 3933 | | | 59 |
| | 89 | 27 | - | - | 20 | - | - | - | - | - | 47 | - | - | - | 3133 | | | 47 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| M | 83 | 38 | - | - | - | - | - | - | - | - | 38 | - | - | - | 2533 | 8 | 6 | 38 |
| | 89 | 21 | - | - | 48 | - | - | - | - | - | 69 | - | - | - | 4600 | 8 | 14 | 69 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +16% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 6466 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 7733 | | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |

| A G R E | Y | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|----|----------------------------|----|----|------------------|---|---|-------------------|---|---|----------------|-------|------|----|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Quercus gambelii | | | | | | | | | | | | | | | | | | |
| S | 83 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 466 | | 7 | |
| | 89 | 65 | - | - | - | - | - | - | - | - | 65 | - | - | - | 4333 | | 65 | |
| | 97 | 2 | - | - | 19 | - | - | 4 | - | - | 25 | - | - | - | 500 | | 25 | |
| Y | 83 | 62 | 1 | - | - | - | - | - | - | - | 62 | 1 | - | - | 4200 | | 63 | |
| | 89 | 286 | 1 | - | - | - | - | - | - | - | 287 | - | - | - | 19133 | | 287 | |
| | 97 | 210 | 6 | - | 58 | - | - | 2 | - | - | 263 | 13 | - | - | 5520 | | 276 | |
| M | 83 | 23 | 89 | 81 | - | - | - | - | - | - | 96 | 80 | 17 | - | 12866 | 30 34 | 193 | |
| | 89 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 66 | 39 33 | 1 | |
| | 97 | 200 | 25 | - | 21 | - | - | - | 7 | - | 246 | 7 | - | - | 5060 | 46 32 | 253 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 18 | 6 | - | - | - | - | - | - | - | 15 | - | 9 | - | 1600 | | 24 | |
| | 97 | 8 | 4 | - | 1 | - | - | - | 2 | - | 7 | 3 | - | 5 | 300 | | 15 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 780 | | 39 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 35% | | | 32% | | | 07% | | | +18% | | | | | | | |
| '89 | | 03% | | | 00% | | | 03% | | | -48% | | | | | | | |
| '97 | | 06% | | | 00% | | | .91% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 17066 | Dec: | 0% | | | | |
| | | | | | | | | | | | '89 | 20799 | | 8% | | | | |
| | | | | | | | | | | | '97 | 10880 | | 3% | | | | |
| Rosa woodsii | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | | 3 | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 26 | - | - | 26 | - | - | 2 | - | - | 52 | 2 | - | - | 1080 | | 54 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - - | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - - | 0 | |
| | 97 | 14 | - | - | 17 | - | - | 3 | - | - | 34 | - | - | - | 680 | 15 29 | 34 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 0 | Dec: | - | | | | |
| | | | | | | | | | | | '89 | 0 | | - | | | | |
| | | | | | | | | | | | '97 | 1760 | | - | | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Symphoricarpos oreophilus | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | | 3 | |
| M | 83 | - | - | 2 | - | - | - | - | - | - | 2 | - | - | - | 133 | 20 | 13 | 2 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | 27 | 28 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 100% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 133 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 80 | | - | | | |

Trend Study 19B-11-97

Study site name: Water Canyon.

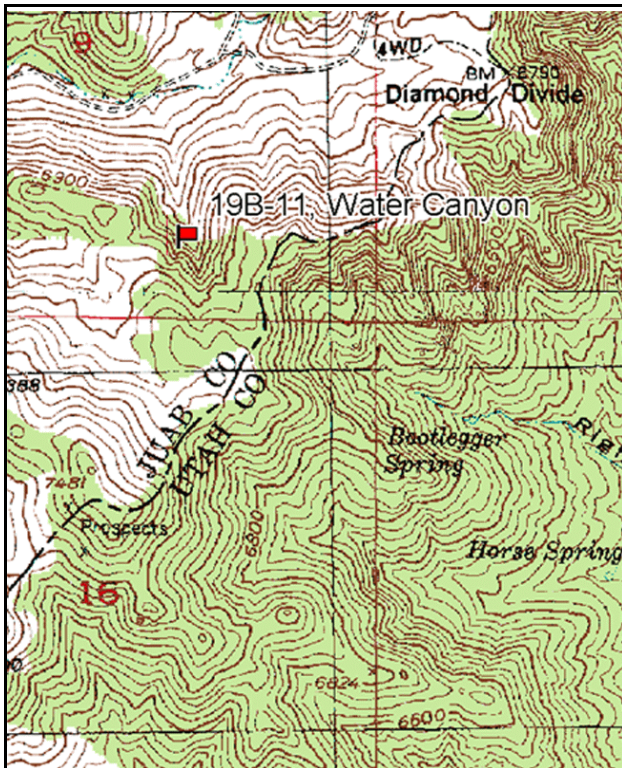
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 205 degrees magnetic.

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

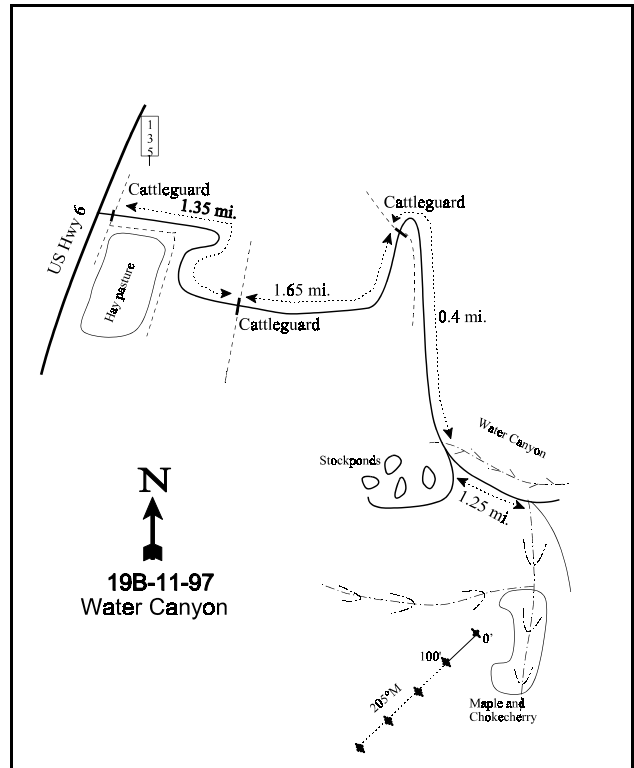
LOCATION DESCRIPTION

From the junction of the Diamond Gulch and Water Canyon Roads, travel east up Water Canyon for 1.25 miles to a point where a 4-wheel drive road takes off to the right (south) up a steep hill. This is just below (west of) where the road crosses to the north side of the creek. Walk up the canyon or drainage to the south, to the point where another small drainage intersects from the west, and a number of clumps of maple and chokecherry begin. Continue walking south up the main drainage to a point midway between the first and second side drainages encountered. Turn right (west) and walk uphill a short distance to where the 0-foot mark of the frequency baseline is located 5 to 10 feet above the clumps of maple and chokecherry. All markers are steel fenceposts 15 to 20 inches in height.



Map Name: Eureka

Township 11S, Range 2W, Section 9



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4414337 N 408588 E

DISCUSSION

Water Canyon - Trend Study No. 19B-11

***SUSPENDED - This site was suspended in 2002. The narrative and data tables from the 1997 report are included below.

The Water Canyon study is located on deer summer range at an elevation of 6,900 feet. The site is on a steep (55%), northeast facing slope occupied by mountain big sagebrush-grass. Numerous clumps of bigtooth maple, which provide shade and resting cover, are scattered throughout the area. Deer and sheep use appears moderate to light. During years with mild winters, this area is probably available year around. Use currently is considered light for deer and sheep. Because the site is near the bottom of the draw next to a spring, utilization estimates will be relatively higher than what the surrounding area actually receives.

The soil is moderately deep and well developed with good organic content (5.6%) and little surface rock or pavement. Soil textural analysis indicates a sandy clay loam with a slightly acidic pH (6.1). The effective rooting depth is 16 inches with a soil temperature of 57°F measured at 17 inches. Erosion is prevalent on the animal trails that zig-zag through the area. There are also bare shrub interspaces that show signs of erosion. There is some noticeable terracing by sheep trails and the plants appear pedestalled for the first part of the study.

The key browse species is mountain big sagebrush with an estimated density of 3,060 plants/acre in 1997. This is a healthy population with an extremely high biotic potential (2,480 seedling plants/acre) this season. The percentage of plants classified in poor vigor has steadily increased over all years to the current estimate of 13%. Utilization is mostly light. Stickyleaf low rabbitbrush has a mature age structure with an estimated density of 3,260 plants/acre in 1997. Mountain snowberry is also scattered throughout the site with an estimated density of 1,280 plants/acre. Both stickyleaf low rabbitbrush and mountain snowberry show light utilization this season. Point-center quarter data from the first and second baseline stakes indicates 840 bigtooth maple trees/acre and 21 juniper trees/acre. Other browse species encountered include slenderbush eriogonum, Oregon grape, Wood's rose, and mountain lover.

Perennial grass sum of nested frequency has declined since 1989. Several individual species have significantly decreased, including bluebunch wheatgrass and slender wheatgrass. Nelson's needlegrass is the most abundant perennial grass with a sum of nested frequency similar to that reported in 1989. Other perennial grasses include Kentucky bluegrass, Sandberg bluegrass, and bottlebrush squirreltail. Cheatgrass is present in 45% of the quadrats and constitutes 44% of the grass cover. Another annual grass, jointed goatgrass, is also present but in low abundance.

The forbs continue to be the most productive part of the understory, but also the most indicative of grazing pressure. One of the most common species, houndstongue, is a biennial most frequently found in waste places and on severely over-grazed pastures. Other invaders and/or increasers include silvery lupine, timber poisonvetch, prickly lettuce, yellow salsify, and thistle. Perennial forb sum of nested frequency has declined since 1989 from 673 to 576.

1983 APPARENT TREND ASSESSMENT

The soil trend appears stable, although soil condition is highly variable across the site. The number of barren and eroded shrub interspaces indicates that erosion could quickly become a problem. The browse species show signs of decline. Shrub populations, especially mountain big sagebrush, are dense and may be somewhat over-aged (76% are mature). Understory production is deficient and composition is indicative of excessive livestock use. Because the area is deer summer range, the lack of desirable forbs is especially disturbing.

1989 TREND ASSESSMENT

The soil trend is stable. There is a high potential for serious erosion and gullyng on the steep slope, especially due to excessive trailing. The browse trend is slightly downward. Stickyleaf low rabbitbrush density has increased while the percent of decadent plants in the mountain big sagebrush population has increased. On this limited summer range area, the increase in abundance and diversity of herbaceous plants is an encouraging sign. The herbaceous understory trend is upward.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - up (5)

1997 TREND ASSESSMENT

Some soil erosion continues to occur on this site, mostly on the game/sheep trails and in the barren shrub interspaces. The soil trend is stable. The mountain big sagebrush population appears to be healthy with great biotic potential this season. An increase in shrub density should not be encouraged on this site. Canopy cover for mountain big sagebrush is currently estimated to be 19%, which will be limiting the production of the herbaceous understory. The browse trend is stable at this time, but the mountain big sagebrush density will be an indicator for herbaceous understory success. The herbaceous understory trend is downward. Perennial herbaceous understory sum of nested frequency has declined since 1989. Many of the plants are increasers or invaders and are indicative of the grazing pressures exerted on the site.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - down (1)

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 11

| Type | Species | Nested Frequency | | | Quadrat Frequency | | | Average |
|-----------------------------|--------------------------------|------------------|------------------|-----------------|-------------------|-----|-----|---------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | Cover % |
| G | <i>Aegilops cylindrica</i> (a) | - | - | 4 | - | - | 1 | .15 |
| G | <i>Agropyron spicatum</i> | _b 153 | _a 27 | _a 26 | 64 | 11 | 12 | .28 |
| G | <i>Agropyron trachycaulum</i> | _a - | _c 132 | _b 32 | - | 58 | 14 | .22 |
| G | <i>Bromus marginatus</i> | _b 8 | _a 1 | _a 1 | 3 | 1 | 1 | .03 |
| G | <i>Bromus tectorum</i> (a) | - | - | 127 | - | - | 45 | 1.91 |
| G | <i>Melica bulbosa</i> | _a - | _b 12 | _a - | - | 6 | - | - |
| G | <i>Poa fendleriana</i> | - | 4 | - | - | 3 | - | - |
| G | <i>Poa pratensis</i> | _b 81 | _a 15 | _a 26 | 37 | 7 | 11 | .16 |
| G | <i>Poa secunda</i> | _a 1 | _b 19 | _{ab} 6 | 1 | 7 | 4 | .04 |
| G | <i>Sitanion hystrix</i> | _a - | _a - | _b 10 | - | - | 6 | .22 |
| G | <i>Stipa columbiana</i> | _a - | _b 103 | _b 89 | - | 39 | 38 | 1.33 |
| Total for Annual Grasses | | 0 | 0 | 131 | 0 | 0 | 46 | 2.06 |
| Total for Perennial Grasses | | 243 | 313 | 190 | 105 | 132 | 86 | 2.29 |
| Total for Grasses | | 243 | 313 | 321 | 105 | 132 | 132 | 4.35 |

| Type | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|---------------------------|------------------------------------|------------------|------|------|-------------------|-----|-----|-----------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | '97 |
| F | <i>Agoseris glauca</i> | 3 | - | - | 1 | - | - | - |
| F | <i>Allium</i> spp. | a- | a- | b10 | - | - | 5 | .07 |
| F | <i>Arabis</i> spp. | 1 | - | - | 1 | - | - | - |
| F | <i>Artemisia dracunculus</i> | - | - | 3 | - | - | 1 | .03 |
| F | <i>Arenaria macradenia</i> | - | 7 | 3 | - | 2 | 1 | .00 |
| F | <i>Astragalus convallarius</i> | a- | b14 | ab6 | - | 6 | 2 | .01 |
| F | <i>Aster</i> spp. | 14 | 3 | 11 | 6 | 2 | 4 | .07 |
| F | <i>Astragalus</i> spp. | - | 9 | 3 | - | 3 | 1 | .00 |
| F | <i>Chenopodium fremontii</i> (a) | - | - | 80 | - | - | 39 | .98 |
| F | <i>Cirsium</i> spp. | - | - | 2 | - | - | 1 | .00 |
| F | <i>Collomia linearis</i> (a) | - | - | 18 | - | - | 12 | .06 |
| F | <i>Collinsia parviflora</i> (a) | - | - | 106 | - | - | 37 | .50 |
| F | <i>Crepis acuminata</i> | - | - | 4 | - | - | 2 | .01 |
| F | <i>Cryptantha</i> spp. | - | - | 22 | - | - | 11 | .05 |
| F | <i>Cynoglossum officinale</i> | c285 | b223 | a130 | 93 | 87 | 52 | 6.24 |
| F | <i>Epilobium brachycarpum</i> (a) | - | - | 16 | - | - | 7 | .03 |
| F | <i>Erigeron</i> spp. | a- | b11 | b8 | - | 5 | 6 | .03 |
| F | <i>Eriogonum racemosum</i> | 3 | 2 | 2 | 1 | 1 | 1 | .00 |
| F | <i>Galium boreale</i> | - | - | 10 | - | - | 3 | .42 |
| F | <i>Gayophytum ramosissimum</i> (a) | - | - | 14 | - | - | 5 | .36 |
| F | <i>Heuchera parvifolia</i> | - | 1 | - | - | 1 | - | - |
| F | <i>Lactuca serriola</i> | 2 | 7 | 9 | 1 | 3 | 5 | .05 |
| F | <i>Lupinus argenteus</i> | a37 | b143 | b135 | 19 | 65 | 61 | 6.00 |
| F | <i>Machaeranthera canescens</i> | - | 7 | - | - | 3 | - | - |
| F | <i>Microsteris gracilis</i> (a) | - | - | 14 | - | - | 5 | .02 |
| F | <i>Phlox longifolia</i> | a18 | b45 | b44 | 9 | 22 | 22 | .16 |
| F | <i>Polygonum douglasii</i> (a) | - | - | 41 | - | - | 19 | .12 |
| F | <i>Senecio integerrimus</i> | a- | c137 | b32 | - | 61 | 17 | .29 |
| F | <i>Taraxacum officinale</i> | - | 60 | 46 | - | 31 | 22 | .68 |
| F | <i>Tragopogon dubius</i> | 3 | - | 1 | 1 | - | 1 | .03 |
| F | <i>Verbascum thapsus</i> | a- | a1 | b10 | - | 1 | 6 | .58 |
| F | <i>Vicia americana</i> | - | - | 4 | - | - | 2 | .03 |
| F | <i>Viola</i> spp. | - | 3 | 1 | - | 1 | 1 | .00 |
| Total for Annual Forbs | | 0 | 0 | 289 | 0 | 0 | 124 | 2.09 |
| Total for Perennial Forbs | | 366 | 673 | 496 | 132 | 294 | 227 | 14.79 |
| Total for Forbs | | 366 | 673 | 785 | 132 | 294 | 351 | 16.89 |

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

BROWSE TRENDS --
Herd unit 19B, Study no: 11

| Type | Species | Strip Frequency | Average Cover % |
|------------------|-------------------------------------------|-----------------|-----------------|
| | | '97 | '97 |
| B | Acer grandidentatum | 34 | 7.49 |
| B | Artemisia tridentata vaseyana | 79 | 19.25 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 65 | 2.65 |
| B | Eriogonum microthecum | 1 | .00 |
| B | Juniperus osteosperma | 1 | - |
| B | Mahonia repens | 6 | .51 |
| B | Pachistima myrsinites | 12 | .00 |
| B | Rosa woodsii | 5 | .15 |
| B | Symphoricarpos oreophilus | 40 | 1.03 |
| Total for Browse | | 243 | 31.11 |

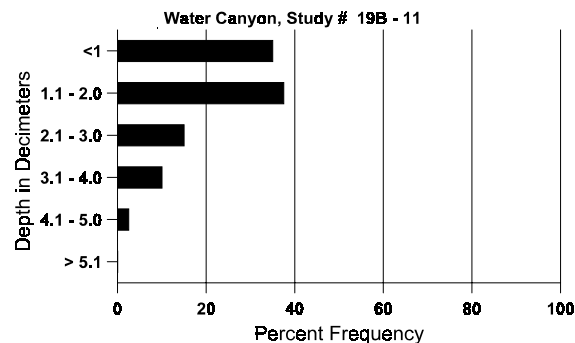
BASIC COVER --
Herd unit 19B, Study no: 11

| Cover Type | Nested Frequency | Average Cover % | | |
|-------------|------------------|-----------------|-------|-------|
| | '97 | '83 | '89 | '97 |
| Vegetation | 324 | 0 | 8.50 | 44.70 |
| Rock | 118 | 2.25 | 3.50 | 3.29 |
| Pavement | 194 | .50 | 0 | 2.63 |
| Litter | 390 | 67.75 | 59.00 | 50.59 |
| Cryptogams | - | 0 | 0 | 0 |
| Bare Ground | 277 | 29.50 | 29.00 | 23.88 |

SOIL ANALYSIS DATA --
Herd Unit 19B, Study no: 11, Water Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 16.1 | 56.8 (16.7) | 6.1 | 52.7 | 20.7 | 26.6 | 5.6 | 29.0 | 307.2 | 0.6 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19B, Study no: 11

| Type | Quadrat Frequency '97 |
|--------|-----------------------|
| Sheep | 13 |
| Rabbit | 5 |
| Elk | 1 |
| Deer | 10 |

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 11

| A G R E | Y | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) | | Total |
|------------------------------------------------|----|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|-----------------|------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | Ht. Cr. | | |
| Acer grandidentatum | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | 5 | 6 | - | 7 | - | - | - | - | - | 18 | - | - | - | 1200 | | | 18 |
| | 97 | 33 | 2 | - | 3 | - | - | 6 | - | - | 44 | - | - | - | 880 | | | 44 |
| M | 83 | 1 | 1 | - | - | - | - | - | - | - | 2 | - | - | - | 133 | 35 | 41 | 2 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 25 | - | - | 5 | - | - | 6 | - | - | 36 | - | - | - | 720 | 55 | 50 | 36 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | | 1 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 50% | | | 00% | | | 00% | | | +89% | | | | | | | |
| '89 | | 37% | | | 00% | | | 00% | | | +21% | | | | | | | |
| '97 | | 03% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 133 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 1266 | | 5% | | | |
| | | | | | | | | | | | | '97 | 1600 | | 0% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|--------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|------|------|-----|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 109 | - | - | 12 | - | - | 3 | - | - | 124 | - | - | - | 2480 | | 124 | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 97 | 17 | 2 | - | - | - | - | - | - | - | 17 | 2 | - | - | 380 | | 19 | |
| M | 83 | 24 | 2 | - | - | - | - | - | - | - | 26 | - | - | - | 1733 | 26 32 | 26 | |
| | 89 | 10 | 5 | - | - | - | - | - | - | - | 14 | 1 | - | - | 1000 | 33 36 | 15 | |
| | 97 | 87 | 4 | - | 6 | - | - | - | - | - | 93 | - | 4 | - | 1940 | 30 39 | 97 | |
| D | 83 | 4 | 4 | - | - | - | - | - | - | - | 8 | - | - | - | 533 | | 8 | |
| | 89 | 7 | 6 | - | 2 | - | - | - | - | - | 13 | - | - | 2 | 1000 | | 15 | |
| | 97 | 19 | 6 | - | 1 | 2 | - | - | - | - | 11 | 1 | 4 | 12 | 740 | | 37 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 800 | | 40 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 18% | | | 00% | | | 00% | | | - 9% | | | | | | | |
| '89 | | 35% | | | 00% | | | 06% | | | +32% | | | | | | | |
| '97 | | 09% | | | 00% | | | 13% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 2266 | Dec: | 24% | | | | |
| | | | | | | | | | | | '89 | 2066 | | 48% | | | | |
| | | | | | | | | | | | '97 | 3060 | | 24% | | | | |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 97 | 4 | - | - | 1 | - | - | - | - | - | 5 | - | - | - | 100 | | 5 | |
| Y | 83 | 9 | - | - | - | - | - | - | - | - | 9 | - | - | - | 600 | | 9 | |
| | 89 | 59 | 11 | - | 1 | - | - | 3 | - | - | 73 | 1 | - | - | 4933 | | 74 | |
| | 97 | 22 | - | - | 9 | - | - | - | - | - | 31 | - | - | - | 620 | | 31 | |
| M | 83 | 52 | - | 5 | - | - | - | - | - | - | 57 | - | - | - | 3800 | 11 12 | 57 | |
| | 89 | 3 | 2 | - | 2 | 1 | - | - | - | - | 8 | - | - | - | 533 | 11 10 | 8 | |
| | 97 | 104 | 8 | - | 13 | - | - | 5 | - | - | 130 | - | - | - | 2600 | 10 10 | 130 | |
| D | 83 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 133 | | 2 | |
| | 89 | 9 | 19 | - | - | - | - | - | - | - | 26 | 2 | - | - | 1866 | | 28 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 07% | | | 00% | | | +38% | | | | | | | |
| '89 | | 30% | | | 00% | | | 00% | | | -56% | | | | | | | |
| '97 | | 05% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 4533 | Dec: | 3% | | | | |
| | | | | | | | | | | | '89 | 7332 | | 25% | | | | |
| | | | | | | | | | | | '97 | 3260 | | 1% | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|---|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Eriogonum microthecum | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| | '83 | 00% | | | 00% | | | 00% | | | | | | | | | | |
| | '89 | 00% | | | 00% | | | 00% | | | | | | | | | | |
| | '97 | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| | '83 | 00% | | | 00% | | | 00% | | | | | | | | | | |
| | '89 | 00% | | | 00% | | | 00% | | | -70% | | | | | | | |
| | '97 | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 66 | | - | | | |
| | | | | | | | | | | | | '97 | 20 | | - | | | |
| Mahonia repens | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 65 | - | - | 7 | - | - | 3 | - | - | 75 | - | - | - | 1500 | 4 | 5 | 75 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| | '83 | 00% | | | 00% | | | 00% | | | | | | | | | | |
| | '89 | 00% | | | 00% | | | 00% | | | | | | | | | | |
| | '97 | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 1500 | | - | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Pachistima myrsinites | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | | 5 | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 26 | - | - | 17 | - | - | - | - | - | 42 | 1 | - | - | 2866 | | 43 | |
| | 97 | 7 | - | - | - | - | - | 1 | - | - | 8 | - | - | - | 160 | | 8 | |
| M | 83 | 17 | - | - | - | - | - | - | - | - | 17 | - | - | - | 1133 | 3 | 7 | |
| | 89 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 200 | 5 | 7 | |
| | 97 | 7 | - | 2 | 6 | - | - | 4 | - | - | 19 | - | - | - | 380 | 4 | 6 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | 6 | - | - | - | - | - | - | 6 | - | - | - | 400 | | 6 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | +67% | | | | | | | |
| '89 | | 00% | | | 12% | | | 00% | | | -84% | | | | | | | |
| '97 | | 00% | | | 07% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 1133 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 3466 | | 12% | | | |
| | | | | | | | | | | | | '97 | 540 | | 0% | | | |
| Rosa woodsii | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | | 5 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 97 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | 7 | 10 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 200 | | - | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Symphoricarpos oreophilus | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 133 | | | 2 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| Y | 83 | 4 | - | - | - | - | - | - | - | - | 4 | - | - | - | 266 | | | 4 |
| | 89 | 3 | 4 | - | 5 | 1 | - | 2 | - | - | 15 | - | - | - | 1000 | | | 15 |
| | 97 | 12 | - | 1 | 2 | - | - | 2 | - | - | 17 | - | - | - | 340 | | | 17 |
| M | 83 | 11 | 1 | - | - | - | - | - | - | - | 12 | - | - | - | 800 | 7 | 8 | 12 |
| | 89 | 1 | 1 | - | - | 4 | - | 3 | - | - | 9 | - | - | - | 600 | 10 | 13 | 9 |
| | 97 | 24 | 3 | 3 | 14 | - | - | 3 | - | - | 45 | - | 1 | - | 940 | 13 | 12 | 47 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | 1 | - | 1 | - | - | - | - | 2 | - | - | - | 133 | | | 2 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 06% | | | 00% | | | 00% | | | +38% | | | | | | | |
| '89 | | 42% | | | 04% | | | 00% | | | -26% | | | | | | | |
| '97 | | 05% | | | 06% | | | 02% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 1066 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 1733 | | 8% | | | |
| | | | | | | | | | | | | '97 | 1280 | | 0% | | | |

Trend Study 19B-14-97

Study site name: Black Rock Canyon.

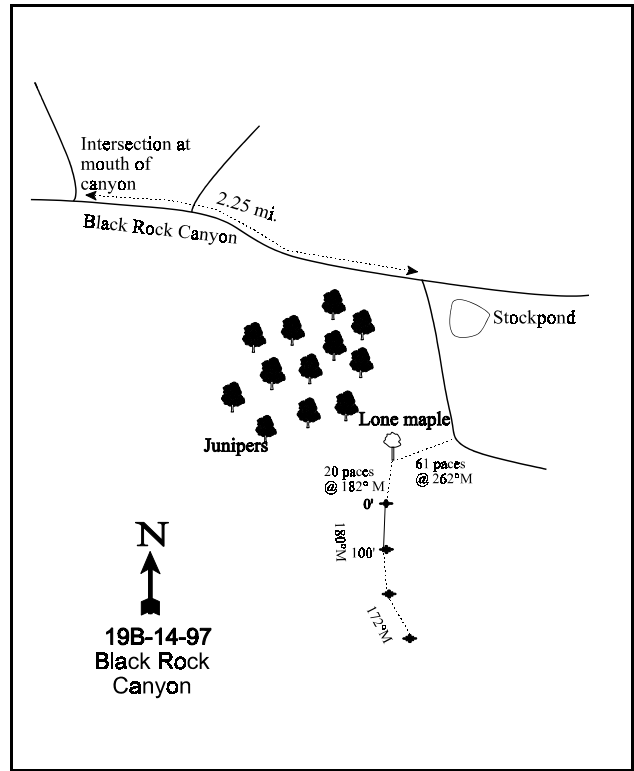
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 180 degrees magnetic (Line 3 @ 172°M).

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

LOCATION DESCRIPTION

From the road intersection at the mouth of Black Rock Canyon, proceed east up the canyon for 2.25 miles to a stock pond. From the west side of this pond, the 0-foot mark of the frequency baseline is at 200 degrees magnetic. The best way to reach the site is to drive down the faint road to where it bends. From the bend in the road the 0-foot stake is 61 paces at 262 degrees magnetic. It is marked by a 15 inch high steel fencepost with a red browse tag, number 3940.



Map Name: Boulder Peak

Diagrammatic Sketch

Township 9S, Range 3W, Section 21

GPS: NAD 27, UTM 12S 4431245 N 398400 E

DISCUSSION

Black Rock Canyon - Trend Study No. 19B-14

***SUSPENDED - This site was suspended in 2002. The narrative and data tables from the 1997 report are included below.

The Black Rock Canyon trend study is located on the north end of the East Tintic Mountains. The study site is on a steep (53%), north facing slope at an elevation of 6,800 feet. The range type is a diverse mixture of mountain brush with a scattered curlleaf mountain mahogany component. Pinyon and juniper are also scattered throughout the area, providing good cover for big game. In 1997, several bedding areas were observed in the vicinity of the site. Pellet transect data from 1997 indicates 33 deer days/acre (82 ddu/ha), less than one elk day use/acre (2 edu/ha), and less than one cow day use/acre (2 cdu/ha). Cattle appear to utilize the surrounding flats and canyon bottoms more intensively than the study area.

The soil is deep with an effective rooting depth of 24 inches. Soil temperature averaged almost 50°F at 18 inches in depth. Soil textural analysis indicates it to be a loam with a slightly alkaline pH (7.5). Percent organic matter is relatively high at 6.5%. The soil surface is well protected by vegetation and litter, keeping erosion to a minimum.

Curlleaf mountain mahogany provides the most canopy cover of all browse species at 14%. Density shows a slight increase since 1989. It is currently estimated at 260 plants/acre. This is a mostly mature population with light utilization. Average height is 14 feet with an average crown measurement of 15½ feet. Mountain snowberry provides 12% canopy cover in 1997. Estimated density is currently 4,680 plants/acre, a decrease from nearly 20,000 estimated plants/acre in both 1983 and 1989. This change is from the more accurate estimate from the larger sample size used in 1997 which more accurately estimates species with clumped and/or discontinuous distributions. This population shows light utilization and good vigor. The estimated density for mountain big sagebrush was 3,065 plants/acre in 1983, 2,199 plants/acre in 1989 and finally 1,980 plants/acre in 1997. Utilization is light to moderate in all readings. The percentage of decadent plants has not changed since 1989, yet vigor continues to decline. The mountain big sagebrush plants are moderately large with an average height measurement of 30 inches and an average crown measurement of 32 inches. Both data and photographs indicate that the population is thinning. Another indicator of continuing downward trend for mountain big sagebrush is that 100% of the decadent plants were classified as dying in 1997. Right now, the dead to live ratio is about 1:3, or about 26% of the plants are dead.

Chokecherry density is currently estimated at 3,000 plants/acre. In 1989, the entire population of chokecherry plants were classified as young. This is likely a misidentification as 62% of the population were classified as mature in the previous reading. Currently, utilization is light to moderate, vigor is good, and decadence low. The Saskatoon serviceberry population shows a steady increase from 598 plants/acre in 1983 to 1,066 plants/acre in 1989, and 1,440 plants/acre in 1997. Utilization is light to moderate and vigor continues to be good. The stickyleaf low rabbitbrush population shows a steady decline since 1983 from 1,932 plants/acre to 1,133 plants/acre in 1989, and 260 plants/acre in 1997. Point-centered quarter data indicates 12 bigtooth maple trees/acre, 5 juniper trees/acre, and 76 pinyon trees/acre. Other browse encountered on the site include Martin ceanothus, true mountain mahogany, and Wood's rose.

In 1989, there was a great increase in herbaceous understory sum of nested frequency from 472 to 850. Much of this increase was due to an increase in forbs. In 1997, the herbaceous understory sum of nested frequency dropped back down to 566 with a decrease for both grasses and forbs. Grasses provide a bulk of the herbaceous understory forage (79%), primarily from sedge, spike fescue, and mutton bluegrass. Species composition of both forbs and grasses is diverse and average in palatability. Currently, utilization is light. Grass and forb productivity is inhibited most by dense shrub growth, not from grazing.

1983 APPARENT TREND ASSESSMENT

This is an average to good quality summer range site with an ecologically stable trend. Soil condition is good, and except for a few isolated spots, is not subject to serious erosion. The area consists of a dense mixed browse stand with an understory and less prominent mix of grasses and forbs. These will continue to provide needed succulence to the degree allowed by their secondary or subdominant status.

1989 TREND ASSESSMENT

The soil trend is stable with no apparent increase in erosion on the site. Vegetative and litter cover remain adequate to keep runoff to a minimum. The browse trend is stable with some species showing a decline in density while others are increasing. The herbaceous understory trend is upward with a great increase in herbaceous understory sum of nested frequency value.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - up (5)

1997 TREND ASSESSMENT

The soil trend continues to be stable. Erosion is only slight due to the abundance of protective vegetation and litter cover. The browse trend is stable overall. There are some changes in populations. However, most of the changes were because of the larger sample size giving more accurate density estimates for the browse species. The one population that has an apparent continuing downward trend is mountain big sagebrush. This is illustrated by the dead to live ratio of 1:3 in the population and that 100% of the decadent plants were classified as dying. Because it only makes up about 14% of the total browse cover, and where many other species have increased, this will have little effect overall. This is especially true since this is a summer range, where these depressed values would be of critical concern if it were a critical winter range. The herbaceous understory production would increase if the browse canopy were to be reduced. The herbaceous understory trend is downward. There has been a great decrease in perennial forb sum of nested frequency since 1989, but it should be noted that forbs only make up 21% of the herbaceous cover.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - down (1)

HERBACEOUS TRENDS --
Herd unit 19B, Study no: 14

| Type | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % |
|------|------------------------|------------------|------------------|------------------|-------------------|-----|-----|-----------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | |
| G | Agropyron trachycaulum | 14 | 36 | 21 | 6 | 13 | 8 | 1.08 |
| G | Carex spp. | _a 177 | _b 213 | _a 127 | 61 | 63 | 33 | 12.64 |
| G | Leucopoa kingii | _a 59 | _b 89 | _a 40 | 26 | 35 | 17 | 1.72 |
| G | Oryzopsis hymenoides | 3 | - | - | 1 | - | - | .03 |
| G | Poa fendleriana | _a 11 | _{ab} 27 | _b 34 | 5 | 11 | 15 | .91 |
| G | Poa pratensis | _b 24 | _a 7 | _{ab} 17 | 12 | 4 | 7 | .28 |
| G | Poa secunda | _a - | _b 6 | _c 32 | - | 5 | 13 | .41 |
| G | Stipa columbiana | 12 | 9 | 18 | 6 | 6 | 9 | .55 |

| T y p e | Species | Nested Frequency | | | Quadrat Frequency | | | Avera ge Cover % '97 |
|------------------|-----------------------------|------------------|------------------|------------------|-------------------|-----|-----|----------------------------------|
| | | '83 | '89 | '97 | '83 | '89 | '97 | |
| | Total for Annual Grasses | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Total for Perennial Grasses | 300 | 387 | 289 | 117 | 137 | 102 | 17.65 |
| | Total for Grasses | 300 | 387 | 289 | 117 | 137 | 102 | 17.65 |
| F | Agoseris glauca | 1 | 1 | 9 | 1 | 1 | 4 | .02 |
| F | Allium spp. | _a 16 | _b 35 | _{ab} 26 | 7 | 21 | 15 | .10 |
| F | Arabis spp. | 3 | 1 | 8 | 1 | 1 | 4 | .02 |
| F | Arenaria spp. | - | - | 20 | - | - | 10 | 1.61 |
| F | Aster chilensis | _a 52 | _b 123 | _a 57 | 24 | 46 | 26 | 1.79 |
| F | Astragalus convallarius | _{ab} 6 | _b 8 | _a - | 3 | 6 | - | - |
| F | Calochortus nuttallii | _a - | _a 3 | _b 30 | - | 1 | 17 | .16 |
| F | Comandra pallida | 2 | - | - | 2 | - | - | - |
| F | Collinsia parviflora (a) | - | - | 14 | - | - | 6 | .05 |
| F | Crepis acuminata | - | 23 | 18 | - | 9 | 10 | .44 |
| F | Erigeron spp. | - | - | 3 | - | - | 2 | .01 |
| F | Eriogonum racemosum | 4 | 6 | 4 | 2 | 3 | 3 | .07 |
| F | Eriogonum umbellatum | 1 | 3 | 4 | 1 | 2 | 2 | .18 |
| F | Fragaria spp. | _{ab} 6 | _b 9 | _a - | 3 | 4 | - | - |
| F | Geranium spp. | 28 | 24 | 22 | 14 | 14 | 10 | .17 |
| F | Helianthus annuus (a) | - | 15 | - | - | 7 | - | - |
| F | Helianthella uniflora | 5 | - | - | 2 | - | - | - |
| F | Ipomopsis aggregata | 2 | 6 | - | 2 | 2 | - | - |
| F | Lathyrus brachycalyx | _a 18 | _b 154 | _a 27 | 10 | 60 | 16 | .47 |
| F | Lithospermum ruderales | _a 7 | _{ab} 20 | _b 18 | 3 | 9 | 10 | .34 |
| F | Lomatium spp. | - | - | 1 | - | - | 1 | .00 |
| F | Machaeranthera canescens | - | 2 | - | - | 2 | - | - |
| F | Microsteris gracilis (a) | - | - | 8 | - | - | 4 | .04 |
| F | Penstemon spp. | - | - | 7 | - | - | 3 | .01 |
| F | Phlox longifolia | - | 2 | - | - | 2 | - | - |
| F | Polygonum douglasii (a) | - | - | 14 | - | - | 5 | .02 |
| F | Senecio integerrimus | - | - | 2 | - | - | 1 | .15 |
| F | Senecio multilobatus | - | - | 4 | - | - | 1 | .00 |
| F | Solidago sparsiflora | 19 | 7 | 21 | 9 | 4 | 8 | .55 |
| F | Taraxacum officinale | 2 | 12 | 1 | 1 | 4 | 1 | .03 |
| F | Unknown forb-perennial | - | 6 | - | - | 3 | - | - |
| F | Viola spp. | - | 3 | - | - | 1 | - | - |
| | Total for Annual Forbs | 0 | 15 | 36 | 0 | 7 | 15 | 0.12 |
| | Total for Perennial Forbs | 172 | 448 | 282 | 85 | 195 | 144 | 6.18 |
| | Total for Forbs | 172 | 463 | 318 | 85 | 202 | 159 | 6.30 |

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

BROWSE TRENDS --
Herd unit 19B, Study no: 14

| Type | Species | Strip Frequency | Average Cover % |
|------------------|----------------------------------------------|-----------------|-----------------|
| | | '97 | '97 |
| B | Acer grandidentatum | 4 | .96 |
| B | Amelanchier alnifolia | 41 | 1.85 |
| B | Artemisia tridentata vaseyana | 63 | 7.31 |
| B | Cercocarpus ledifolius | 12 | 14.10 |
| B | Ceanothus martinii | 13 | .21 |
| B | Cercocarpus montanus | 10 | 1.02 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 11 | .48 |
| B | Pachistima myrsinites | 66 | 3.04 |
| B | Pinus monophylla | 9 | 4.67 |
| B | Prunus virginiana | 65 | 2.87 |
| B | Rosa woodsii | 33 | 1.77 |
| B | Symphoricarpos oreophilus | 63 | 12.44 |
| Total for Browse | | 390 | 50.78 |

CANOPY COVER --
Herd unit 19B, Study no: 14

| Species | Percent Cover |
|------------------------|---------------|
| | '97 |
| Amelanchier alnifolia | 1 |
| Cercocarpus ledifolius | 29 |
| Pinus monophylla | 4 |

BASIC COVER --
Herd unit 19B, Study no: 14

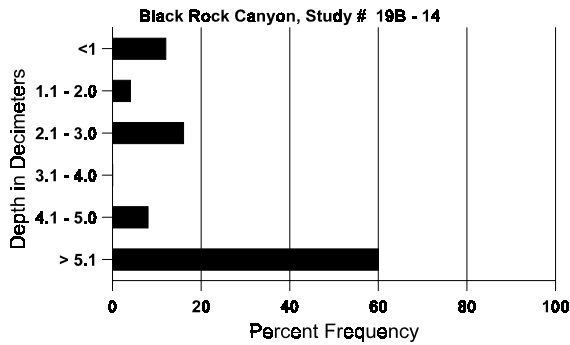
| Cover Type | Nested Frequency | Average Cover % | | |
|-------------|------------------|-----------------|-------|-------|
| | | '97 | '83 | '89 |
| Vegetation | 343 | 5.75 | 27.25 | 61.04 |
| Rock | 121 | 8.00 | 7.50 | 9.61 |
| Pavement | 13 | 0 | 0 | .19 |
| Litter | 390 | 74.50 | 57.75 | 63.36 |
| Cryptogams | 13 | 1.75 | .25 | .48 |
| Bare Ground | 86 | 10.00 | 7.25 | 4.92 |

SOIL ANALYSIS DATA --

Herd Unit 19B, Study no: 14, Black Rock Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 24.1 | 49.5 (17.7) | 7.5 | 35.4 | 42.1 | 22.6 | 6.5 | 14.0 | 243.2 | 0.5 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19B, Study no: 14

| Type | Quadrat Frequency | Pellet Transect | |
|--------|-------------------|------------------------|------------------------|
| | | Pellet Groups per Acre | Days Use per Acre (ha) |
| | '97 | 07 | 07 |
| Deer | 6 | 426 | 33 (82) |
| Cattle | - | 9 | 1 (2) |

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 14

| A G R E | Y | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total |
|------------------------------------------------|-----|----------------------------|---|---|------------------|---|---|-------------------|---|---|-------------|----------------|-----|------|-----------------|--------------------------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | |
| Acer grandidentatum | | | | | | | | | | | | | | | | | |
| | '83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | '89 | - | 1 | - | - | - | - | - | 1 | - | - | - | - | 2 | 133 | | 2 |
| | '97 | 7 | - | - | 1 | - | - | - | - | - | - | - | 8 | 160 | | 8 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | | <u>%Change</u> | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '89 | | 50% | | | 00% | | | 00% | | | | +17% | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | |
| | | | | | | | | | | | | '89 | 133 | | - | | |
| | | | | | | | | | | | | '97 | 160 | | - | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Amelanchier alnifolia | | | | | | | | | | | | | | | | | | |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 89 | 4 | 4 | - | - | 1 | - | 3 | - | - | 11 | 1 | - | - | 800 | | 12 | |
| | 97 | 5 | - | - | 3 | - | - | - | - | - | 8 | - | - | - | 160 | | 8 | |
| M | 83 | - | 1 | 2 | 2 | 2 | - | - | - | - | 2 | - | 5 | - | 466 | 48 | 24 | 7 |
| | 89 | - | 1 | - | 1 | 2 | - | - | - | - | 4 | - | - | - | 266 | 101 | 36 | 4 |
| | 97 | 25 | 16 | 5 | 14 | - | - | 3 | 1 | - | 60 | - | 4 | - | 1280 | 34 | 29 | 64 |
| D | 83 | - | 1 | - | - | - | - | - | - | - | - | - | 1 | - | 66 | | 1 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 44% | | | 22% | | | 67% | | | +44% | | | | | | | |
| '89 | | 50% | | | 00% | | | 00% | | | +26% | | | | | | | |
| '97 | | 22% | | | 07% | | | 06% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 598 | Dec: | 11% | | | |
| | | | | | | | | | | | | '89 | 1066 | | 0% | | | |
| | | | | | | | | | | | | '97 | 1440 | | 0% | | | |
| Artemisia tridentata vaseyana | | | | | | | | | | | | | | | | | | |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 4 | - | - | - | - | - | - | - | - | 3 | - | 1 | - | 80 | | 4 | |
| M | 83 | 30 | 11 | - | - | - | - | - | - | - | 41 | - | - | - | 2733 | 33 | 34 | 41 |
| | 89 | 25 | - | - | 1 | - | - | - | - | - | 8 | 17 | 1 | - | 1733 | 32 | 31 | 26 |
| | 97 | 56 | 10 | 5 | 2 | - | - | 1 | - | - | 72 | - | 2 | - | 1480 | 30 | 32 | 74 |
| D | 83 | 3 | 1 | - | - | - | - | - | - | - | - | - | 4 | - | 266 | | 4 | |
| | 89 | 7 | - | - | - | - | - | - | - | - | 1 | 3 | 3 | - | 466 | | 7 | |
| | 97 | 13 | 6 | - | 1 | 1 | - | - | - | - | - | - | - | 21 | 420 | | 21 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 680 | | 34 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 26% | | | 00% | | | 09% | | | -28% | | | | | | | |
| '89 | | 00% | | | 00% | | | 12% | | | -10% | | | | | | | |
| '97 | | 17% | | | 05% | | | 24% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 3065 | Dec: | 9% | | | |
| | | | | | | | | | | | | '89 | 2199 | | 21% | | | |
| | | | | | | | | | | | | '97 | 1980 | | 21% | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|------|------|-----|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Cercocarpus ledifolius | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 97 | 1 | - | - | 1 | - | - | 2 | 8 | - | 12 | - | - | - | 240 | 172 | 186 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | 2 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +75% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 0 | Dec: | 0% | | | | |
| | | | | | | | | | | | '89 | 66 | | 0% | | | | |
| | | | | | | | | | | | '97 | 260 | | 8% | | | | |
| Ceanothus martinii | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 1 | 11 | 1 | - | 1 | - | - | - | - | 1 | 13 | - | - | 933 | | 14 | |
| | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 83 | - | - | 6 | - | - | - | - | - | - | - | - | 6 | - | 400 | 24 | 31 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 97 | 12 | 1 | - | 3 | - | - | - | - | - | 15 | - | 1 | - | 320 | 14 | 26 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | 2 | - | - | - | - | - | - | - | - | 2 | - | - | 133 | | 2 | |
| | 97 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | | 3 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 100% | | | 100% | | | +62% | | | | | | | |
| '89 | | 88% | | | 06% | | | 00% | | | -62% | | | | | | | |
| '97 | | 05% | | | 00% | | | 05% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 400 | Dec: | 0% | | | | |
| | | | | | | | | | | | '89 | 1066 | | 12% | | | | |
| | | | | | | | | | | | '97 | 400 | | 15% | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|--------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Cercocarpus montanus</i> | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 97 | 6 | 7 | 3 | 1 | - | - | - | 1 | - | 18 | - | - | - | 360 | 65 | 54 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 35% | | | 15% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 400 | | - | | | |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | | | | | | | | | | | |
| Y | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 89 | 6 | - | - | 3 | - | - | - | - | - | 9 | - | - | - | 600 | | 9 | |
| | 97 | - | - | - | 2 | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| M | 83 | 28 | - | - | - | - | - | - | - | - | 28 | - | - | - | 1866 | 16 | 15 | |
| | 89 | 4 | - | - | - | - | - | 1 | - | - | 5 | - | - | - | 333 | 16 | 14 | |
| | 97 | 6 | - | - | 4 | - | - | 1 | - | - | 11 | - | - | - | 220 | 18 | 16 | |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 3 | - | - | - | - | - | - | - | - | 1 | - | 2 | - | 200 | | 3 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | -41% | | | | | | | |
| '89 | | 00% | | | 00% | | | 12% | | | -77% | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 1932 | Dec: | 0% | | | |
| | | | | | | | | | | | | '89 | 1133 | | 18% | | | |
| | | | | | | | | | | | | '97 | 260 | | 0% | | | |
| <i>Cowania mexicana stansburiana</i> | | | | | | | | | | | | | | | | | | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 82 | 159 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 0 | | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-------|------|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 83 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | 29 | 16 | 1 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 66 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 66 | | - | | | |
| | | | | | | | | | | | | '97 | 0 | | - | | | |
| Pachistima myrsinites | | | | | | | | | | | | | | | | | | |
| Y | 83 | 127 | - | - | - | - | - | - | - | - | 127 | - | - | - | 8466 | | 127 | |
| | 89 | 79 | - | - | 5 | - | - | 91 | - | - | 175 | - | - | - | 11666 | | 175 | |
| | 97 | 12 | - | - | 14 | - | - | - | - | - | 26 | - | - | - | 520 | | 26 | |
| M | 83 | 118 | - | - | - | - | - | - | - | - | 118 | - | - | - | 7866 | 4 | 9 | 118 |
| | 89 | 2 | - | - | - | - | - | 8 | - | - | 10 | - | - | - | 666 | 4 | 4 | 10 |
| | 97 | 127 | 4 | - | 126 | - | - | 34 | - | - | 291 | - | - | - | 5820 | 5 | 6 | 291 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | -24% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -49% | | | | | | | |
| '97 | | 01% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 16332 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 12332 | | - | | | |
| | | | | | | | | | | | | '97 | 6340 | | - | | | |
| Pinus monophylla | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 6 | - | - | 2 | - | - | 2 | - | - | 10 | - | - | - | 200 | | 10 | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 97 | 8 | - | - | - | - | - | - | - | - | 7 | - | 1 | - | 160 | | 8 | |
| M | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | - | - | 2 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +67% | | | | | | | |
| '97 | | 00% | | | 00% | | | 10% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 66 | | - | | | |
| | | | | | | | | | | | | '97 | 200 | | - | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|----|------------------|---|---|-------------------|---|---|----------------|------|------|-----|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Prunus virginiana | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 83 | 22 | - | - | - | - | - | - | - | - | - | 22 | - | - | 1466 | | 22 | |
| | 89 | 120 | - | - | 1 | - | - | 12 | - | - | 129 | 4 | - | - | 8866 | | 133 | |
| | 97 | 13 | - | - | 1 | - | - | - | - | - | 14 | - | - | - | 280 | | 14 | |
| M | 83 | 37 | 11 | - | - | - | - | - | - | - | - | 48 | - | - | 3200 | 20 | 12 | 48 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 97 | 79 | 18 | 11 | 13 | 3 | - | - | - | - | 124 | - | - | - | 2480 | 35 | 23 | 124 |
| D | 83 | 8 | - | - | - | - | - | - | - | - | - | 8 | - | - | 533 | | 8 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | 10 | - | - | 2 | - | - | - | - | - | 7 | - | 2 | 3 | 240 | | 12 | |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 200 | | 10 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 14% | | | 00% | | | 00% | | | +41% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -66% | | | | | | | |
| '97 | | 14% | | | 07% | | | 03% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 5199 | Dec: | 10% | | | | |
| | | | | | | | | | | | '89 | 8866 | | 0% | | | | |
| | | | | | | | | | | | '97 | 3000 | | 8% | | | | |
| Rosa woodsii | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 1 | - | - | - | - | - | 2 | - | - | 3 | - | - | - | 200 | | 3 | |
| | 97 | 1 | - | - | 1 | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| Y | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 61 | - | - | 2 | - | - | 6 | - | - | 68 | 1 | - | - | 4600 | | 69 | |
| | 97 | 10 | - | - | 4 | - | - | 1 | - | - | 15 | - | - | - | 300 | | 15 | |
| M | 83 | 22 | - | - | - | - | - | - | - | - | - | - | 22 | - | 1466 | 9 | 10 | 22 |
| | 89 | 7 | 5 | - | - | - | - | - | - | - | 10 | 2 | - | - | 800 | 19 | 7 | 12 |
| | 97 | 78 | - | 4 | 19 | - | - | 4 | - | - | 98 | - | 7 | - | 2100 | 19 | 10 | 105 |
| D | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 89 | 2 | 1 | - | - | - | - | - | - | - | - | 1 | 2 | - | 200 | | 3 | |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 00% | | | 00% | | | 100% | | | +74% | | | | | | | |
| '89 | | 07% | | | 00% | | | 02% | | | -57% | | | | | | | |
| '97 | | 00% | | | 03% | | | 06% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '83 | 1466 | Dec: | 0% | | | | |
| | | | | | | | | | | | '89 | 5600 | | 4% | | | | |
| | | | | | | | | | | | '97 | 2400 | | 0% | | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|-------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Symphoricarpos oreophilus | | | | | | | | | | | | | | | | | | |
| S | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | 6 | - | - | - | - | - | - | - | 6 | - | - | - | 120 | | | 6 |
| Y | 83 | 52 | - | - | - | - | - | - | - | - | 31 | 21 | - | - | 3466 | | | 52 |
| | 89 | 114 | - | - | - | - | - | 17 | - | - | 131 | - | - | - | 8733 | | | 131 |
| | 97 | 2 | - | 2 | 27 | - | - | - | - | - | 31 | - | - | - | 620 | | | 31 |
| M | 83 | 174 | 70 | - | - | - | - | - | - | - | 82 | 162 | - | - | 16266 | 31 | 19 | 244 |
| | 89 | 156 | - | - | 5 | - | - | 3 | - | - | 164 | - | - | - | 10933 | 25 | 20 | 164 |
| | 97 | 131 | 38 | 4 | 29 | - | - | 1 | - | - | 191 | 6 | 6 | - | 4060 | 22 | 31 | 203 |
| X | 83 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 80 | | | 4 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '83 | | 24% | | | 00% | | | 00% | | | - 0% | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -76% | | | | | | | |
| '97 | | 16% | | | 03% | | | 03% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '83 | 19732 | Dec: | - | | | |
| | | | | | | | | | | | | '89 | 19666 | | - | | | |
| | | | | | | | | | | | | '97 | 4680 | | - | | | |

SUMMARY

WILDLIFE MANAGEMENT UNIT 19B - WEST DESERT, VERNON

Of the 17 range trend studies found within management unit 19B, 14 were reread during the summer of 2002, and three were suspended. Suspended sites included North Oak Brush Canyon (#9), Water Canyon (#11), and Black Rock Canyon (#14). These studies were suspended as they are no longer representative of critical big game ranges. All of these studies lie on steep north and east aspects in very thick browse communities and have minimal wildlife use.

In 2002, range trends were driven largely by drought conditions. Weather station data collected at Vernon show that since 1980, most years have been either at or above normal in total annual precipitation. Exceptions include a dry period from 1988-1990, and the current drought cycle that began in 1999. Seasonal distribution of precipitation is perhaps more important than total annual precipitation. The Vernon weather data show that the fall of 2001, winter of 2001-02, and spring of 2002 were below normal in precipitation at 90%, 61%, and 70% of normal respectively. Spring precipitation (March-May) is especially important as the cool season perennial species start to grow.

Of the 14 studies that were sampled in 2002, nine sites had downward herbaceous trends. Drought conditions combined with Mormon cricket use resulted in herbaceous species, primarily forbs, being less abundant in frequency, cover, or both. Crickets were encountered on 9 of the 14 sites sampled in 2002. The sum of nested frequency value for perennial species declined on 11 of the 14 sites for both grasses and forbs in 2002. The decrease in grass frequency was not as dramatic as that for forbs. To illustrate how severe the loss of forbs was in 2002, seven sites in this unit had sum of nested frequency decreases of 70% or more, with two sites being over 90%. Soil trends are also heavily influenced by drought, with 9 of the 14 studies sampled in 2002 showing downward soil trends. Bare soil often increases during dry conditions as vegetation and litter cover decrease. As protective cover provided by herbaceous vegetation and litter declines, more soil is exposed to erosive forces and often show increased soil loss. No studies in 2002 had upward trends for either soils or the herbaceous species.

Browse trends were less effected by drought in 2002. Nine sites had a stable trend, and only three had downward trends. The browse trend was slightly up at Lee's Creek (#6) as Wyoming big sagebrush increased in density, and up at Dennis Spring (#13) where a wildfire in 2001 burned out an overly abundant mountain big sagebrush population that was suppressing the understory. Key population parameters that are used in determining browse trends include decadence, vigor, and reproduction (number of seedling and young plants coming into the population). Vigor actually improved in key browse populations on one-half of the sites in 2002, while decadence increased in key browse populations on one-half of the sites. Reproduction within the key browse populations remains low on most sites, with the exception of Lee's Creek (#6), Dennis Spring (#13) and Furner Valley (#18). Although few of the studies have downward browse trends in 2002, low reproduction and increased decadence at many sites show that shrubs populations are stressed due to the drought, and could become more negatively effected if precipitation patterns do not improve soon.

A summary table of each study and it's associated trends follows.

Trend Summary

| | Category | 1983 | 1989 | 1997 | 2002 |
|-----------------------------------|-----------------------|------|------|------|------|
| 19B-1 Sabie Mountain | soil | est | 5 | 4 | 1 |
| | browse | est | 3 | 2 | 3 |
| | herbaceous understory | est | 3 | 2 | 1 |
| 19B-2 Upper Little Valley | soil | est | 3 | 4 | 1 |
| | browse | est | 3 | 3 | 2 |
| | herbaceous understory | est | 2 | 3 | 1 |
| 19B-3 Bennion Creek | soil | est | 3 | 4 | 1 |
| | browse | est | 4 | 2 | 3 |
| | herbaceous understory | est | 3 | 3 | 1 |
| 19B-4 Harker Canyon | soil | est | 4 | 4 | 1 |
| | browse | est | 3 | 3 | 3 |
| | herbaceous understory | est | 5 | 1 | 1 |
| 19B-5 West Government Creek | soil | est | 4 | 4 | 1 |
| | browse | est | 5 | 3 | 3 |
| | herbaceous understory | est | 4 | 3 | 1 |
| 19B-6 Lee's Creek | soil | est | 2 | 3 | 3 |
| | browse | est | 3 | 5 | 4 |
| | herbaceous understory | est | 4 | 3 | 3 |
| 19B-7 Judd Creek | soil | est | 3 | 3 | 1 |
| | browse | est | 2 | 4 | 2 |
| | herbaceous understory | est | 3 | 1 | 1 |
| 19B-8 South Pine Canyon | soil | est | 3 | NR | 1 |
| | browse | est | 3 | NR | 1 |
| | herbaceous understory | est | 4 | NR | 1 |
| 19B-10 Sioux Pass | soil | est | 3 | 3 | 2 |
| | browse | est | 2 | 3 | 3 |
| | herbaceous understory | est | 3 | 3 | 3 |

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up
 (est) = established, (n/a) = no trend, (susp) = suspended, (NR) = not read

| | Category | 1983 | 1989 | 1997 | 2002 |
|------------------------------------|-----------------------|------|------|------|------|
| 19B-12 Sunrise Canyon | soil | est | 3 | 3 | 3 |
| | browse | est | 3 | 3 | 3 |
| | herbaceous understory | est | 2 | 3 | 3 |
| 19B-13 Dennis Spring | soil | est | 3 | 3 | 1 |
| | browse | est | 5 | 3 | 4 |
| | herbaceous understory | est | 3 | 3 | 2 |
| 19B-15 Upper Broad Canyon | soil | est | 3 | 2 | 3 |
| | browse | est | 2 | 3 | 3 |
| | herbaceous understory | est | 3 | 3 | 3 |
| 19B-16 Nephi Dump | soil | est | 3 | 3 | 3 |
| | browse | est | 2 | 2 | 3 |
| | herbaceous understory | est | 4 | 5 | 3 |
| 19B-18 Furner Valley | soil | est | 4 | 3 | 3 |
| | browse | est | 2 | 2 | 3 |
| | herbaceous understory | est | 4 | 3 | 2 |
| SUSPENDED STUDIES | | | | | |
| 19B-9 North Oak Brush Canyon | soil | est | 3 | 4 | susp |
| | browse | est | 3 | 3 | susp |
| | herbaceous understory | est | 3 | 3 | susp |
| 19B-11 Water Canyon | soil | est | 3 | 3 | susp |
| | browse | est | 2 | 3 | susp |
| | herbaceous understory | est | 5 | 1 | susp |
| 19B-14 Black Rock Canyon | soil | est | 3 | 3 | susp |
| | browse | est | 3 | 3 | susp |
| | herbaceous understory | est | 5 | 1 | susp |

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up
(est) = established, (n/a) = no trend, (susp) = suspended, (NR) = not read

2002 SPECIAL PROJECTS

2002 SPECIAL PROJECTS - MANAGEMENT UNITS 10, 19B, 21

Special projects are carried out by project personnel to address immediate range monitoring needs throughout the state. These are projects that are deemed high priority and cannot wait for the regular rotation schedule. The location and number of special studies conducted depend upon funding and need, but usually occur on an annual basis. Range trend personnel work with DWR biologists and federal land managers to prioritize special studies within each DWR administrative region. Special projects are established for a variety of reasons including, but not limited to the following: to monitor habitat restoration projects; to monitor high use areas by wildlife, livestock, or both (conflict areas); and to gather baseline data for anticipated habitat treatments in the future.

In 2002, special studies were reread in management units 19B (West Desert, Vernon) and 21 (Fillmore), and established in management unit 10 (Book Cliffs). The studies in units 19B and 21 were reread to monitor habitat restoration projects that resulted from the large wildfires that occurred in 1996 west of Nephi. Three new studies were established on top of the North Book Cliffs to gather baseline data for a new 3-way exclosure that was built near PR Spring. Maps, data tables, and a narrative of these projects follow.

Trend Study 10R-32-02

Study site name: PR Spring Total Enclosure .

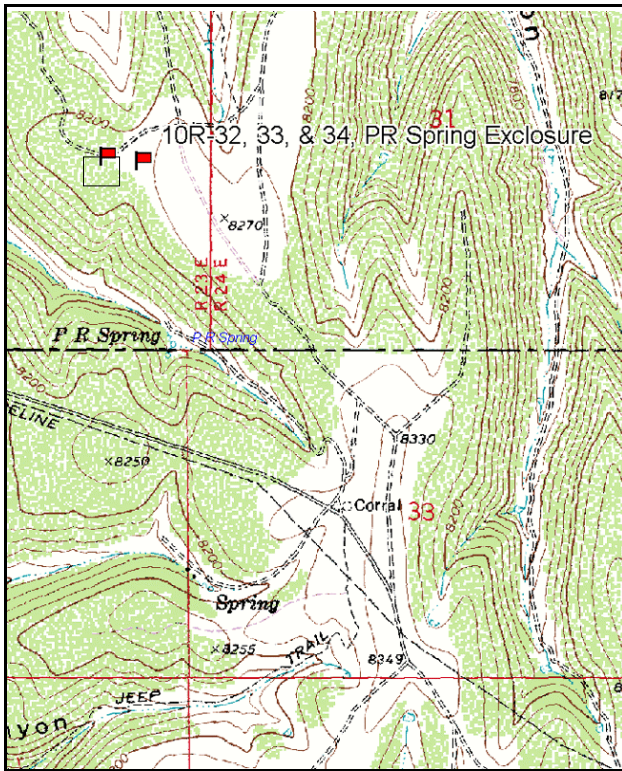
Vegetation type: Mountain Brush .

Compass bearing: frequency baseline 260 degrees magnetic.

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

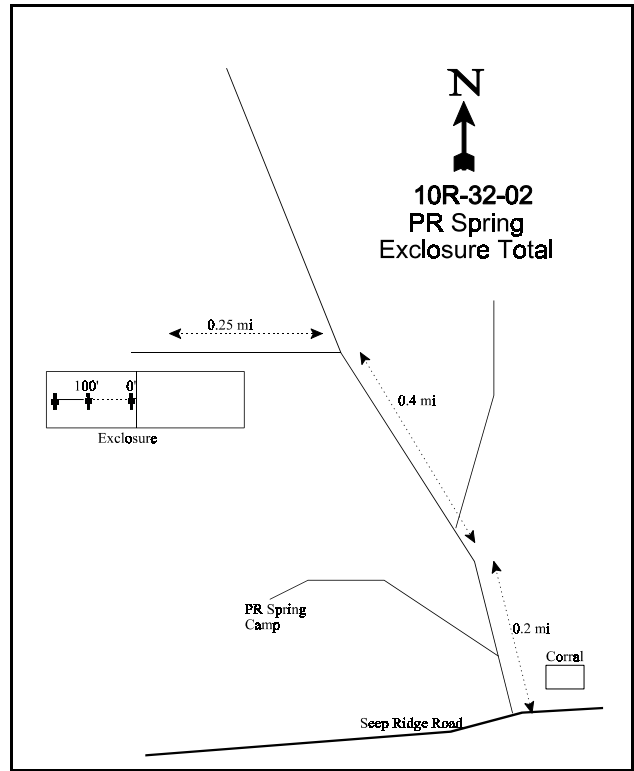
LOCATION DESCRIPTION

On Seep Ridge Road go to the PR Spring turnoff. Travel 0.2 miles staying right (do not go down road to PR Spring and campground). Continue left 0.4 miles. Turn left once again and travel approximately 0.25 miles to a weather station then the enclosure. The 0-foot stake in the total enclosure is located near the fence separating the total and livestock enclosures. The 0-foot stake is five fence posts from the north fence. The first baseline is 100 feet long and the second baseline is 86 feet long. The 0-foot stake is marked by browse tag number 435.



Map Name: P R Spring

Township 15S, Range 23E, Section 36



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4369908 N 647433 E

DISCUSSION

PR Spring Total Exclosure - Study No. 10R-32

This study was established in 2002 to gather baseline data for a 3-way exclosure that was built in 2001 by the BLM near PR Spring on the North Book Cliffs. This transect samples a mountain brush community within the total exclosure which is now inaccessible to all classes of animals. The study lies on a nearly level ridge at an elevation of 8,200 feet. Due to the dimensions of the exclosure, the sampling baseline is only 200 feet in length. The area represents summer range for wildlife, and is also grazed by livestock. In 2002, a pellet group transect was read to estimate use before the exclosure was constructed. Elk, deer, and cattle use was estimated at respectively 23, 39, and 7 days use/acre (56 edu/ha, 96 ddu/ha, and 18 cdu/ha). All wildlife pellet groups were from the late winter and spring of 2001, while cattle pats were from previous grazing season.

Soils on the site are clay loam in texture and neutral in reactivity (pH of 6.7). Percent organic matter is moderate at 3.6%. Soils are quite shallow with an effective rooting depth of less than 10 inches. Penetrometer readings taken in 2002 also show that the upper 8 inches of the profile are very rocky. Erosion is minimal due to the abundance of vegetation and litter cover and lack of significant slope. The erosion condition class was determined as stable in 2002.

The browse component dominates the vegetation community as it provides 75% of the total cover on the site. Total line-intercept canopy cover of the browse component was estimated at 61% in 2002. Several preferred species are present including serviceberry, mountain big sagebrush, true mountain mahogany, and bitterbrush. Snowberry, although less preferred, provides the highest average cover and has the highest density of any single species in the total exclosure. Snowberry density was estimated at 5,320 plant/acre with most of the population being mature plants. Use on snowberry prior to the exclosure was light. Population densities of serviceberry, mountain big sagebrush, and true mountain mahogany were estimated at 1,800 plants/acre, 3,560 plants/acre, and 2,980 plants/acre in 2002. Prior to the exclosure, use on serviceberry and mahogany was moderate to heavy, while use on mountain big sagebrush was light. Decadence for all of these species was low, and vigor was good in 2002. Recruitment was very good for all of the preferred species. Annual leader growth for serviceberry, mountain big sagebrush, and true mountain mahogany averaged respectively 2.1 inches, 3.1 inches, and 1.9 inches in 2002. Less preferred browse that were also sampled include stickyleaf low rabbitbrush, Gambel oak, and grey horsebrush.

The understory is rather sparse for a mountain brush community at this elevation. This is due in part to the dense canopy of shrubs as well as drought conditions in 2002. Grasses are comprised totally of perennial species including a *Carex*, thickspike wheatgrass, mutton bluegrass, Kentucky bluegrass, prairie junegrass, and bluebunch wheatgrass. Most of the grasses are found underneath, or in close proximity to shrubs, and it was noted that interspaces were relatively bare in 2002. The forb component is moderately diverse, but had only fair production. Two species, an *astragalus* and mat penstemon, provided the majority of the forb cover. Composition is fairly good with desirable species such as pale agoseris, yellow Indian paintbrush, redroot eriogonum, sulfur eriogonum, and Lewis flax being present. The understory would greatly benefit from a reduction in overstory shrub cover and density.

APPARENT TREND ASSESSMENT

Soils appear to be stable with an abundance of protective ground cover from vegetation and litter. Erosion is very minimal at the present time and will likely remain so. The browse component is diverse and abundant and appears to be stable. Preferred species are plentiful and have very good reproduction. Line-intercept canopy cover for browse is estimated at over 61% which is very high. The herbaceous understory has fair diversity and a fairly good composition, but could be much more abundant with a reduction in the overstory canopy of shrubs. With only one year of data, it is difficult to tell which direction the understory trend, but further increases in browse would most likely be negative for herbaceous species.

HERBACEOUS TRENDS --
Herd unit 10R, Study no: 32

| T y p e | Species | Nested Frequency | Quadrat Frequency | Average Cover % |
|-----------------------------|---------------------------------|---------------------|----------------------|--------------------|
| | | '02 | '02 | '02 |
| G | <i>Agropyron dasystachyum</i> | 193 | 70 | 3.82 |
| G | <i>Agropyron spicatum</i> | 5 | 3 | .06 |
| G | <i>Carex</i> spp. | 148 | 46 | 5.37 |
| G | <i>Koeleria cristata</i> | 6 | 2 | .18 |
| G | <i>Poa fendleriana</i> | 74 | 24 | 2.85 |
| G | <i>Poa pratensis</i> | 16 | 6 | .25 |
| Total for Annual Grasses | | 0 | 0 | 0 |
| Total for Perennial Grasses | | 442 | 151 | 12.55 |
| Total for Grasses | | 442 | 151 | 12.55 |
| F | <i>Agoseris glauca</i> | 4 | 2 | .01 |
| F | <i>Antennaria rosea</i> | 4 | 2 | .01 |
| F | <i>Arenaria</i> spp. | 5 | 2 | .03 |
| F | <i>Astragalus</i> spp. | 91 | 40 | 2.77 |
| F | <i>Astragalus utahensis</i> | 6 | 2 | .15 |
| F | <i>Balsamorhiza sagittata</i> | 1 | 1 | .00 |
| F | <i>Castilleja flava</i> | 31 | 11 | .49 |
| F | <i>Cirsium</i> spp. | 19 | 10 | .15 |
| F | <i>Collinsia parviflora</i> (a) | 2 | 1 | .00 |
| F | <i>Crepis acuminata</i> | 5 | 1 | .03 |
| F | <i>Erigeron eatonii</i> | 75 | 33 | .54 |
| F | <i>Eriogonum racemosum</i> | 18 | 7 | .13 |
| F | <i>Eriogonum umbellatum</i> | 20 | 11 | .37 |
| F | <i>Ipomopsis aggregata</i> | 4 | 2 | .03 |
| F | <i>Lepidium</i> spp. (a) | 3 | 2 | .01 |
| F | <i>Linum lewisii</i> | 11 | 6 | .08 |
| F | <i>Machaeranthera canescens</i> | 4 | 2 | .03 |
| F | <i>Penstemon caespitosus</i> | 129 | 53 | 1.56 |
| F | <i>Phlox longifolia</i> | 7 | 5 | .02 |
| F | <i>Taraxacum officinale</i> | 14 | 6 | .03 |
| F | <i>Tragopogon dubius</i> | 4 | 2 | .01 |
| Total for Annual Forbs | | 5 | 3 | 0.01 |
| Total for Perennial Forbs | | 452 | 198 | 6.51 |
| Total for Forbs | | 457 | 201 | 6.52 |

BROWSE TRENDS --
Herd unit 10R, Study no: 32

| T y p e | Species | Strip Frequency | Average Cover % |
|------------------|----------------------------------------------|--------------------|--------------------|
| | | '02 | '02 |
| B | Amelanchier utahensis | 55 | 11.43 |
| B | Artemisia tridentata vaseyana | 77 | 14.28 |
| B | Cercocarpus montanus | 66 | 7.50 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 60 | 3.65 |
| B | Purshia tridentata | 11 | .33 |
| B | Quercus gambelii | 20 | .95 |
| B | Symphoricarpos oreophilus | 93 | 17.60 |
| B | Tetradymia canescens | 3 | .04 |
| Total for Browse | | 385 | 55.81 |

CANOPY COVER --
Herd unit 10R, Study no: 32

| Species | Percent Cover |
|----------------------------------------------|------------------|
| | '02 |
| Amelanchier utahensis | 13.58 |
| Artemisia tridentata vaseyana | 20.08 |
| Cercocarpus montanus | 5.33 |
| Chrysothamnus viscidiflorus viscidiflorus | 1.00 |
| Gutierrezia sarothrae | .92 |
| Purshia tridentata | .17 |
| Quercus gambelii | .25 |
| Symphoricarpos oreophilus | 20.33 |

Key Browse Annual Leader Growth
Herd unit 10R , Study no: 32

| Species | Average leader growth (in) |
|-------------------------------|-------------------------------|
| | '02 |
| Artemisia tridentata vaseyana | 3.1 |
| Amelanchier utahensis | 2.1 |
| Cercocarpus montanus montanus | 1.9 |

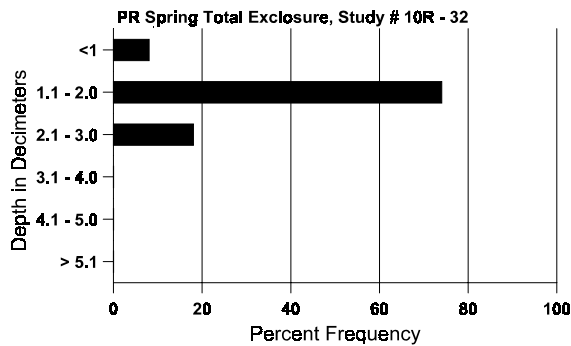
BASIC COVER --
Herd unit 10R, Study no: 32

| Cover Type | Nested Frequency | Average Cover % |
|-------------|------------------|-----------------|
| | '02 | '02 |
| Vegetation | 416 | 58.40 |
| Rock | 40 | .23 |
| Pavement | 182 | 7.22 |
| Litter | 481 | 58.92 |
| Cryptogams | 17 | .25 |
| Bare Ground | 182 | 9.25 |

SOIL ANALYSIS DATA --
Herd Unit 10R, Study no: 32, PR Spring Total Exclosure

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 9.74 | - | 6.8 | 35.3 | 32.7 | 32.0 | 3.6 | 14.9 | 291.2 | 0.8 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 10R, Study no: 32

| Type | Quadrat Frequency | Pellet Groups per Acre | Days Use per Acre (ha) |
|--------|-------------------|------------------------|------------------------|
| | '02 | '02 | '02 |
| Rabbit | 12 | - | - |
| Elk | 9 | 296 | 23 (56) |
| Deer | 15 | 505 | 39 (96) |
| Cattle | 1 | 87 | 7 (18) |

Pellet count for pre-exclosure use.

BROWSE CHARACTERISTICS --

Herd unit 10R, Study no: 32

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|--------------------------------------------------|--------|----------------------------|----|----|-------------------------|----|----|---------------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Amelanchier utahensis</i> | | | | | | | | | | | | | | | | | | |
| S | 02 | - | - | - | - | - | - | 1 | - | - | 1 | - | - | - | 20 | | 1 | |
| Y | 02 | 17 | 1 | 1 | 13 | 3 | - | 3 | - | - | 38 | - | - | - | 760 | | 38 | |
| M | 02 | 9 | 5 | 6 | 3 | 5 | 10 | 6 | - | - | 44 | - | - | - | 880 | 52 | 51 | 44 |
| D | 02 | 1 | - | 2 | - | - | 4 | - | - | 1 | 4 | - | - | 4 | 160 | | 8 | |
| X | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| % Plants Showing '02 | | <u>Moderate Use</u> 16% | | | <u>Heavy Use</u> 27% | | | <u>Poor Vigor</u> 04% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 1800 | Dec: | 9% | | | |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | | | | | | | |
| S | 02 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | | 5 | |
| Y | 02 | 38 | - | - | - | - | - | - | - | - | 38 | - | - | - | 760 | | 38 | |
| M | 02 | 91 | 13 | 7 | 3 | - | - | - | - | - | 111 | 2 | 1 | - | 2280 | 30 | 38 | 114 |
| D | 02 | 19 | 5 | 1 | 1 | - | - | - | - | - | 19 | - | - | 7 | 520 | | 26 | |
| X | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 340 | | 17 | |
| % Plants Showing '02 | | <u>Moderate Use</u> 10% | | | <u>Heavy Use</u> 04% | | | <u>Poor Vigor</u> 04% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 3560 | Dec: | 15% | | | |
| <i>Cercocarpus montanus</i> | | | | | | | | | | | | | | | | | | |
| S | 02 | - | - | - | 1 | - | - | 3 | - | - | 4 | - | - | - | 80 | | 4 | |
| Y | 02 | 20 | 2 | 3 | 13 | - | - | - | - | - | 38 | - | - | - | 760 | | 38 | |
| M | 02 | 7 | 4 | 35 | 5 | 15 | 35 | 4 | - | - | 103 | 2 | - | - | 2100 | 43 | 35 | 105 |
| D | 02 | - | - | 1 | - | - | 1 | - | - | - | 1 | - | - | 1 | 40 | | 2 | |
| X | 02 | - | - | 1 | - | - | - | - | - | - | 1 | - | - | - | 80 | | 4 | |
| % Plants Showing '02 | | <u>Moderate Use</u> 14% | | | <u>Heavy Use</u> 52% | | | <u>Poor Vigor</u> .68% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 2900 | Dec: | 1% | | | |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | | | | | | | | | | | |
| S | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| Y | 02 | 13 | - | - | - | - | - | - | - | - | 13 | - | - | - | 260 | | 13 | |
| M | 02 | 114 | - | - | 18 | - | - | 2 | - | - | 134 | - | - | - | 2680 | 13 | 14 | 134 |
| D | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 2980 | Dec: | 1% | | | |

| A G R E | Y | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|-----|----------------------------|---|---|-------------------------|---|---|--------------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Purshia tridentata | | | | | | | | | | | | | | | | | | |
| M | '02 | 1 | 3 | 1 | - | 1 | 4 | 2 | - | - | 10 | 2 | - | - | 240 | 12 | 18 | 12 |
| D | '02 | - | - | - | - | - | 1 | - | - | - | 1 | - | - | - | 20 | | | 1 |
| % Plants Showing '02 | | <u>Moderate Use</u> 31% | | | <u>Heavy Use</u> 46% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 260 | Dec: | 8% | | | |
| Quercus gambelii | | | | | | | | | | | | | | | | | | |
| S | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| Y | '02 | 3 | - | - | 6 | - | - | 5 | - | - | 14 | - | - | - | 280 | | | 14 |
| M | '02 | 11 | 1 | - | 2 | - | - | - | - | - | 14 | - | - | - | 280 | - | - | 14 |
| % Plants Showing '02 | | <u>Moderate Use</u> 04% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 560 | Dec: | - | | | |
| Symphoricarpos oreophilus | | | | | | | | | | | | | | | | | | |
| S | '02 | 5 | - | - | 1 | - | - | 1 | - | - | 7 | - | - | - | 140 | | | 7 |
| Y | '02 | 43 | - | - | 6 | - | - | - | - | - | 49 | - | - | - | 980 | | | 49 |
| M | '02 | 147 | - | - | 62 | - | - | 8 | - | - | 217 | - | - | - | 4340 | 17 | 31 | 217 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 5320 | Dec: | - | | | |
| Tetradymia canescens | | | | | | | | | | | | | | | | | | |
| Y | '02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | | 2 |
| M | '02 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | 7 | 8 | 3 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 100 | Dec: | - | | | |

Trend Study 10R-33-02

Study site name: PR Spring Livestock Exclosure.

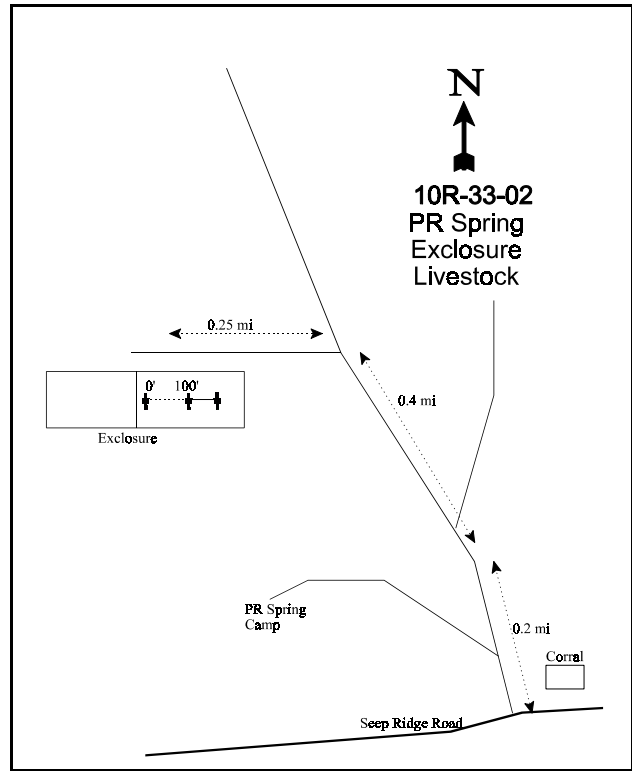
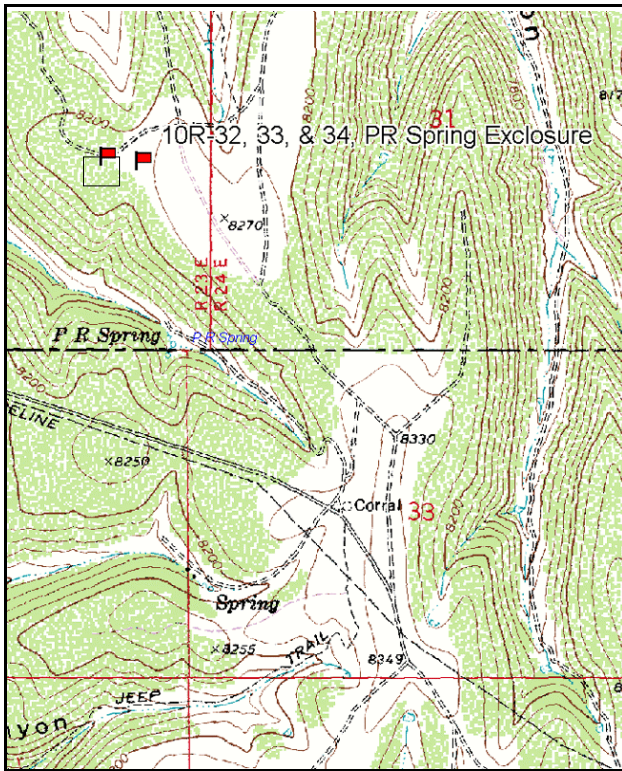
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 80 degrees magnetic.

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

LOCATION DESCRIPTION

On the Seep Ridge Road go to the PR Spring turnoff. Travel 0.2 miles staying right (do not go down road to PR Spring and campground). Continue left 0.4 miles. Turn left once again and travel approximately 0.25 miles to a weather station then the exclosure. The 0-foot stake in the livestock exclosure is located near the fence separating the total and livestock exclosures. The 0-foot stake is marked by browse tag number 423.



Map Name: P R Spring

Diagrammatic Sketch

Township 15S, Range 23E, Section 36

GPS: NAD 27, UTM 12S 4369912 N 647435 E

DISCUSSION

PR Spring Livestock Exclosure - Study No. 10R-33

This transect samples the livestock exclosure at PR Spring which is accessible to wildlife, but excludes livestock. The sampling baseline lies just east of the total exclosure baseline. Physical characteristics are the same as those reported for the total exclosure transect. The sampling baseline within the livestock exclosure is also only 200 feet in length. One observation worth noting is that the browse component within the livestock exclosure is not as thick compared to the total exclosure. Use inside the livestock exclosure prior to exclosure construction was light to moderate by wildlife and light by livestock. Pellet group transect data from 2002 estimated 19 elk days use/acre (46 edu/ha), 48 deer days use/acre (117 ddu/ha), and 14 cow days use/acre (34 cdu/ha). As with the total exclosure, cattle use inside the livestock portion of the exclosure was that prior to the exclosures construction. Elk and deer pellets appeared to be late winter and spring. Wildlife have been able to remain at higher elevations due to several consecutive mild winters preceding the 2002 reading.

Soils are clay loam in texture and neutral in reactivity (pH of 6.7). Effective rooting depth along this transect was estimated at just under 12 inches in 2002. Penetrometer readings also reveal that the upper 8-12 inches of the profile are very rocky. Vegetation and litter cover are abundant and adequate to keep erosion at a minimal level. Bare ground was moderate in 2002 at 20%. The erosion condition classification was determined as stable in 2002.

Although diverse and abundant, the browse component in the livestock exclosure is not as dense as that in the nearby total exclosure. Line-intercept canopy cover for browse was estimated at just over 45% in 2002. Serviceberry, mountain big sagebrush, and true mountain mahogany represent the key browse species. Together they provide 66% of the browse cover, or 41% of the total vegetation cover within the livestock exclosure. Serviceberry had an estimated density of 1,760 plants/acre in 2002, with a high proportion of young in the population (52%), moderate to heavy use, and low decadence. Vigor was good as well. Mountain big sagebrush density was estimated at 3,240 plants/acre, with most of the population consisting of mature and decadent plants. In 2002, the young age class was moderately abundant (460 young plants/acre), but not adequate to replace the combination of decadent plants classified as dying and the number of dead individuals that were sampled. Mahogany density was estimated at 1,240 plants/acre in 2002. The population shows low decadence, normal vigor, moderate to heavy use, and moderately high recruitment with the young age class making up 34% of the population. Average annual leader growth on all of the key browse was about two inches of growth in 2002.

As with the total exclosure, snowberry has the highest density of all the browse species within the livestock exclosure at 4,640 plants/acre in 2002. Use was light, vigor normal, and decadence low. Bitterbrush, while highly preferred, occurs in low density at 320 plants/acre. Bitterbrush shows heavy use, normal vigor, and low decadence (13%). Other browse sampled within the livestock exclosure include dwarf rabbitbrush, low rabbitbrush, broom snakeweed, Gambel oak, and grey horsebrush.

The understory is slightly more abundant within the livestock exclosure than it was in the total exclosure. Grasses provided 24% of the total vegetation cover on the site, with forbs providing an additional 16% cover. Grass diversity is low, but composed entirely of perennial species. *Carex* was the most abundant species providing nearly 9% average cover which accounted for 63% of the total grass cover. Kentucky bluegrass and thickspike wheatgrass were also moderately abundant. Grasses showed no utilization in 2002.

The forb component has fair diversity and good composition. Two species, an *astragalus* and mat penstemon, are the dominant species as they accounted for 74% of the total forb cover in 2002. Desirable forbs included pale agoseris, Utah milkvetch, yellow Indian paintbrush, tapertip hawksbeard, redroot eriogonum, Lewis flax, lobeleaf groundsel, and globemallow.

APPARENT TREND ASSESSMENT

Soils are in good condition due to good vegetation and litter cover and the nearly level terrain. Bare ground is moderately high at 20%, but with a dry spring and summer, this is not excessive. Trend for soil appears stable. The browse component appears healthy overall. Preferred species provide the bulk of the total cover and have good recruitment from young plants, low decadence, and generally good vigor. Use on the key species is moderate to heavy, except on mountain big sagebrush, which shows mostly light use. Less preferred increasers such as broom snakeweed and stickyleaf low rabbitbrush are only a minor component and should remain so. The herbaceous understory has fair diversity, but good composition within the livestock enclosure. Although a handful of species are dominant, many desirable species are present and should increase with better precipitation in the future. Trend for both the browse and the herbaceous understory components appears stable.

HERBACEOUS TRENDS --

Herd unit 10R, Study no: 33

| T y p e | Species | Nested Frequency | Quadrat Frequency | Average Cover % |
|-----------------------------|---------------------------------|---------------------|----------------------|--------------------|
| | | '02 | '02 | '02 |
| G | <i>Agropyron dasystachyum</i> | 102 | 41 | 1.14 |
| G | <i>Agropyron spicatum</i> | 1 | 1 | .00 |
| G | <i>Carex</i> spp. | 187 | 64 | 8.90 |
| G | <i>Poa fendleriana</i> | 24 | 12 | .57 |
| G | <i>Poa pratensis</i> | 136 | 39 | 3.43 |
| G | <i>Sitanion hystrix</i> | 5 | 1 | .03 |
| Total for Annual Grasses | | 0 | 0 | 0 |
| Total for Perennial Grasses | | 455 | 158 | 14.08 |
| Total for Grasses | | 455 | 158 | 14.08 |
| F | <i>Agoseris glauca</i> | 7 | 3 | .02 |
| F | <i>Antennaria rosea</i> | 12 | 7 | .11 |
| F | <i>Astragalus</i> spp. | 146 | 64 | 5.00 |
| F | <i>Astragalus utahensis</i> | 5 | 3 | .04 |
| F | <i>Castilleja flava</i> | 25 | 12 | .35 |
| F | <i>Cirsium</i> spp. | 8 | 4 | .02 |
| F | <i>Crepis acuminata</i> | 5 | 2 | .01 |
| F | <i>Erigeron eatonii</i> | 130 | 52 | .83 |
| F | <i>Eriogonum racemosum</i> | 22 | 11 | .20 |
| F | <i>Eriogonum umbellatum</i> | 14 | 9 | .14 |
| F | <i>Lepidium</i> spp. (a) | 5 | 4 | .02 |
| F | <i>Linum lewisii</i> | 9 | 5 | .02 |
| F | <i>Lupinus argenteus</i> | 2 | 1 | .15 |
| F | <i>Machaeranthera canescens</i> | 13 | 8 | .11 |
| F | <i>Penstemon caespitosus</i> | 217 | 78 | 1.85 |
| F | <i>Phlox longifolia</i> | 90 | 34 | .32 |
| F | <i>Polygonum douglasii</i> (a) | 5 | 2 | .01 |
| F | <i>Potentilla gracilis</i> | 1 | 1 | .00 |

| T y p e | Species | Nested Frequency | Quadrat Frequency | Average Cover % |
|---------------------------|----------------------|---------------------|----------------------|--------------------|
| | | '02 | '02 | '02 |
| F | Senecio multilobatus | 3 | 1 | .00 |
| F | Sphaeralcea coccinea | 11 | 3 | .06 |
| F | Taraxacum officinale | 4 | 4 | .02 |
| Total for Annual Forbs | | 10 | 6 | 0.02 |
| Total for Perennial Forbs | | 724 | 302 | 9.31 |
| Total for Forbs | | 734 | 308 | 9.34 |

BROWSE TRENDS --

Herd unit 10R, Study no: 33

| T y p e | Species | Strip Frequency | Average Cover % |
|------------------|----------------------------------------------|--------------------|--------------------|
| | | '02 | '02 |
| B | Amelanchier utahensis | 53 | 5.44 |
| B | Artemisia tridentata vaseyana | 79 | 15.19 |
| B | Cercocarpus montanus | 31 | 3.41 |
| B | Chrysothamnus depressus | 4 | .04 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 48 | 1.00 |
| B | Gutierrezia sarothrae | 4 | .03 |
| B | Mahonia repens | 1 | - |
| B | Purshia tridentata | 14 | .48 |
| B | Quercus gambelii | 4 | .01 |
| B | Symphoricarpos oreophilus | 80 | 9.72 |
| B | Tetradymia canescens | 17 | .62 |
| Total for Browse | | 335 | 35.95 |

CANOPY COVER -- LINE INTERCEPT

Herd unit 10R, Study no: 33

| Species | Percent Cover '02 |
|----------------------------------------------|-------------------------|
| Amelanchier utahensis | 9.08 |
| Artemisia tridentata vaseyana | 17.67 |
| Cercocarpus montanus | 5.08 |
| Chrysothamnus viscidiflorus viscidiflorus | 1.17 |
| Gutierrezia sarothrae | .03 |
| Purshia tridentata | 1.25 |
| Quercus gambelii | .17 |
| Symphoricarpos oreophilus | 10.67 |
| Tetradymia canescens | .17 |

Key Browse Annual Leader Growth
Herd unit 10R , Study no: 33

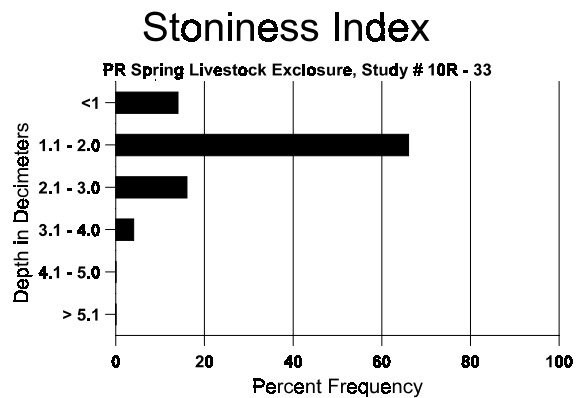
| Species | Average leader growth (in) '02 |
|-------------------------------|--------------------------------|
| Amelanchier utahensis | 2.0 |
| Cercocarpus montanus montanus | 2.2 |
| Artemisia tridentata vaseyana | 1.9 |

BASIC COVER --
Herd unit 10R, Study no: 33

| Cover Type | Nested Frequency '02 | Average Cover % '02 |
|-------------|----------------------|---------------------|
| Vegetation | 427 | 52.09 |
| Rock | 57 | 1.24 |
| Pavement | 273 | 6.34 |
| Litter | 475 | 46.46 |
| Cryptogams | 3 | .03 |
| Bare Ground | 280 | 20.18 |

SOIL ANALYSIS DATA --
Herd Unit 10R, Study no: 33, PR Spring Livestock Enclosure

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 11.71 | - | 6.8 | 35.3 | 32.7 | 32.0 | 3.6 | 14.9 | 291.2 | 0.8 |



PELLET GROUP FREQUENCY --

Herd unit 10R, Study no: 33

| Type | Quadrat Frequency '02 | Pellet Groups per Acre '02 | Days Use per Acre (ha) '02 |
|--------|-----------------------|----------------------------|----------------------------|
| Rabbit | 11 | - | - |
| Elk | 7 | 244 | 19 (46) |
| Deer | 14 | 618 | 48 (117) |
| Cattle | 3 | 165 | 14 (34) |

Pellet count for pre-exclosure use.

BROWSE CHARACTERISTICS --

Herd unit 10R, Study no: 33

| A G R E | Y | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|----|----------------------------|---|----|----------------------|---|----|-----------------------|---|---|----------------|---|---|----|-----------------|--------------------------|------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Amelanchier utahensis</i> | | | | | | | | | | | | | | | | | | |
| S | 02 | 4 | - | - | 1 | - | - | - | - | - | 5 | - | - | - | 100 | | | 5 |
| Y | 02 | 18 | 1 | - | 21 | 4 | - | 2 | - | - | 44 | 2 | - | - | 920 | | | 46 |
| M | 02 | 1 | 7 | 6 | 3 | 7 | 12 | 1 | - | - | 37 | - | - | - | 740 | 45 | 43 | 37 |
| D | 02 | - | - | 1 | - | - | 3 | 1 | - | - | 3 | - | - | 2 | 100 | | | 5 |
| X | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| % Plants Showing '02 | | <u>Moderate Use</u> 22% | | | <u>Heavy Use</u> 25% | | | <u>Poor Vigor</u> 02% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | | '02 | 1760 | Dec: | 6% |
| <i>Artemisia tridentata vaseyana</i> | | | | | | | | | | | | | | | | | | |
| S | 02 | 6 | - | - | - | - | - | - | - | - | 6 | - | - | - | 120 | | | 6 |
| Y | 02 | 22 | - | 1 | - | - | - | - | - | - | 23 | - | - | - | 460 | | | 23 |
| M | 02 | 70 | 2 | 8 | 1 | - | - | - | - | - | 81 | - | - | - | 1620 | 29 | 37 | 81 |
| D | 02 | 42 | 8 | 7 | 1 | - | - | - | - | - | 40 | - | - | 18 | 1160 | | | 58 |
| X | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 400 | | | 20 |
| % Plants Showing '02 | | <u>Moderate Use</u> 06% | | | <u>Heavy Use</u> 10% | | | <u>Poor Vigor</u> 11% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | | '02 | 3240 | Dec: | 36% |
| <i>Cercocarpus montanus</i> | | | | | | | | | | | | | | | | | | |
| S | 02 | 1 | - | - | 3 | - | - | - | - | - | 4 | - | - | - | 80 | | | 4 |
| Y | 02 | 14 | 5 | - | 2 | - | - | - | - | - | 21 | - | - | - | 420 | | | 21 |
| M | 02 | 6 | 3 | 17 | - | 1 | 12 | - | - | - | 39 | - | - | - | 780 | 50 | 36 | 39 |
| D | 02 | - | - | - | - | - | 2 | - | - | - | 2 | - | - | - | 40 | | | 2 |
| X | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 |
| % Plants Showing '02 | | <u>Moderate Use</u> 15% | | | <u>Heavy Use</u> 50% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | | '02 | 1240 | Dec: | 3% |

| A G R E | Y 0 2 | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | |
|--------------------------------------------------|-------------|-----------------------------|---|---|-------------------------|---|---|--------------------------|---|---|----------------|---|---|-----|--------------------|--------------------------------|-------|----|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Chrysothamnus depressus</i> | | | | | | | | | | | | | | | | | | |
| M | 02 | 4 | 2 | - | - | - | - | - | - | - | 6 | - | - | - | 120 | 3 | 8 | 6 |
| % Plants Showing '02 | | <u>Moderate Use</u> 33% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | '02 | 120 | Dec: | - | |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | | | | | | | | | | | |
| Y | 02 | 13 | - | - | - | - | - | - | - | - | 13 | - | - | - | 260 | | | 13 |
| M | 02 | 84 | - | - | 4 | - | - | - | - | - | 88 | - | - | - | 1760 | 11 | 11 | 88 |
| D | 02 | 3 | 1 | - | 3 | - | - | - | - | - | 5 | - | - | 2 | 140 | | | 7 |
| % Plants Showing '02 | | <u>Moderate Use</u> .92% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 02% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | '02 | 2160 | Dec: | 6% | |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | | | | | | | | |
| Y | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | | 2 |
| M | 02 | 8 | - | - | - | - | - | - | - | - | 8 | - | - | - | 160 | 4 | 6 | 8 |
| D | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | | 2 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | '02 | 240 | Dec: | 17% | |
| <i>Mahonia repens</i> | | | | | | | | | | | | | | | | | | |
| M | 02 | - | - | - | 6 | - | - | - | - | - | 6 | - | - | - | 120 | - | - | 6 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | '02 | 120 | Dec: | - | |
| <i>Purshia tridentata</i> | | | | | | | | | | | | | | | | | | |
| Y | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | | 2 |
| M | 02 | - | - | 6 | - | 1 | 4 | - | - | 1 | 12 | - | - | - | 240 | 12 | 25 | 12 |
| D | 02 | - | - | 1 | - | - | 1 | - | - | - | 2 | - | - | - | 40 | | | 2 |
| % Plants Showing '02 | | <u>Moderate Use</u> 06% | | | <u>Heavy Use</u> 81% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | | | '02 | 320 | Dec: | 13% | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|-------------------------|---|---|--------------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Quercus gambelii</i> | | | | | | | | | | | | | | | | | | |
| Y | 02 | 2 | - | - | 1 | - | - | 1 | - | - | 4 | - | - | - | 80 | | 4 | |
| M | 02 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | 17 | 7 | 1 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 100 | Dec: | - | | | |
| <i>Symphoricarpos oreophilus</i> | | | | | | | | | | | | | | | | | | |
| Y | 02 | 46 | - | - | 7 | - | - | 4 | - | - | 57 | - | - | - | 1140 | | 57 | |
| M | 02 | 135 | 6 | - | 28 | - | - | 1 | - | - | 170 | - | - | - | 3400 | 15 | 25 | 170 |
| D | 02 | 5 | - | - | - | - | - | - | - | - | 2 | - | - | 3 | 100 | | 5 | |
| X | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| % Plants Showing '02 | | <u>Moderate Use</u> 03% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 01% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 4640 | Dec: | 2% | | | |
| <i>Tetradymia canescens</i> | | | | | | | | | | | | | | | | | | |
| Y | 02 | 6 | - | - | - | - | - | - | - | - | 6 | - | - | - | 120 | | 6 | |
| M | 02 | 23 | - | 4 | - | - | - | - | - | - | 27 | - | - | - | 540 | 4 | 5 | 27 |
| D | 02 | 1 | 2 | - | - | - | - | - | - | - | 3 | - | - | - | 60 | | 3 | |
| % Plants Showing '02 | | <u>Moderate Use</u> 06% | | | <u>Heavy Use</u> 11% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 720 | Dec: | 8% | | | |

Trend Study 10R-34-02

Study site name: P R Spring Enclosure Outside

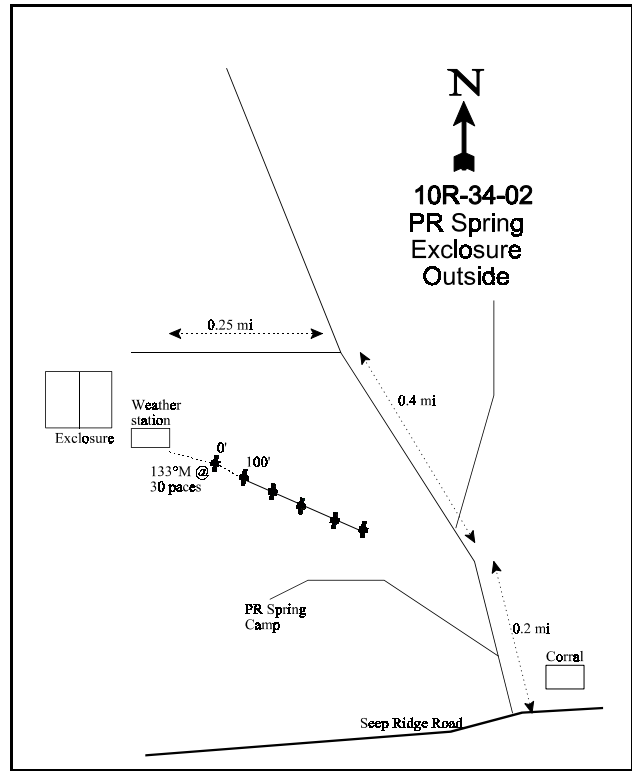
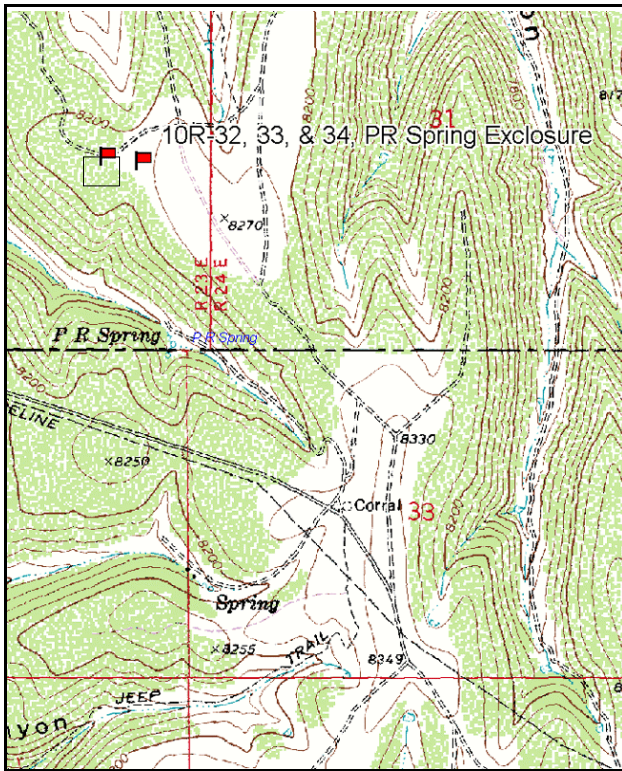
Vegetation type: Mountain Brush

Compass bearing: frequency baseline__degrees magnetic.

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

LOCATION DESCRIPTION

On the Seep Ridge Road go to the PR Spring turnoff. Travel 0.2 miles staying right (do not go down road to PR Spring and campground). Continue left 0.4 miles. Turn left once again and travel approximately 0.25 miles to a weather station then the enclosure. From the southeast corner of the weather station the 0-foot stake is 150 feet at 133 degrees magnetic. The 0-foot stake is marked by browse tag number 424.



Map Name: P R Spring

Diagrammatic Sketch

Township 15S, Range 23E, Section 36

GPS: NAD 27, UTM 12S 4369893 N 647556 E

DISCUSSION

PR Spring Exclosure Outside - Study No. 10R-34

This transect samples the mountain brush community outside of and surrounding the exclosure complex at PR Spring. This site slopes gently (5-10%) to the southwest at an elevation of about 8,000 feet. This site is accessible by all classes of animals as it lies outside the exclosure. Because this transect lies outside of the exclosure complex, it is not restricted and is a full 500 feet in length. In 2002, big game use was moderate while livestock use was light. A pellet group transect read on site estimated 31 elk days use/acre (78 edu/ha), 73 deer days use/acre (180 ddu/ha), and 14 cow days use/acre (34 cdu/ha). All cattle pats were from the grazing season of 2001, while the deer and elk pellet groups were from late winter and spring.

Soils are clay loam in texture and neutral in reactivity (pH of 6.7). Effective rooting depth along the baseline averaged nearly 13 inches. The soil profile is rocky throughout. The soil surface outside the exclosure has moderately high pedestalling around shrubs leaving the interspaces with a pitted appearance. There are many game and livestock trails transecting the site. This is where most of the bare ground is found. Vegetation and litter cover are abundant where erosion appears to be minimized, except along the trails. The erosion condition class bordered on being stable and slight in 2002.

The key browse component outside the exclosure complex contains the same species as those within both the total and livestock exclosures, but dominance levels of these species differ. Mountain big sagebrush remains abundant, but bitterbrush is more abundant outside the exclosure and serviceberry and true mountain mahogany are minor components. Mountain big sagebrush and bitterbrush provided 72% of the browse cover with estimated densities of respectively 4,180 plants/acre and 1,840 plants/acre. The mountain big sagebrush population has moderately high decadence (32%) and low recruitment (7%), but mostly light use and good vigor. Bitterbrush has been heavily utilized, but has good recruitment by young plants (22%), low decadence, and normal vigor. Serviceberry density was estimated at 1,220 plants/acre in 2002 with moderate to heavy use, good vigor, very high recruitment (66%), and low decadence. Mahogany density was estimated at 480 plants/acre with high recruitment (46%), low decadence, mostly good vigor, and moderate to heavy use. Annual leader growth for these key species was low in 2002 averaging about one inch outside the exclosure. Snowberry is also abundant outside the exclosure with an estimated 3,340 plants/acre in 2002.

As with the total and livestock exclosure transects, the understory outside has fair diversity and good composition. Three perennial grasses are particularly abundant outside the exclosure, *Carex*, mutton bluegrass, and Kentucky bluegrass. Thickspike wheatgrass is also moderately abundant. The majority of the grass plants occur underneath shrub crowns, which did not appear to have been utilized at the time of sampling in late June 2002. Forbs are diverse and well distributed throughout the site. The most abundant species include mat penstemon, longleaf phlox, rose pussytoes, Eaton fleabane, silvery lupine, and an *astragalus*. As this is summer range for wildlife, forbs are of particular importance. With the abundance of browse throughout this area, the understory could be greatly improved with a prescribed burn or other treatment to decrease the canopy and density of shrubs and favor an increase in herbaceous plants.

APPARENT TREND ASSESSMENT

Soils are well protected by vegetation and litter cover on the site, except for the areas impacted by nearby game and livestock trails. Erosion is apparent on the trails transecting the site but the condition class was determined as stable to slight overall. Soils appear stable at the present time. The browse component outside the enclosure is abundant and diverse, but currently has a relatively too high of a proportion of mountain big sagebrush. Although palatable, mountain big sagebrush is less preferred in the summer than bitterbrush, serviceberry, and mahogany, and a treatment to reduce the amount of sagebrush should be considered. Prescribed burning is a good option because most of the highly preferred browse species will resprout after fire, while most of the mountain big sagebrush would be removed. Because the herbaceous component is diverse and moderately abundant, there is an adequate seed-bank and the herbaceous understory would be greatly improved following treatment. Both the browse and herbaceous components appear stable at this time. Further increases in shrub densities and canopy cover would be negative for the herbaceous understory.

HERBACEOUS TRENDS --
Herd unit 10R, Study no: 34

| T y p e | Species | Nested Frequency | Quadrat Frequency | Average Cover % |
|-----------------------------|-------------------------------|---------------------|----------------------|--------------------|
| | | '02 | '02 | '02 |
| G | Agropyron dasystachyum | 144 | 56 | 1.09 |
| G | Agropyron spicatum | 4 | 3 | .06 |
| G | Carex spp. | 147 | 54 | 5.56 |
| G | Festuca ovina | 4 | 1 | .00 |
| G | Poa fendleriana | 189 | 62 | 4.75 |
| G | Poa pratensis | 178 | 57 | 4.47 |
| G | Poa secunda | 10 | 4 | .02 |
| G | Stipa columbiana | 3 | 1 | .38 |
| Total for Annual Grasses | | 0 | 0 | 0 |
| Total for Perennial Grasses | | 679 | 238 | 16.36 |
| Total for Grasses | | 679 | 238 | 16.36 |
| F | Agoseris glauca | 28 | 13 | .11 |
| F | Alyssum alyssoides (a) | 9 | 4 | .02 |
| F | Antennaria rosea | 26 | 9 | .93 |
| F | Androsace septentrionalis (a) | 8 | 5 | .05 |
| F | Arenaria spp. | 21 | 6 | .25 |
| F | Astragalus spp. | 30 | 16 | .49 |
| F | Astragalus utahensis | 13 | 8 | .06 |
| F | Castilleja flava | 13 | 6 | .05 |
| F | Cirsium spp. | 2 | 1 | .00 |
| F | Crepis acuminata | 9 | 5 | .05 |
| F | Erigeron eatonii | 92 | 47 | .65 |
| F | Eriogonum umbellatum | 23 | 12 | .13 |

| T y p e | Species | Nested Frequency | Quadrat Frequency | Average Cover % |
|---------------------------|--------------------------|---------------------|----------------------|--------------------|
| | | '02 | '02 | '02 |
| F | Hackelia patens | 1 | 1 | .03 |
| F | Lepidium spp. (a) | 4 | 2 | .01 |
| F | Linum lewisii | 1 | 1 | .00 |
| F | Lupinus argenteus | 43 | 24 | .54 |
| F | Microsteris gracilis (a) | 7 | 2 | .01 |
| F | Penstemon caespitosus | 129 | 54 | 1.33 |
| F | Phlox hoodii | 2 | 1 | .00 |
| F | Phlox longifolia | 129 | 58 | .98 |
| F | Polygonum douglasii (a) | 4 | 3 | .01 |
| F | Potentilla gracilis | 2 | 1 | .03 |
| F | Senecio integerrimus | 6 | 2 | .03 |
| F | Taraxacum officinale | 54 | 25 | .30 |
| F | Tragopogon dubius | 2 | 1 | .00 |
| F | Viola spp. | 2 | 1 | .03 |
| Total for Annual Forbs | | 32 | 16 | 0.10 |
| Total for Perennial Forbs | | 628 | 292 | 6.05 |
| Total for Forbs | | 660 | 308 | 6.16 |

BROWSE TRENDS --

Herd unit 10R, Study no: 34

| T y p e | Species | Strip Frequency | Average Cover % |
|------------------|----------------------------------------------|--------------------|--------------------|
| | | '02 | '02 |
| B | Amelanchier utahensis | 41 | .39 |
| B | Artemisia tridentata vaseyana | 91 | 22.69 |
| B | Cercocarpus montanus | 15 | .76 |
| B | Chrysothamnus depressus | 1 | .00 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 35 | .78 |
| B | Purshia tridentata | 63 | 2.77 |
| B | Quercus gambelii | 1 | - |
| B | Symphoricarpos oreophilus | 77 | 8.12 |
| B | Tetradymia canescens | 3 | - |
| Total for Browse | | 327 | 35.54 |

CANOPY COVER -- LINE INTERCEPT

Herd unit 10R, Study no: 34

| Species | Percent Cover '02 |
|----------------------------------------------|----------------------|
| Amelanchier utahensis | 1.08 |
| Artemisia tridentata vaseyana | 26.08 |
| Cercocarpus montanus | 1.08 |
| Chrysothamnus viscidiflorus viscidiflorus | .67 |
| Purshia tridentata | 5.00 |
| Symphoricarpos oreophilus | 8.50 |
| Tetradymia canescens | .07 |

Browse Annual Leader Growth

Herd unit 10R , Study no: 34

| Species | Average leader growth (in) '02 |
|-------------------------------|-----------------------------------|
| Amelanchier utahensis | 1.1 |
| Cercocarpus montanus montanus | 0.9 |
| Artemisia tridentata vaseyana | 0.8 |

BASIC COVER --

Herd unit 10R, Study no: 34

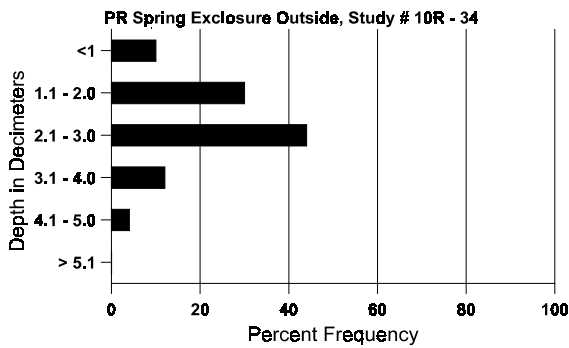
| Cover Type | Nested Frequency '02 | Average Cover % '02 |
|-------------|-------------------------|------------------------|
| Vegetation | 433 | 52.77 |
| Rock | 15 | .16 |
| Pavement | 133 | 2.59 |
| Litter | 479 | 53.15 |
| Cryptogams | 11 | .03 |
| Bare Ground | 219 | 13.12 |

SOIL ANALYSIS DATA --

Herd Unit 10R, Study no: 34, PR Spring Outside Enclosure

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %0M | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 12.93 | - | 6.8 | 35.3 | 32.7 | 32.0 | 3.6 | 14.9 | 291.2 | 0.8 |

Stoniness Index



PELLET GROUP FREQUENCY -- Herd unit 10R, Study no: 34

| Type | Quadrat Frequency '02 | Pellet Groups per Acre '02 | Days Use per Acre (ha) '02 |
|--------|-----------------------|----------------------------|----------------------------|
| Rabbit | 12 | - | - |
| Grouse | 1 | - | - |
| Elk | 24 | 409 | 31 (78) |
| Deer | 19 | 948 | 73 (180) |
| Cattle | 2 | 165 | 14 (34) |

BROWSE CHARACTERISTICS -- Herd unit 10R, Study no: 34

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|----------------------------------------------------|--------|----------------------------|----|---|----------------------|---|---|-----------------------|---|---|----------------|---|---|----|-----------------|--------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Amelanchier utahensis | | | | | | | | | | | | | | | | | | |
| S | '02 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| Y | '02 | 10 | 3 | 5 | 11 | - | - | 11 | - | - | 40 | - | - | - | 800 | | | 40 |
| M | '02 | 1 | 6 | 3 | - | - | 1 | 1 | - | - | 12 | - | - | - | 240 | 43 | 33 | 12 |
| D | '02 | - | 1 | 7 | - | - | 1 | - | - | - | 7 | - | - | 2 | 180 | | | 9 |
| X | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 80 | | | 4 |
| % Plants Showing '02 | | <u>Moderate Use</u> 16% | | | <u>Heavy Use</u> 28% | | | <u>Poor Vigor</u> 03% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) '02 | | | | | | | | | | | | | | | 1220 | Dec: | | 15% |
| Artemisia tridentata vaseyana | | | | | | | | | | | | | | | | | | |
| S | '02 | 12 | - | - | - | - | - | - | - | - | 12 | - | - | - | 240 | | | 12 |
| Y | '02 | 15 | - | - | - | - | - | - | - | - | 15 | - | - | - | 300 | | | 15 |
| M | '02 | 100 | 21 | 1 | 6 | - | - | - | - | - | 128 | - | - | - | 2560 | 31 | 38 | 128 |
| D | '02 | 51 | 8 | 4 | 3 | - | - | - | - | - | 50 | - | - | 16 | 1320 | | | 66 |
| X | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 520 | | | 26 |
| % Plants Showing '02 | | <u>Moderate Use</u> 14% | | | <u>Heavy Use</u> 02% | | | <u>Poor Vigor</u> 08% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) '02 | | | | | | | | | | | | | | | 4180 | Dec: | | 32% |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|--------------------------------------------------|--------|----------------------------|---|----|-------------------------|---|----|--------------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Cercocarpus montanus</i> | | | | | | | | | | | | | | | | | | |
| S | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| Y | 02 | 2 | 5 | - | 2 | - | - | 2 | - | - | 11 | - | - | - | 220 | | 11 | |
| M | 02 | - | 1 | 5 | - | 1 | 2 | 1 | - | 1 | 11 | - | - | - | 220 | 49 | 36 | 11 |
| D | 02 | - | 1 | 1 | - | - | - | - | - | - | - | - | - | 2 | 40 | | 2 | |
| % Plants Showing '02 | | <u>Moderate Use</u> 33% | | | <u>Heavy Use</u> 38% | | | <u>Poor Vigor</u> 08% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 480 | Dec: | 8% | | | |
| <i>Chrysothamnus depressus</i> | | | | | | | | | | | | | | | | | | |
| M | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | 2 | 3 | 2 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 40 | Dec: | - | | | |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | | | | | | | | | | | |
| Y | 02 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 140 | | 7 | |
| M | 02 | 47 | 1 | - | 1 | - | - | - | - | - | 49 | - | - | - | 980 | 14 | 17 | 49 |
| D | 02 | 7 | 2 | - | - | - | - | - | - | - | 6 | - | - | 3 | 180 | | 9 | |
| % Plants Showing '02 | | <u>Moderate Use</u> 05% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 05% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 1300 | Dec: | 14% | | | |
| <i>Purshia tridentata</i> | | | | | | | | | | | | | | | | | | |
| Y | 02 | 5 | 8 | 5 | 2 | - | - | - | - | - | 20 | - | - | - | 400 | | 20 | |
| M | 02 | 6 | 3 | 36 | 2 | 1 | 17 | - | - | 1 | 66 | - | - | - | 1320 | 14 | 25 | 66 |
| D | 02 | - | - | 3 | - | 1 | 2 | - | - | - | 5 | - | - | 1 | 120 | | 6 | |
| % Plants Showing '02 | | <u>Moderate Use</u> 14% | | | <u>Heavy Use</u> 70% | | | <u>Poor Vigor</u> 01% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 1840 | Dec: | 7% | | | |
| <i>Quercus gambelii</i> | | | | | | | | | | | | | | | | | | |
| Y | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 76 | 36 | 0 |
| % Plants Showing '02 | | <u>Moderate Use</u> 00% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '02 | 20 | Dec: | - | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total |
|------------------------------------------------|--------|----------------------------|---|----|-------------------------|---|---|--------------------------|---|---|----------------|------|------|----|--------------------|--------------------------------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | |
| <i>Symphoricarpos oreophilus</i> | | | | | | | | | | | | | | | | | |
| Y | 02 | 23 | - | - | 1 | - | - | 1 | - | - | 24 | - | - | - | 500 | | 25 |
| M | 02 | 105 | 9 | 12 | 12 | - | - | 1 | - | - | 139 | - | - | - | 2780 | 16 25 | 139 |
| D | 02 | 2 | - | 1 | - | - | - | - | - | - | 1 | - | - | 2 | 60 | | 3 |
| X | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 80 | | 4 |
| % Plants Showing '02 | | <u>Moderate Use</u> 05% | | | <u>Heavy Use</u> 08% | | | <u>Poor Vigor</u> 01% | | | <u>%Change</u> | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '02 | 3340 | Dec: | 2% | | | |
| <i>Tetradymia canescens</i> | | | | | | | | | | | | | | | | | |
| Y | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 |
| M | 02 | 1 | 1 | - | - | - | - | - | - | - | 2 | - | - | - | 40 | 8 8 | 2 |
| % Plants Showing '02 | | <u>Moderate Use</u> 33% | | | <u>Heavy Use</u> 00% | | | <u>Poor Vigor</u> 00% | | | <u>%Change</u> | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '02 | 60 | Dec: | - | | | |

PR Spring Exclosure Complex - Summary

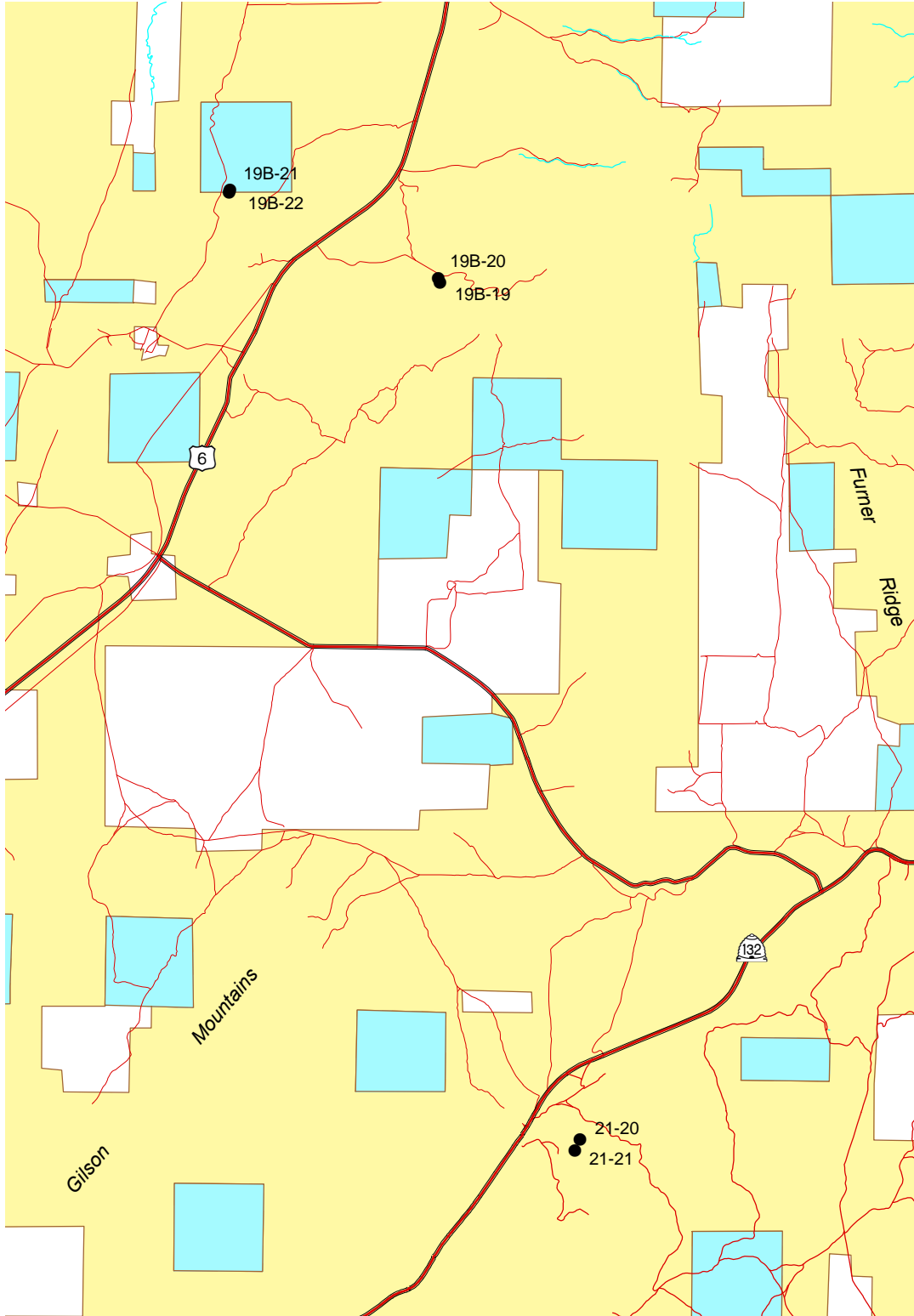
Because the exclosure complex was built only the year prior to the establishment of these transects, treatment effects cannot be determined from the data at the present time. However, the data does provide a baseline for the vegetation community sampled by these studies. Future readings will allow monitoring of changes and comparisons between the treatments to be evaluated.

It is important to point out that the exclosure complex was not built in a totally homogeneous area. The total and livestock exclosures were placed in an area where several browse species are moderately abundant. This includes large, tree-like serviceberry plants that provide an abundance of overhead canopy cover. The transect that monitors the community outside of the exclosures is much more open where mountain big sagebrush is the dominant species. Due to the dimensions of the exclosure, the transects established inside the total and livestock exclosures are only 200 feet in length, while the transect outside is 500 feet long. Some of the difference in vegetation characteristics between these studies arises from differing transect lengths as well as the heterogeneity of the vegetation community.

Basic ground cover characteristics are similar between all of the transects. Vegetation and litter cover are abundant, especially the browse component. Bare ground ranges from 16% inside the livestock exclosure to only 7% within the total exclosure. Rock and pavement are low on all the treatments.

The browse component dominates the vegetation community on all transects. Inside the total exclosure, browse accounts for 74% of the total vegetation cover. Shrubs provide about 60% of the vegetation cover both inside the livestock exclosure and outside the exclosure complex. Herbaceous species, especially forbs, are somewhat limited on these studies. Grasses provide respectively 28%, 24%, and 11% of the vegetation cover in the total exclosure, livestock exclosure, and outside the exclosure complex. Forbs provide 16% or less of the total cover on all sites.

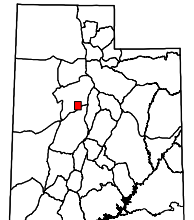
Burn Rehab Treatment Area



Map Scale 1:115,249 (1 inch = 1.8 miles)

Map Location

-  BLM
-  State of Utah
-  Private Land
-  Water Body
-  Major Road
-  Minor Road
-  Water Course



Leamington Burn Complex Special Projects

Introduction

In 1996, Utah experienced its most active, extensive, and devastating fire season in history. In Millard and Juab Counties alone, some 250,000 acres were burned. The Leamington complex was the largest burned area covering approximately 138,340 acres of mostly pinyon-juniper woodland. Rehabilitation efforts began in the fall of 1996 which included drilling the more accessible low-lying areas, with the remainder being aerially seeded and one-way chained to cover the seed and enhance establishment of the seeded species. On the Leamington complex, about 6,100 acres were treated with a rangeland drill, 10,736 acres were aerial seeded and one-way chained, and 8,308 acres were aerially seeded only. Aerially seeding and then chaining is an effective method of breaking up burned trees which provide valuable surface litter to help protect the soil from erosion and it enhances seed establishment by covering the seed. This practice was stopped temporarily because of concerns voiced by environmental and Native American groups with regard to archeological resources in the burned areas even though an archeological survey had been completed. During the summer of 1997, two study sites were established, Leamington burn and Leamington burn & chain. One was placed in a burned and seeded area, and the other established in the immediate area where it had been burned, seeded, then chained one-way. Two additional pairs of sites was established in 1998 at Paul Bunyan and near the Jericho sheep shearing sheds to monitor the same treatment effects as the Leamington sites. The purpose of these sites was to monitor the recovery of these areas following rehabilitation using seeding alone compared to seeding and chaining.

Seed Lists

Paul Bunyan Burn (19B-19) and Paul Bunyan Burn & Chain (19B-20)

Aerial Mix

| Species | Pounds of Seed | Pounds per acre |
|------------------------------------------------|----------------|-----------------|
| High Crest (<i>Agropyron cristatum</i>) | 15,100 | 4.0 |
| Rye (<i>Elymus junceus</i>) | 11,350 | 3.0 |
| Tall wheatgrass (<i>Agropyron elongatum</i>) | 7,500 | 2.0 |

Dribbler Mix

| | | |
|-------------------------------------------------|-------|-----|
| Fourwing saltbush (<i>Atriplex canescens</i>) | 3,800 | 1.0 |
|-------------------------------------------------|-------|-----|

Jericho State Section (19B-21)

Aerial Mix

| Species | Pounds per acre |
|----------------------------------------------------------|-----------------|
| High Crest (<i>Agropyron cristatum</i>) | 5 |
| Intermediate Wheatgrass (<i>Agropyron intermedium</i>) | 3 |
| Alfalfa (<i>Medicago sativa</i>) | 1 |
| Yellow Sweet Clover (<i>Melilotus officinalis</i>) | 0.5 |

Jericho BLM (19B-22)

Aerial Mix

| Species | Pounds of Seed | Pounds per acre |
|------------------------------------------------|----------------|-----------------|
| High Crest (<i>Agropyron cristatum</i>) | 6,550 | 3.1 |
| Rye (<i>Elymus junceus</i>) | 4,400 | 2.1 |
| Tall wheatgrass (<i>Agropyron elongatum</i>) | 4,250 | 2.0 |
| Smooth Brome (<i>Bromus inermis</i>) | 4,000 | 1.9 |

Dribbler Mix

| | | |
|-------------------------------------------------|-------|-----|
| Fourwing saltbush (<i>Atriplex canescens</i>) | 2,150 | 1.0 |
|-------------------------------------------------|-------|-----|

Leamington Burn (21-20) and Leamington Burn & Chain (21-21)

Aerial Mix

| Species | Pounds of seed | lbs/acre |
|------------------------------------------------|----------------|----------|
| High Crest (<i>Agropyron cristatum</i>) | 12,450 | 3.3 |
| Rye (<i>Elymus junceus</i>) | 12,450 | 3.3 |
| Tall wheatgrass (<i>Agropyron elongatum</i>) | 8,300 | 2.2 |
| Great Basin Wildrye (<i>Elymus cinereus</i>) | 2,000 | 0.53 |
| Smooth brome (<i>Bromus inermis</i>) | 600 | 0.16 |
| Alfalfa (<i>Medicago sativa</i>) | 1,200 | 0.32 |
| Small burnet (<i>Sanguisorba minor</i>) | 500 | 0.13 |

Dribbler Mix

| | | |
|-------------------------------------------------|-------|-----|
| Fourwing saltbush (<i>Atriplex canescens</i>) | 3,700 | 1.0 |
|-------------------------------------------------|-------|-----|

Trend Study 19B-19-02

Study site name: Paul Bunyan Burn .

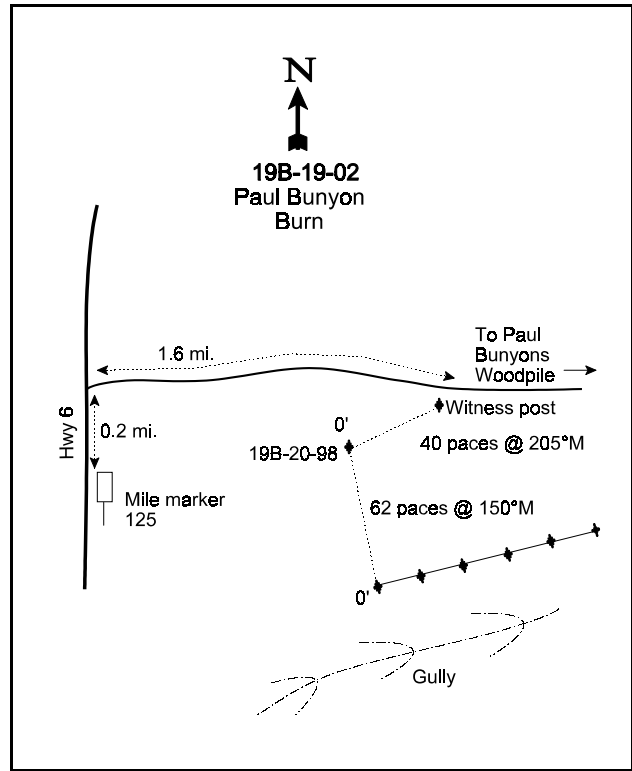
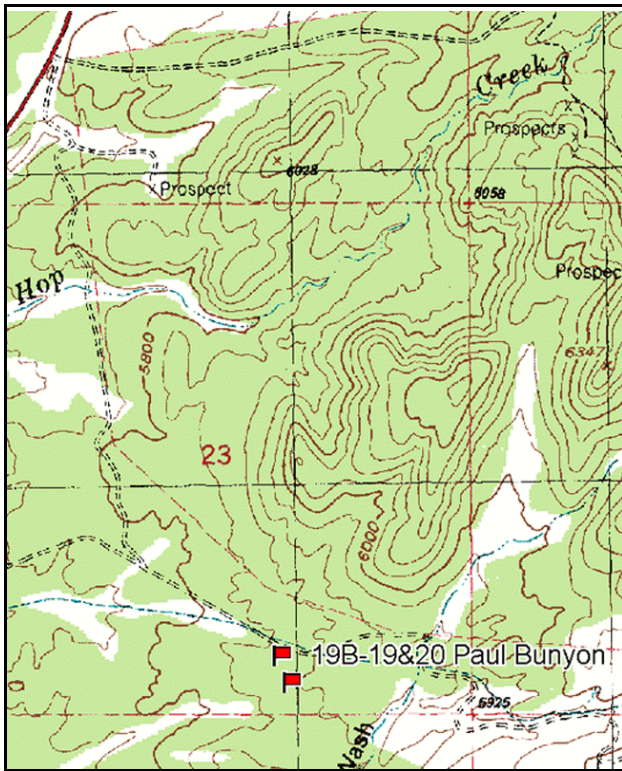
Vegetation type: Burn and Seeded .

Compass bearing: frequency baseline 68 degrees magnetic.

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

LOCATION DESCRIPTION

From Hwy 6 go 0.2 miles north of mile marker 125. Turn right (east) heading toward the Paul Bunyan Woodpile. Drive 1.6 miles to a four foot tall witness post on the right side of the road. The 0-foot stake for study 19B-20 is 40 paces at 205degrees magnetic. The 0-foot stake for 19B-19 is 62 paces at 150 degrees magnetic from the other sites' 0-foot stake. The site is marked by short green fenceposts. The 0-foot stake is marked by browse tag # 66.



Map Name: McIntyre

Diagrammatic Sketch

Township 12S, Range 3W, Section 23

GPS: NAD 27, UTM 12S 4401335 N 401959 E

DISCUSSION

Paul Bunyan Burn - Trend Study No. 19B-19

This study was established in 1998 to monitor a burned and seeded pinyon-juniper area. This site, Paul Bunyan Burn, and the adjacent Paul Bunyan Burn and Chain site (19B-20) were part of the extensive Leamington burn complex which burned approximately 138,340 acres of mostly pinyon-juniper rangelands. Rehabilitation efforts were started during the fall of 1996. This included drilling, chaining, and seeding. This site samples a burned site that was aerielly seeded and not chained. A nearby burned area that was aerielly seeded then chained is sampled by study 19B-20 to contrast the difference between the two treatments. The Paul Bunyan Burn site has a west aspect with a gentle slope of 8 to 10%. Elevation is approximately 5,900 feet. Wildlife use this site only sparingly. Deer and elk pellets have been infrequent in all readings. A pellet group transect read on site in 2002 estimated 7 deer days use/acre (18 ddu/ha) and less than 1 cow day use/acre (2 cdu/ha). No elk pellets were sampled in the transect or in any quadrats in 2002. Rabbit droppings have been fairly common in all readings.

Soil at the site is moderately deep with an effective rooting depth estimated at 14 inches. Soil texture is a sandy clay loam with a neutral pH (7.0). Rock and pavement was abundant on the soil surface with a cover value estimated at 36% in 1999. Rock and pavement cover declined to 22% in 2002. Litter cover has steadily increased on the site with each reading from an initial estimate of 16% in 1998 to nearly 46% in 2002. Stoniness index data taken from penetrometer readings shows that most rocks are concentrated under the surface between 4-12 inches in depth. Due to the sandy texture of the soil, combined with high surface pavement cover, average soil temperature was high at 70°F at a depth of almost 16 inches in 1998. Bare soil was high at nearly 40% in 1998, but has steadily declined to 24% in 2002. It is most common under burned juniper trees where little vegetation of any kind is found. Some erosion is occurring on the site but it is localized and not severe. The erosion condition class was determined as stable in 2002.

Before the 1996 fire, this site was dominated by juniper trees. Point quarter data collected on dead trees estimated a density of 331 trees/acre in 1998. Following the fire, the browse component on this site is basically non-existent. A few plants of fourwing saltbush, bitterbrush, and ephedra occur scattered around the site, but none were sampled in the density strips in 2002. Use on the few plants that are present is heavy.

Perennial grasses are the key component in the vegetation community. Because this site was seeded, but not chained, perennial grasses have been slow to develop. The benefit of chaining is that it prepares the seedbed and increases the amount of safe sites wherein seeds can germinate and become established. Perennial grasses provided only 4% average cover in 1998 and 1999, but cover increased to nearly 12% by 2002. Introduced seeded species are the most abundant, these include crested wheatgrass and Russian wildrye. Native grasses are few but include bluebunch wheatgrass, Indian ricegrass, and bottlebrush squirreltail. Cheatgrass was the most abundant grass in cover and nested frequency in 1998 and 1999. It provided 76% and 82% of the total grass cover in 1998 and 1999 respectively. Cover declined in 2002 to less than 4%, which represented only 23% of the total grass cover in 2002. Nested frequency of cheatgrass significantly increased between 1998 and 1999, but significantly decreased in 2002 with. The decline in cheatgrass cover and frequency in 2002 is due mostly to drought conditions. Grasses have been vigorous with some of the seeded species growing to a height of three feet.

Forbs are lacking, especially perennial species. Sum of nested frequency for perennial forbs has steadily decreased since the first reading. Annual forbs were moderately abundant in 2002 with pale alyssum, tumble mustard, and Russian thistle being the most abundant. No forbs were included in the aerial seed mix due to planned future spraying of the site to control noxious weeds. Mormon crickets were noted to have utilized forbs in 2002.

1998 APPARENT TREND ASSESSMENT

There is a considerable amount of bare soil on the site, but erosion does not appear to be a problem. The lack of slope plays a large role in decreased erosion on this site. The soil trend will likely improve as more herbaceous vegetation becomes established in the future. There is little browse on the site. The few fourwing saltbush encountered appear to be well established. The herbaceous understory is well established, but cheatgrass is dominant and provides 76% of the grass cover and 60% of the herbaceous cover. All of the seeded grasses contained in the seed mix are found on the site, however only crested wheatgrass and Russian wildrye occur more than occasionally. The native grasses, Indian ricegrass and bottlebrush squirreltail, are also present but rare. They were likely depleted prior to the fire due to the high juniper tree density (331 trees/acre). Forb composition is poor with weedy biennial and annual species providing most of the cover. This condition will likely improve in time.

2002 TREND ASSESSMENT

Trend for soil is slightly up. Litter cover continues to increase, while bare ground continues to decline. Erosion remains minimal. Because of the lack of browse on this site following the burn, there really is not a browse trend. There are a few fourwing saltbush, bitterbrush, and ephedra throughout the area, but they were not sampled in the density strips in 2002. The herbaceous understory has a stable trend overall. Sum of nested frequency for perennial grasses increased while that of perennial forbs declined. Crested wheatgrass and Russian wildrye are the most abundant herbaceous species at the present time. Cheatgrass significantly declined in both cover and frequency in 2002 due to drought conditions. It would be expected to return to near equal abundance with normal precipitation patterns.

TREND ASSESSMENT

soil - slightly up (4)

browse - N/A

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 19

| T y p e | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % | | |
|-----------------------------|----------------------|------------------|------------------|------------------|-------------------|-----|-----|-----------------|-------|-------|
| | | '98 | '99 | '02 | '98 | '99 | '02 | '98 | '99 | '02 |
| G | Agropyron cristatum | _a 58 | _b 74 | 93 | 25 | 34 | 40 | 1.64 | 2.61 | 7.23 |
| G | Agropyron elongatum | 7 | 7 | 9 | 3 | 3 | 4 | .33 | .19 | .61 |
| G | Agropyron spicatum | - | 3 | - | - | 1 | - | - | .00 | - |
| G | Bromus inermis | - | - | - | - | - | - | .00 | .03 | - |
| G | Bromus japonicus (a) | - | - | 4 | - | - | 2 | - | - | .03 |
| G | Bromus tectorum (a) | _a 268 | _b 395 | _a 227 | 79 | 96 | 66 | 12.52 | 20.85 | 3.51 |
| G | Elymus junceus | 27 | 22 | 26 | 9 | 9 | 11 | 1.49 | 1.32 | 2.77 |
| G | Oryzopsis hymenoides | _{ab} 4 | _a 3 | _b 6 | 2 | 2 | 4 | .21 | .45 | .74 |
| G | Sitanion hystrix | _{ab} 2 | _a - | _b 9 | 1 | - | 3 | .38 | .00 | .23 |
| Total for Annual Grasses | | 268 | 395 | 231 | 79 | 96 | 68 | 12.52 | 20.85 | 3.54 |
| Total for Perennial Grasses | | 98 | 109 | 143 | 40 | 49 | 62 | 4.06 | 4.62 | 11.60 |
| Total for Grasses | | 366 | 504 | 374 | 119 | 145 | 130 | 16.58 | 25.48 | 15.14 |

| T y p e | Species | Nestled Frequency | | | Quadrat Frequency | | | Average Cover % | | |
|---------------------------|----------------------------------|-------------------|-----------------|------------------|-------------------|-----|-----|-----------------|------|------|
| | | '98 | '99 | '02 | '98 | '99 | '02 | '98 | '99 | '02 |
| F | <i>Alyssum desertorum</i> (a) | _a 45 | _a 65 | _b 290 | 19 | 25 | 73 | .26 | .20 | 4.65 |
| F | <i>Argemone munita</i> | - | - | - | - | - | - | .30 | .03 | - |
| F | <i>Astragalus</i> spp. | 3 | - | 6 | 2 | - | 3 | .01 | - | .04 |
| F | <i>Camelina microcarpa</i> (a) | - | 8 | - | - | 3 | - | - | .30 | - |
| F | <i>Carduus nutans</i> (a) | 2 | - | - | 1 | - | - | .00 | - | - |
| F | <i>Chaenactis douglasii</i> | _b 11 | _a - | _{ab} 3 | 5 | - | 1 | .24 | - | .00 |
| F | <i>Chenopodium</i> spp. (a) | - | - | 1 | - | - | 1 | - | - | .00 |
| F | Cruciferae | _b 10 | _a - | _a - | 5 | - | - | .24 | - | - |
| F | <i>Cryptantha</i> spp. | - | - | 5 | - | - | 2 | - | - | .03 |
| F | <i>Descurainia pinnata</i> (a) | 8 | - | - | 3 | - | - | .18 | - | - |
| F | <i>Eriogonum cernuum</i> (a) | _b 16 | _{ab} 8 | _a - | 7 | 3 | - | .23 | .06 | - |
| F | <i>Gilia</i> spp. (a) | - | 2 | 1 | - | 1 | 1 | - | .00 | .00 |
| F | <i>Helianthus annuus</i> (a) | - | 2 | - | - | 1 | - | - | .00 | - |
| F | <i>Lactuca serriola</i> | _b 68 | _b 86 | _a - | 36 | 37 | - | 2.51 | 1.20 | - |
| F | <i>Lesquerella</i> spp. | - | - | 3 | - | - | 1 | .00 | - | .00 |
| F | <i>Machaeranthera canescens</i> | - | - | 1 | - | - | 1 | - | - | .00 |
| F | <i>Nicotiana attenuata</i> (a) | - | - | - | - | - | - | .00 | - | - |
| F | <i>Phlox hoodii</i> | - | - | 3 | - | - | 1 | - | - | .00 |
| F | <i>Phlox longifolia</i> | - | - | 3 | - | - | 2 | - | - | .01 |
| F | <i>Salsola iberica</i> (a) | _a 1 | _a 10 | _b 43 | 1 | 4 | 14 | .01 | .33 | .78 |
| F | <i>Senecio multilobatus</i> | - | - | 5 | - | - | 2 | - | - | .04 |
| F | <i>Sisymbrium altissimum</i> (a) | _a 4 | _a 22 | _b 86 | 2 | 12 | 25 | .31 | .49 | 2.20 |
| Total for Annual Forbs | | 76 | 117 | 421 | 33 | 49 | 114 | 1.02 | 1.40 | 7.65 |
| Total for Perennial Forbs | | 92 | 86 | 29 | 48 | 37 | 13 | 3.32 | 1.23 | 0.14 |
| Total for Forbs | | 168 | 203 | 450 | 81 | 86 | 127 | 4.34 | 2.64 | 7.80 |

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

BROWSE TRENDS --

Herd unit 19B, Study no: 19

| T y p e | Species | Strip Frequency | | | Average Cover % | | |
|------------------|---------------------------|-----------------|-----|-----|-----------------|-----|-----|
| | | '98 | '99 | '02 | '98 | '99 | '02 |
| B | <i>Atriplex canescens</i> | 2 | 0 | 0 | .03 | - | - |
| Total for Browse | | 2 | 0 | 0 | 0.03 | 0 | 0 |

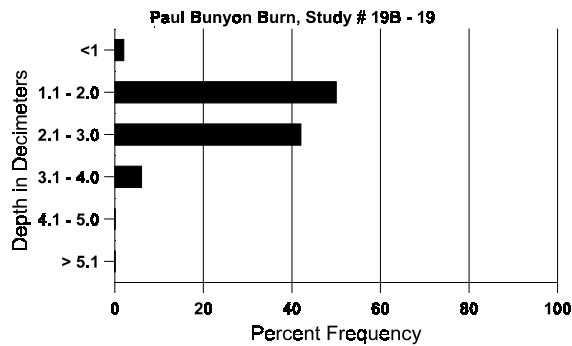
BASIC COVER --
Herd unit 19B, Study no: 19

| Cover Type | Nested Frequency | | | Average Cover % | | |
|-------------|------------------|-----|-----|-----------------|-------|-------|
| | '98 | '99 | '02 | '98 | '99 | '02 |
| Vegetation | 312 | 426 | 428 | 21.67 | 30.56 | 24.22 |
| Rock | 182 | 145 | 96 | 3.33 | 3.46 | 2.35 |
| Pavement | 461 | 395 | 373 | 32.45 | 14.92 | 19.34 |
| Litter | 460 | 459 | 480 | 15.95 | 35.60 | 45.85 |
| Cryptogams | - | - | 5 | 0 | 0 | .38 |
| Bare Ground | 415 | 371 | 372 | 39.84 | 28.43 | 23.67 |

SOIL ANALYSIS DATA --
Herd Unit 19B, Study no: 19, Paul Bunyon Burn

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | ds/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 14.0 | 70.0 (15.5) | 7.0 | 48.7 | 24.7 | 26.6 | 2.7 | 11.6 | 115.2 | 0.6 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 19B, Study no: 19

| Type | Quadrat Frequency | | | Pellet Groups per Acre '02 | Days Use per Acre (ha) '02 |
|--------|-------------------|-----|-----|----------------------------|----------------------------|
| | '98 | '99 | '02 | | |
| Rabbit | 11 | 13 | 22 | - | - |
| Elk | - | 4 | - | - | - |
| Deer | 1 | 3 | 6 | 96 | 7 (18) |
| Cattle | - | - | - | 9 | 1 (2) |

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 19

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Artemisia tridentata wyomingensis</i> | | | | | | | | | | | | | | | | | | |
| X | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '98 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '99 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |
| <i>Atriplex canescens</i> | | | | | | | | | | | | | | | | | | |
| Y | 98 | - | - | 1 | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| M | 98 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | - | - | 1 |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 44 | 62 | 0 |
| X | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '98 | | 00% | | | 50% | | | 00% | | | | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '98 | 40 | Dec: | - | | | |
| | | | | | | | | | | | | '99 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |
| <i>Chrysothamnus nauseosus albicaulis</i> | | | | | | | | | | | | | | | | | | |
| M | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 42 | 66 | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '98 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '99 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|---|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Cowania mexicana stansburiana</i> | | | | | | | | | | | | | | | | | | |
| M | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 16 | 18 | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '98 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '99 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |
| <i>Ephedra viridis</i> | | | | | | | | | | | | | | | | | | |
| M | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 27 | 44 | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '98 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '99 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |
| <i>Juniperus osteosperma</i> | | | | | | | | | | | | | | | | | | |
| X | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 380 | | | 19 |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 340 | | | 17 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '98 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '99 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |
| <i>Purshia tridentata</i> | | | | | | | | | | | | | | | | | | |
| M | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 13 | 22 | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '98 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '99 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |

Trend Study 19B-20-02

Study site name: Paul Bunyan Burn and Chain .

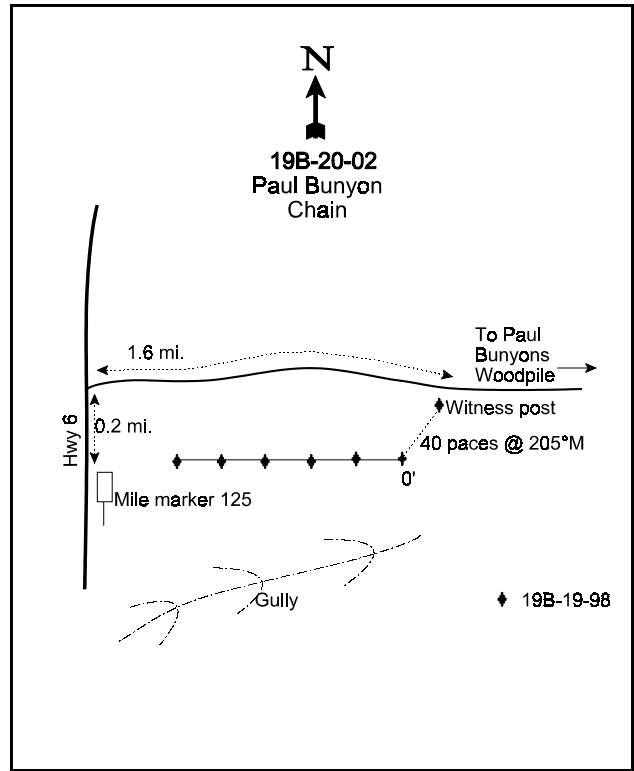
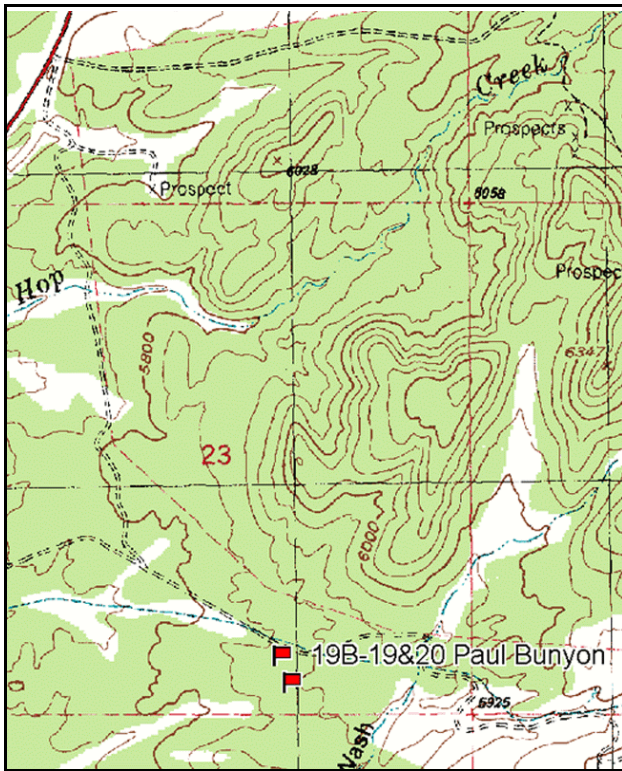
Vegetation type: Burn and Seeded .

Compass bearing: frequency baseline 268 degrees magnetic.

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

LOCATION DESCRIPTION

From Hwy 6 go 0.2 miles north of mile marker 125. Turn right heading toward the Paul Bunyan Woodpile. Drive 1.6 miles to a four foot tall witness post on the right side of the road. The 0-foot stake for this study is 40 paces at 205 degrees magnetic from the witness post. The site is marked by short green fenceposts. The 0-foot stake is marked by browse tag #74.



Map Name: McIntyre

Diagrammatic Sketch

Township 12S, Range 3W, Section 23

GPS: NAD 27, UTM 12S 4401419 N 401929 E

DISCUSSION

Paul Bunyan Burn and Chain - Trend Study No. 19B-20

This study was placed northwest of the Paul Bunyan Burn site (19B-19). Seed was aerially applied and then this site was chained one-way with an Ely chain to help cover the seed and enhance establishment of seeded species. It has a western aspect with a gentle 5% slope. Elevation is approximately 5,900 feet. A pellet group transect read on site in 1999 found no deer sign but rabbit pellets were found in moderately high numbers. Pellet group transect data collected in 2002 again sampled no deer or elk pellet groups. Due to the lack of browse throughout the area, this site is of very little use for wintering big game.

Soil on this site is very similar to the adjacent Paul Bunyan Burn site (19B-19). Effective rooting depth is estimated at 14 inches. Soil texture is a sandy clay loam with a neutral pH (7.0). Percent phosphorus is lower at just 8.9 ppm which may be limiting to plant development for values less than 10ppm can limit plant growth and development. In 1998, ground cover characteristics were similar to those on the burned only site, except pavement cover which was lower and bare ground that was higher. In 2002, vegetation and bare ground remained stable compared to the 1999 data, while litter cover increased. There is little sign of erosion on the site. The erosion condition class was determined as stable in 2002.

Seeded fourwing saltbush was applied with a seed dribbler which dropped seed over the tracks of the bulldozers as they pulled the chain over the site. Density of fourwing saltbush was estimated at 280 plants/acre in 1998, 240 plants/acre in 1999, and 160 plants/acre in 2002. The decline in density is due to the loss of the young age class in 2002. Fourwing plants were vigorous in 1998, but with drought in 2002, poor vigor was displayed by 63% of the remaining population and decadence was high at 63%. Other palatable browse on the site include a few scattered plants of green ephedra, white-stemmed rubber rabbitbrush, Stansbury cliffrose, and bitterbrush.

The herbaceous understory was much quicker to develop on this site compared to the burn and unchained site. Crested wheatgrass, Russian wildrye, and tall wheatgrass were all represented well in the first reading in 1998. Cheatgrass brome was also abundant during the initial reading with the highest nested frequency value of any species. Crested wheatgrass and tall wheatgrass have remained at stable frequencies since 1998, but Russian wildrye has significantly decreased with the drought. Cheatgrass was stable in nested frequency between 1998 and 1999, but with drought in 2002, significantly declined. Cheatgrass cover also declined in 2002. Native perennial grasses have been rare in all samples. In 2002, crested wheatgrass, tall wheatgrass, and Russian wildrye accounted for 83% of the total grass cover on the site. Forbs are lacking on the chained site as was the case with the unchained site. In 1998, total forb cover was actually higher on the unchained site, but composition was similar and only prickly lettuce and tumble mustard were common. In 2002, sum of nested frequency for perennial forbs declined.

1998 APPARENT TREND ASSESSMENT

Percent bare ground is abundant, but significant erosion does not appear to be occurring. Vegetation cover is well dispersed and consists mostly of perennial grasses. The soil trend will improve as more herbaceous vegetation becomes established. The seeded fourwing saltbush has established well with a density of 280 plants/acre. These are vigorous and age class composition indicates an expanding population with young plants accounting for half of the population. The herbaceous understory is well established and will most likely increase in the future. Perennial seeded grasses are abundant and robust. Native grasses are also present in small numbers. Cheatgrass has similar nested frequency values compared to the unchained site, but cover is one-third lower (12.5% vs 4.4%). The vigorous perennial grasses appear to be suppressing cheatgrass. Forbs are infrequent with a similar poor composition compared to the unchained site. Composition will likely change in the future with some of the weedy species dying out. However, there will probably never be a good forb component due to the lack of an adequate seed bank. Forbs were not included in the seeding mix because of the possibility of future spraying to kill noxious weeds.

2002 TREND ASSESSMENT

Trend for soil is stable. Ground cover estimates are similar to the 1999 levels. Litter cover slightly increased in 2002. Erosion remains minimal and the erosion condition class was determined as stable. Trend for browse is down. Fourwing saltbush seemed to have established quite well in 1998, but density has decreased with the loss of the young age class in 2002. Poor vigor and decadence are high as well at 63%. It appears that the browse component will be minimal and provide very little winter forage for big game in the future. The herbaceous understory has a stable trend. Perennial grasses are maintaining themselves on the site, and cheatgrass has significantly decreased in nested frequency. Forbs remain sparse and unimportant.

TREND ASSESSMENT

soil - stable (3)

browse - down (1)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 20

| T y p e | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % | | |
|-----------------------------|----------------------------------|------------------|------------------|------------------|-------------------|-----|-----|-----------------|-------|-------|
| | | '98 | '99 | '02 | '98 | '99 | '02 | '98 | '99 | '02 |
| G | <i>Agropyron cristatum</i> | 133 | 139 | 158 | 52 | 53 | 60 | 7.22 | 8.46 | 12.64 |
| G | <i>Agropyron elongatum</i> | 52 | 44 | 47 | 24 | 22 | 18 | 2.69 | 2.12 | 2.34 |
| G | <i>Agropyron spicatum</i> | 9 | 13 | 14 | 3 | 6 | 4 | .56 | .78 | 1.44 |
| G | <i>Bromus tectorum</i> (a) | _b 270 | _b 265 | _a 124 | 84 | 76 | 43 | 4.39 | 5.38 | 2.13 |
| G | <i>Elymus junceus</i> | _b 78 | _a 24 | _a 33 | 32 | 11 | 18 | 3.87 | .45 | 3.65 |
| G | <i>Oryzopsis hymenoides</i> | - | - | 2 | - | - | 1 | - | - | .06 |
| G | <i>Poa secunda</i> | - | 7 | - | - | 4 | - | - | .02 | - |
| G | <i>Sitanion hystrix</i> | 4 | 4 | - | 3 | 1 | - | .21 | .01 | .00 |
| Total for Annual Grasses | | 270 | 265 | 124 | 84 | 76 | 43 | 4.39 | 5.38 | 2.13 |
| Total for Perennial Grasses | | 276 | 231 | 254 | 114 | 97 | 101 | 14.56 | 11.86 | 20.16 |
| Total for Grasses | | 546 | 496 | 378 | 198 | 173 | 144 | 18.95 | 17.24 | 22.29 |
| F | <i>Alyssum desertorum</i> (a) | _a 13 | _a 27 | _b 122 | 5 | 10 | 38 | .19 | .10 | .38 |
| F | <i>Antennaria rosea</i> | - | - | 3 | - | - | 1 | - | - | .00 |
| F | <i>Astragalus calycosus</i> | 10 | 6 | 7 | 4 | 4 | 3 | .09 | .04 | .04 |
| F | <i>Calochortus nuttallii</i> | 2 | - | - | 1 | - | - | .00 | - | - |
| F | <i>Chaenactis douglasii</i> | 4 | - | 1 | 2 | - | 1 | .03 | - | .00 |
| F | <i>Cryptantha</i> spp. | 3 | 7 | - | 1 | 2 | - | .00 | .01 | - |
| F | <i>Gilia</i> spp. (a) | 3 | 1 | - | 1 | 1 | - | .00 | .00 | - |
| F | <i>Lactuca serriola</i> | _b 35 | _b 49 | _a 11 | 19 | 18 | 4 | .58 | .36 | .19 |
| F | <i>Lesquerella</i> spp. | 1 | - | 1 | 1 | - | 1 | .01 | - | .00 |
| F | <i>Lomatium</i> spp. | 3 | - | - | 1 | - | - | .03 | - | - |
| F | <i>Phlox hoodii</i> | 2 | - | 2 | 1 | - | 1 | .00 | - | .15 |
| F | <i>Phlox longifolia</i> | _a - | _a - | _b 11 | - | - | 5 | - | - | .02 |
| F | <i>Salsola iberica</i> (a) | _a 1 | _{ab} 14 | _b 21 | 1 | 7 | 9 | .03 | .09 | .22 |
| F | <i>Sisymbrium altissimum</i> (a) | _b 20 | _a 2 | _a - | 12 | 1 | - | .32 | .07 | - |
| F | <i>Streptanthus cordatus</i> | 9 | - | 1 | 3 | - | 1 | .06 | - | .01 |

| Type | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % | | |
|------|---------------------------|------------------|-----|-----|-------------------|-----|-----|-----------------|------|------|
| | | '98 | '99 | '02 | '98 | '99 | '02 | '98 | '99 | '02 |
| | Total for Annual Forbs | 37 | 44 | 143 | 19 | 19 | 47 | 0.55 | 0.27 | 0.60 |
| | Total for Perennial Forbs | 69 | 62 | 37 | 33 | 24 | 17 | 0.83 | 0.41 | 0.42 |
| | Total for Forbs | 106 | 106 | 180 | 52 | 43 | 64 | 1.38 | 0.68 | 1.03 |

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

BROWSE TRENDS --

Herd unit 19B, Study no: 20

| Type | Species | Strip Frequency | | | Average Cover % | | |
|------|------------------------------------------------------------|-----------------|-----|-----|-----------------|------|------|
| | | '98 | '99 | '02 | '98 | '99 | '02 |
| B | <i>Atriplex canescens</i> | 14 | 11 | 8 | .63 | .73 | .48 |
| B | <i>Chrysothamnus viscidiflorus</i> <i>viscidiflorus</i> | 1 | 0 | 1 | - | - | - |
| B | <i>Ephedra viridis</i> | 0 | 1 | 0 | - | - | - |
| | Total for Browse | 15 | 12 | 9 | 0.63 | 0.73 | 0.48 |

BASIC COVER --

Herd unit 19B, Study no: 20

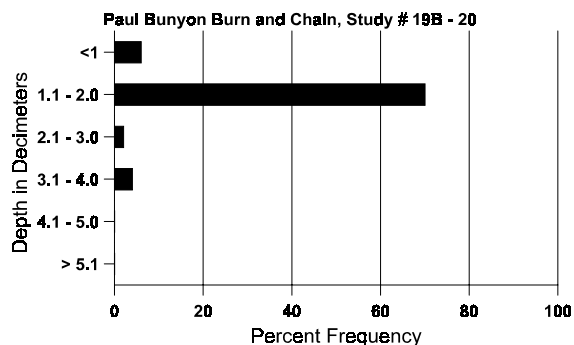
| Cover Type | Nested Frequency | | | Average Cover % | | |
|-------------|------------------|-----|-----|-----------------|-------|-------|
| | '98 | '99 | '02 | '98 | '99 | '02 |
| Vegetation | 345 | 359 | 338 | 21.46 | 24.41 | 24.92 |
| Rock | 207 | 167 | 160 | 4.19 | 4.36 | 3.43 |
| Pavement | 446 | 423 | 394 | 17.03 | 16.23 | 20.65 |
| Litter | 465 | 463 | 472 | 13.75 | 26.82 | 37.07 |
| Bare Ground | 469 | 401 | 381 | 49.65 | 32.64 | 30.29 |

SOIL ANALYSIS DATA --

Herd Unit 19B, Study no: 20, Paul Bunyon Burn and Chain

| Effective rooting depth (inches) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | ds/m |
|----------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 13.9 | 69.0 (14.5) | 7.0 | 48.4 | 25.1 | 26.6 | 2.7 | 8.9 | 134.4 | 0.6 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19B, Study no: 20

| Type | Quadrat Frequency | | | Pellet Groups per Acre '02 | Days Use per Acre (ha) '02 |
|--------|-------------------|-----|-----|----------------------------|----------------------------|
| | '98 | '99 | '02 | | |
| Rabbit | 3 | 8 | 13 | - | - |
| Horse | - | - | 1 | - | - |
| Elk | - | 8 | - | - | - |
| Deer | - | - | 3 | - | - |

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 20

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | | | | | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|---|-------------------|--------------------------|----------------|---|---|---|-----|--|---|
| | | 1 | 2 | 3 | 4 | | | | | | | | | |
| <i>Artemisia tridentata wyomingensis</i> | | | | | | | | | | | | | | |
| X | '98 | - | - | - | - | - | - | - | - | - | - | 120 | | 6 |
| | '99 | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | '02 | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | | | |
| '98 | | 00% | | 00% | | 00% | | | | | | | | |
| '99 | | 00% | | 00% | | 00% | | | | | | | | |
| '02 | | 00% | | 00% | | 00% | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '98 | 0 | Dec: | - | | | | | |
| | | | | | | '99 | 0 | | - | | | | | |
| | | | | | | '02 | 0 | | - | | | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total | |
|--------------------------------------------------|----------------------------|---------------------|---|------------------|---|--------------------|--------------------------------|----------------|-------|-------|
| | | 1 | 2 | 3 | 4 | | 1 | 2 | | |
| <i>Atriplex canescens</i> | | | | | | | | | | |
| S | 98 | 1 | - | - | - | - | - | - | 1 | 1 |
| | 99 | - | - | - | 1 | - | - | - | 1 | 1 |
| | 02 | - | - | - | - | - | - | - | 0 | 0 |
| Y | 98 | 7 | - | - | - | - | - | - | 140 | 7 |
| | 99 | 3 | - | - | - | - | - | - | 60 | 3 |
| | 02 | - | - | - | - | - | - | - | 0 | 0 |
| M | 98 | 7 | - | - | - | - | - | - | 140 | 31 35 |
| | 99 | 8 | - | - | - | - | - | - | 160 | 28 31 |
| | 02 | 2 | 1 | - | - | - | - | - | 60 | 36 43 |
| D | 98 | - | - | - | - | - | - | - | 0 | 0 |
| | 99 | 1 | - | - | - | - | - | - | 20 | 1 |
| | 02 | 5 | - | - | - | - | - | 5 | 100 | 5 |
| X | 98 | - | - | - | - | - | - | - | 0 | 0 |
| | 99 | - | - | - | - | - | - | - | 0 | 0 |
| | 02 | - | - | - | - | - | - | - | 40 | 2 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | |
| '98 | | 00% | | 00% | | 00% | | -14% | | |
| '99 | | 00% | | 00% | | 00% | | -33% | | |
| '02 | | 13% | | 00% | | 63% | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '98 | 280 | Dec: | 0% | |
| | | | | | | '99 | 240 | | 8% | |
| | | | | | | '02 | 160 | | 63% | |
| <i>Chrysothamnus nauseosus albicaulis</i> | | | | | | | | | | |
| M | 98 | - | - | - | - | - | - | - | 0 | - - |
| | 99 | - | - | - | - | - | - | - | 0 | - - |
| | 02 | - | - | - | - | - | - | - | 0 | 33 60 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | |
| '98 | | 00% | | 00% | | 00% | | | | |
| '99 | | 00% | | 00% | | 00% | | | | |
| '02 | | 00% | | 00% | | 00% | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '98 | 0 | Dec: | - | |
| | | | | | | '99 | 0 | | - | |
| | | | | | | '02 | 0 | | - | |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | | | |
| M | 98 | 1 | - | - | - | - | - | - | 20 | - - |
| | 99 | - | - | - | - | - | - | - | 0 | - - |
| | 02 | 1 | - | - | - | - | - | - | 20 | 16 31 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | |
| '98 | | 00% | | 00% | | 00% | | | | |
| '99 | | 00% | | 00% | | 00% | | | | |
| '02 | | 00% | | 00% | | 00% | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '98 | 20 | Dec: | - | |
| | | | | | | '99 | 0 | | - | |
| | | | | | | '02 | 20 | | - | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total |
|------------------------------------------------|----------------------------|---------------------|---|------------------|---|--------------------|--------------------------------|----------------|
| | | 1 | 2 | 3 | 4 | | | |
| <i>Cowania mexicana stansburiana</i> | | | | | | | | |
| M | 98 | - | - | - | - | - | - | 0 |
| | 99 | - | - | - | - | - | - | 0 |
| | 02 | - | - | - | - | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> |
| '98 | | 00% | | 00% | | 00% | | |
| '99 | | 00% | | 00% | | 00% | | |
| '02 | | 00% | | 00% | | 00% | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '98 | 0 | Dec: - |
| | | | | | | '99 | 0 | - |
| | | | | | | '02 | 0 | - |
| <i>Ephedra viridis</i> | | | | | | | | |
| Y | 98 | - | - | - | - | - | - | 0 |
| | 99 | 1 | - | - | - | - | - | 20 |
| | 02 | - | - | - | - | - | - | 0 |
| M | 98 | - | - | - | - | - | - | 0 |
| | 99 | - | - | - | - | - | - | 0 |
| | 02 | - | - | - | - | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> |
| '98 | | 00% | | 00% | | 00% | | |
| '99 | | 00% | | 00% | | 00% | | |
| '02 | | 00% | | 00% | | 00% | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '98 | 0 | Dec: - |
| | | | | | | '99 | 20 | - |
| | | | | | | '02 | 0 | - |
| <i>Juniperus osteosperma</i> | | | | | | | | |
| X | 98 | - | - | - | - | - | - | 360 |
| | 99 | - | - | - | - | - | - | 220 |
| | 02 | - | - | - | - | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> |
| '98 | | 00% | | 00% | | 00% | | |
| '99 | | 00% | | 00% | | 00% | | |
| '02 | | 00% | | 00% | | 00% | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '98 | 0 | Dec: - |
| | | | | | | '99 | 0 | - |
| | | | | | | '02 | 0 | - |
| <i>Purshia tridentata</i> | | | | | | | | |
| M | 98 | - | - | - | - | - | - | 0 |
| | 99 | - | - | - | - | - | - | 0 |
| | 02 | - | - | - | - | - | - | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> |
| '98 | | 00% | | 00% | | 00% | | |
| '99 | | 00% | | 00% | | 00% | | |
| '02 | | 00% | | 00% | | 00% | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '98 | 0 | Dec: - |
| | | | | | | '99 | 0 | - |
| | | | | | | '02 | 0 | - |

Summary and Comparison of Paul Bunyan Burn (19B-19) and Paul Bunyan Burn & Chain (19B-20)

Studies 19B-19 and 19B-20 were established in 1998 to monitor the recovery of the vegetation community on two treatments following a wildfire. Both of these studies were aerially seeded, with study 19B-20 being one-way chained following the seeding with an Ely chain. These studies were paired to compare differences in restoration efforts between seeding only (19B-19) and seeding followed by one-way chaining (19B-20) to cover the seed and enhance establishment of the seeded species. Both sites were seeded with the same seed mix.

The most important comparisons that can be made between these sites is with the establishment and persistence of the herbaceous species since the treatments. Grasses have developed into the major component of the vegetation community on these studies. During the initial reading in 1998, perennial grasses were more abundant in sum of nested frequency and average cover on the seeded and chained site compared to the unchained site (Figures 1 and 2).

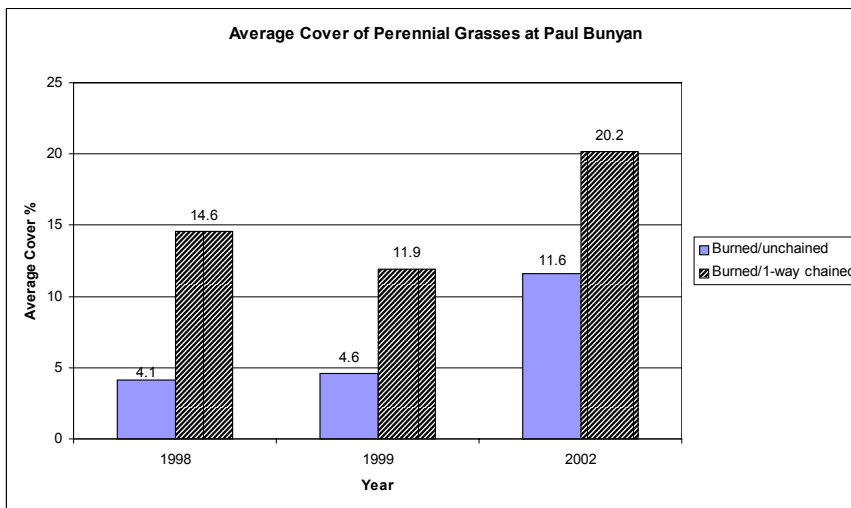


Figure 1. A comparison of percent cover values for perennial grasses from 1998-2002 on the Paul Bunyan fire rehabilitation studies.

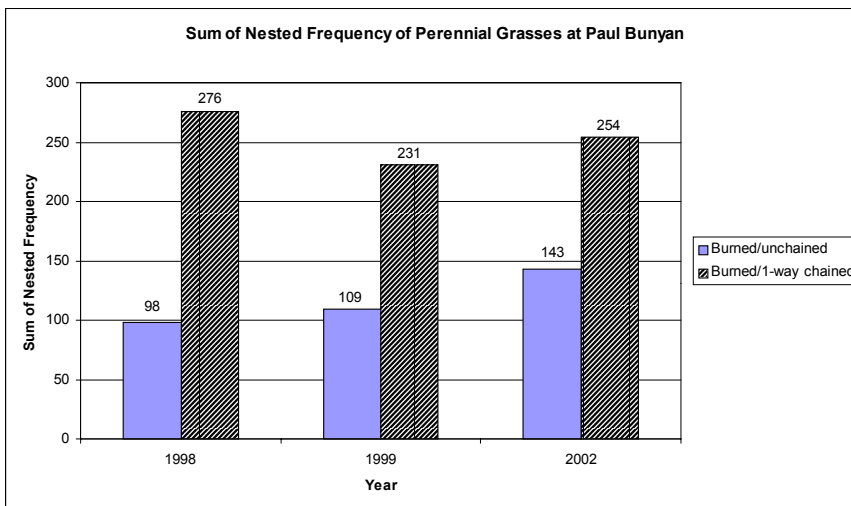


Figure 2. A comparison of sum of nested frequency values for perennial grasses from 1998-2002 on the Paul Bunyan fire rehabilitation studies.

During the first reading, perennial grasses provided more than three times the amount of cover on the site that was seeded and one-way chained. Sum of nested frequency for all perennial grasses combined was nearly three times higher on the chained site as well. In 2002, five years after the treatments were conducted, perennial grasses still provide nearly twice the amount of cover and sum of nested frequency on the site that was seeded and chained compared to the site that was only seeded.

Cheatgrass provided more average cover on the unchained site in 1998, although nested frequency was nearly identical between the two treatments (Figures 3 and 4). In 1999 and 2002, cheatgrass cover and nested frequency was higher on the unchained site. The abundance of cheatgrass on both sites was less in 2002 due to continuing drought conditions.

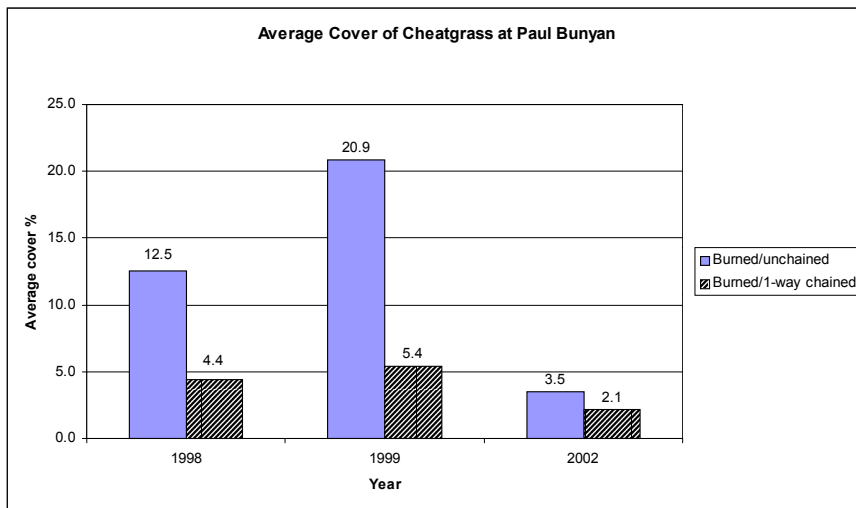


Figure 3. A comparison of percent cover values for cheatgrass from 1998-2002 on the Paul Bunyan fire rehabilitation studies.

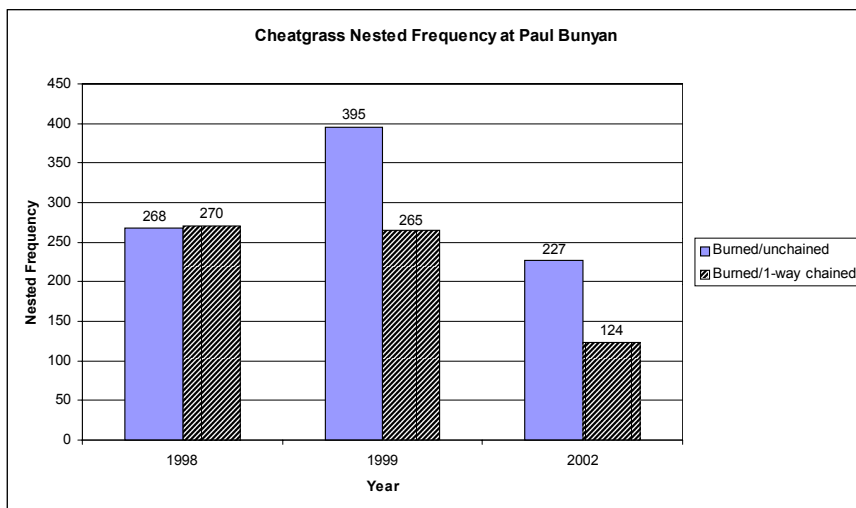


Figure 4. A comparison of cheatgrass nested frequency values from 1998-2002 on the Paul Bunyan fire rehabilitation studies.

The best way to control cheatgrass abundance is to have a healthy and abundant perennial understory. The data from these studies is consistent with this idea. There was less cheatgrass on the chained and seeded site, both initially and five years following treatment. Perennial grasses established better where the chain was used to prepare the seedbed compared to seeding the site and doing nothing to prepare the seedbed.

Both the forb and browse components are sparse and relatively unimportant on these sites. Forbs were not included in the seed mix because of the threat of noxious weed invasion and the possibility of needing to use herbicides following treatment. The browse component was dominated by juniper prior to the burn resulting in a depleted native seedbank of herbaceous and shrub species. Most of the vegetative community at the present time is made up of non-native seeded species which will likely continue in the future. These sites have very little use for wildlife due to the minimal amount of palatable browse for winter forage.

DISCUSSION

Jericho State Section - Trend Study No. 19B-21

This study is located in Tintic Valley west of U.S. Highway 6, and north of the old Jericho sheep shearing sheds. It samples a burned sagebrush flat just east of the railroad tracks. The area was part of the extensive Leamington burn complex of 1996. The site is nearly level with a slight southwest aspect. Elevation is approximately 5,400 feet. The site once supported a dense stand of basin big sagebrush. The fire burned very hot and eliminated all of the sagebrush from the site. Burned sagebrush stems, counted in 1998, provide an estimated pre-burn density of 5,600 plants/acre. Low hills surround the site which once contained a mixture of sagebrush and juniper. This study samples a section of land owned by the State of Utah that was aerially seeded with crested wheatgrass, intermediate wheatgrass, alfalfa, and yellow sweet clover after the fire. The site was not chained to cover the seed. In 1998, pellet group data demonstrated little rabbit use and sign of only a few trespass cattle. A pellet group transect read on site in 2002 estimated 64 sheep days use/acre (159 sdu/ha). No wildlife droppings were sampled in the transect, deer pellets were sampled in only three quadrats.

Soil on the site is fairly deep with an effective rooting depth of 16 inches. Texture is a loam with very little rock or pavement on the surface. Rock is also uncommon in the soil profile. The soil is neutral in reactivity with a pH of 7.1. Soil temperature was quite high averaging 67°F at a depth of almost 18 inches in 1998. Phosphorus may be limiting at only 3.8 ppm as 10 ppm is thought to be minimal for normal plant growth and development. Bare ground was abundant in both 1998 and 2002 averaging almost 60% over the site. In 1998, the soil surface had large cracks present indicating the existence of shrink-swell clays. This surface characteristic likely enhanced the establishment of seeded grasses and forbs by providing safe sites for establishment. Erosion is not a problem on the site due to the abundant herbaceous cover combined with the nearly level terrain. Some shallow gullies found on the site indicate some erosion occurred in the past but these channels are now filled with grasses and forbs. The erosion condition class was determined as stable in 2002.

Following the wildfire, no surviving shrubs have been sampled on the site, and none were included within the seed mix. Unless another treatment is done to seed shrubs into the site, this area will likely be devoid of browse for the distant future.

In 1998, the herbaceous understory consisted of nearly equal amounts of grasses and forbs. Both classes of plants provided over 20% average cover on the site. Grass composition is dominated by seeded grasses, primarily crested wheatgrass. Intermediate wheatgrass was also abundant in 1998, but has significantly decreased in both frequency and cover since. Cheatgrass brome, which was abundant in 1998, decreased significantly in nested frequency and cover in 2002 due to drought and an increasing perennial grass component. Native grasses include western wheatgrass, Indian ricegrass, and bottlebrush squirreltail, but all occur infrequently.

The forb component has low diversity. Two species, yellow sweet clover and alfalfa, totally dominated the forb component in 1998 by providing 94% of the forb cover. These plants were large and very vigorous. In 1998, grasshoppers were abundant on the site and had apparently selectively eaten all of the yellow sweet clover leaves, while alfalfa was not utilized. In 2002, yellow sweet clover was not sampled, while alfalfa remained stable in nested frequency, but declined in cover by nearly one-half (12% to 7%). Perennial grasses and forbs declined in sum of nested frequency in 2002 with much of this being attributed to drought conditions. Mormon crickets were also abundant on the site in 2002, and were noted as having heavily utilized the alfalfa on the site.

1998 APPARENT TREND ASSESSMENT

The soil appears stable with no apparent erosion occurring. Trend for soil will improve with increased litter and vegetative cover. There are no shrubs on the site or in the general vicinity except on the adjacent Jericho BLM site (19B-21) which was seeded with fourwing saltbush. Shrubs will take many years to establish on the site due to a lack of a nearby seed source. The herbaceous understory is well established with an almost equal amount of grass and forb cover. Seeded grasses are abundant and will likely increase in the few next years until competition becomes more acute. The composition of forbs will likely change in a few years as yellow sweet clover, a short-lived biannual forb, becomes less abundant. However, alfalfa appears to be well established and should persist unless subjected to overutilization by livestock. The abundance of perennial grasses and forbs appears to be keeping cheatgrass suppressed. Nested frequency is fairly high at 247, but cover is only 6%.

2002 TREND ASSESSMENT

Trend for soil is stable. Bare ground remains very high at nearly 60%. Vegetative cover decreased, but litter cover increased by nearly the same magnitude. Erosion is low and the small gullies throughout the site are not active. There is no browse trend for this site as this component is non-existent. The herbaceous understory has a slightly downward trend. Sum of nested frequency for perennial grasses slightly declined, while that of perennial forbs is only about one-half of the 1998 level. The drastic decline in forbs is not surprising with the drought, and occurred on most of the sites in the Vernon management unit in 2002 combined with utilization by Mormon crickets. As was reported in 1998, yellow sweet clover, a short-lived species, was not sampled in 2002. Alfalfa remains stable in frequency, but had greatly reduced vigor due to drought and conditions.

TREND ASSESSMENT

soil - stable (3)

browse - N/A

herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 21

| Type | Species | Nested Frequency | | Quadrat Frequency | | Average Cover % | |
|-----------------------------|-----------------------|------------------|-----------------|-------------------|-----|-----------------|-------|
| | | '98 | '02 | '98 | '02 | '98 | '02 |
| G | Agropyron cristatum | 250 | 292 | 78 | 89 | 9.84 | 15.13 |
| G | Agropyron intermedium | _b 159 | _a 41 | 58 | 19 | 6.69 | 1.22 |
| G | Agropyron smithii | _a - | _b 45 | - | 18 | - | .27 |
| G | Bromus tectorum (a) | _b 247 | _a 37 | 69 | 16 | 5.99 | .47 |
| G | Elymus junceus | - | 5 | - | 2 | - | .30 |
| G | Oryzopsis hymenoides | 4 | 6 | 1 | 3 | .03 | .33 |
| G | Sitanion hystrix | _b 18 | _a - | 10 | - | .79 | - |
| Total for Annual Grasses | | 247 | 37 | 69 | 16 | 5.99 | 0.47 |
| Total for Perennial Grasses | | 431 | 389 | 147 | 131 | 17.36 | 17.26 |
| Total for Grasses | | 678 | 426 | 216 | 147 | 23.35 | 17.74 |

| Type | Species | Nested Frequency | | Quadrat Frequency | | Average Cover % | |
|---------------------------|---------------------------|------------------|----------------|-------------------|-----|-----------------|------|
| | | '98 | '02 | '98 | '02 | '98 | '02 |
| F | Alyssum desertorum (a) | 13 | 10 | 4 | 5 | .19 | .02 |
| F | Astragalus spp. | 3 | - | 1 | - | .03 | - |
| F | Descurainia pinnata (a) | 3 | - | 1 | - | .00 | - |
| F | Erigeron spp. | 2 | - | 2 | - | .15 | - |
| F | Melilotus officinalis | _b 93 | _a - | 40 | - | 8.05 | - |
| F | Medicago sativa | 175 | 164 | 76 | 66 | 12.24 | 6.72 |
| F | Phlox hoodii | 2 | - | 1 | - | .15 | - |
| F | Phlox longifolia | 2 | - | 1 | - | .03 | - |
| F | Potentilla gracilis | 1 | - | 1 | - | .15 | - |
| F | Sisymbrium altissimum (a) | 10 | - | 4 | - | .49 | - |
| F | Sphaeralcea coccinea | 2 | 2 | 2 | 2 | .03 | .01 |
| Total for Annual Forbs | | 26 | 10 | 9 | 5 | 0.68 | 0.02 |
| Total for Perennial Forbs | | 280 | 166 | 124 | 68 | 20.84 | 6.73 |
| Total for Forbs | | 306 | 176 | 133 | 73 | 21.53 | 6.75 |

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

BASIC COVER --

Herd unit 19B, Study no: 21

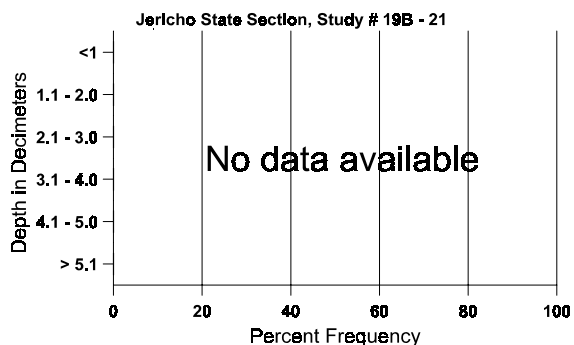
| Cover Type | Nested Frequency | | Average Cover % | |
|-------------|------------------|-----|-----------------|-------|
| | '98 | '02 | '98 | '02 |
| Vegetation | 429 | 355 | 41.50 | 26.00 |
| Rock | 33 | 15 | .13 | .06 |
| Pavement | 219 | 272 | .80 | .84 |
| Litter | 468 | 478 | 10.19 | 27.91 |
| Cryptogams | - | 64 | 0 | .31 |
| Bare Ground | 456 | 465 | 56.47 | 59.64 |

SOIL ANALYSIS DATA --

Herd Unit 19B, Study no: 21, Jericho State Section

| Effective rooting depth (inches) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | ds/m |
|----------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 16.1 | 67.0 (17.5) | 7.1 | 44.0 | 31.1 | 24.9 | 0.9 | 3.8 | 278.4 | 0.6 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19B, Study no: 21

| Type | Quadrat Frequency | | Pellet Groups per Acre '02 | Days Use per Acre (ha) '02 |
|--------|-------------------|-----|----------------------------|----------------------------|
| | '98 | '02 | | |
| Sheep | - | 16 | 835 | 64 (159) |
| Rabbit | 2 | 2 | - | - |
| Deer | - | 3 | - | - |

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 21

| A G R E | Y | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total |
|------------------------------------------------|-----|----------------------------|---|---|------------------|---|---|-------------------|---|---|-------------|----------------|---|------|-----------------|--------------------------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | |
| <i>Artemisia tridentata tridentata</i> | | | | | | | | | | | | | | | | | |
| X | '98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 5600 | | 280 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | | <u>%Change</u> | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '98 | 0 | Dec: | - | | |
| | | | | | | | | | | | | '02 | 0 | | - | | |
| <i>Opuntia spp.</i> | | | | | | | | | | | | | | | | | |
| X | '98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | 2 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | | <u>%Change</u> | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '98 | 0 | Dec: | - | | |
| | | | | | | | | | | | | '02 | 0 | | - | | |

Trend Study 19B-22-02

Study site name: Jericho BLM.

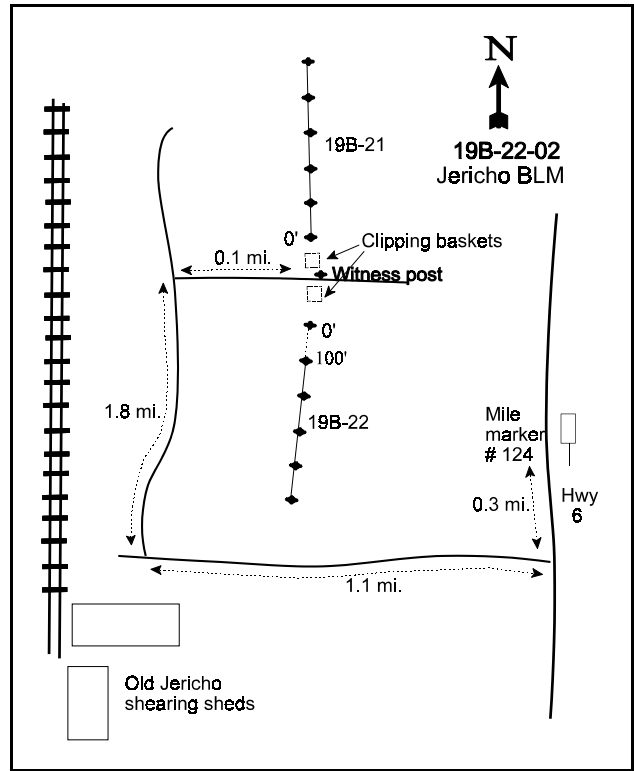
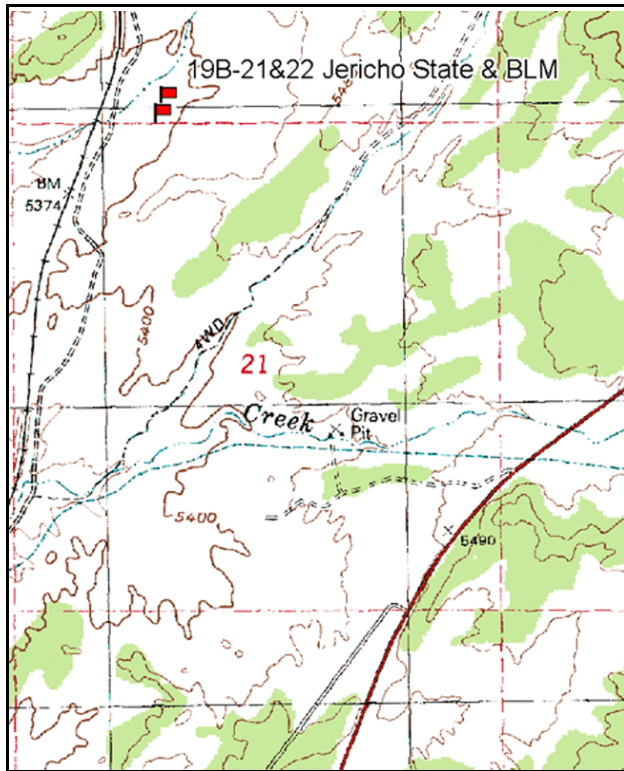
Vegetation type: Burn.

Compass bearing: frequency baseline 0 degrees magnetic.

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

LOCATION DESCRIPTION

From mile marker 124 on Hwy 6, drive 0.3 miles south to a road heading west. Take this road for 1.1 miles to the old Jericho shearing sheds on the left and an intersection before the railroad tracks. Turn right and follow the road on the east side of the tracks for 1.8 miles. At this point is the border of state land and BLM land. Turn right and follow the faint road along the border for 0.1 miles to a witness post and some clipping baskets. The 0-foot stake is 100 feet at 192 degrees magnetic from the witness post. The 0-foot stake has browse tag #475.



Map Name: McIntyre

Diagrammatic Sketch

Township 12S, Range 3W, Section 16

GPS: NAD 27, UTM 12S 4402945 N 398178 E

DISCUSSION

Jericho BLM - Trend Study No. 19B-22

This study samples the same sagebrush flat as study 19B-21. The baseline begins about 200 feet south of the Jericho State Section baseline stake. Terrain is nearly level with a slight southwest aspect. Elevation is approximately 5,400 feet. This site was part of the Leamington wildfire burn complex that burned thousands of acres in 1996. This transect samples an area that was aerielly seeded and then one-way chained with an Ely chain to enhance establishment of seeded species. The seed mix consisted of four exotic perennial grasses and one shrub, fourwing saltbush. The fourwing seed was applied with a seed dribbler which dropped seeds on the bulldozer tracks during the chaining. The 1998 pellet group transect encountered only one deer pellet group and a few trespass cattle pats. Pellet group transect data collected in 2002 estimated 35 sheep days use/acre (88 sdu/ha). Deer pellets were sampled in only three quadrats in 2002.

Soil on this site is very similar to the unchained site (19B-21). Effective rooting depth was estimated at almost 18 inches with little rock or pavement on the surface or within the profile. Soil texture is a loam with a neutral pH (7.3). Percent organic matter is 2½ times higher than on the unchained site. Phosphorus is low at only 4 ppm and can be limiting to plant growth and development where 10 ppm is considered minimal for normal plant growth and development. Bare ground was abundant in 1998 and 2002 at 50% and 56% respectively. The erosion condition class was determined to be stable to slight in 2002. Severe pedestalling around the base of bunchgrasses provides most of the evidence of past erosion.

The site once supported a dense stand of basin big sagebrush. Counts of burned stems on this site estimated a pre-burn sagebrush density of 2,640 plants/acre. The chaining obviously disturbed the ground surface and probably skewed the sample. No live sagebrush plants have been sampled following the burn. The seeded shrub, fourwing saltbush, had an estimated density of 400 plants/acre in 1998, decreasing to 200 plants/acre in 2002. Much of the decline in density was due to the loss of the young age class in 2002, although 60 dead plants/acre were also sampled. Vigor was normal and no decadent plants were sampled in 1998, but in 2002, 80% of the population was decadent and the same proportion displayed poor vigor. Sheep had utilized the fourwing on the site in 2002. These negative trends are drought induced and will hopefully reverse with better precipitation in the future. This sparse population of fourwing saltbush cannot afford further losses or it may disappear altogether. The only other browse sampled in 2002 was pricklypear cactus at an estimated 20 plants/acre.

This site received a seed mix of only exotic perennial grasses which established very well. Tall wheatgrass was the most abundant herbaceous species in 1998, followed by crested wheatgrass, Russian wildrye, and smooth brome. Tall wheatgrass decreased in both nested frequency and average cover in 2002, but still remains the second most abundant grass. Crested wheatgrass significantly increased in nested frequency and doubled in cover between the 1998 and 2002 readings. Western wheatgrass, a rhizomatous native, was not sampled in 1998, but occurred in 33 quadrats in 2002. Other native perennials include bluebunch wheatgrass, Indian ricegrass, and bottlebrush squirreltail. Cheatgrass was very abundant in 1998 with a nested frequency value of 334 and a quadrat frequency of 94%. Cheatgrass occurred primarily in patches where perennial grasses did not establish well. In 2002, cheatgrass significantly declined in frequency and cover. The decline in cheatgrass is due to the combination of two factors, drought in 2002 and an increasing and highly competitive perennial grass component.

Forbs were rare in both sampling years with only three annual and four perennial species being encountered. The annuals, pale alyssum and tumble mustard, provided nearly all of the forb cover in 1998. Forbs will probably never be a significant component on this site unless seeded into the site sometime in the future. It was noted that there were fewer crickets on this transect compared to the Jericho State Section transect in 2002, probably due to the lack of forbs.

1998 APPARENT TREND ASSESSMENT

The soil trend appears stable with abundant and well dispersed vegetative cover. The trend will improve in the future as vegetation and litter cover increase. The only shrub on the site is fourwing saltbush which was seeded with a dribbler. It appears to have established in sufficient numbers to maintain itself and probably increase in the future. Currently, there are an estimated 400 plants/acre, 75% of which were classified as young. The herbaceous understory is dominated by seeded perennial grasses which appear to be well established. Cheatgrass is present and occurs in dense patches, but only where perennial grasses did not establish in good numbers. Overall, cheatgrass accounts for only 29% of the grass cover. It will likely not increase as long as the site is not over-grazed in the spring. Forbs are scarce and the composition is poor with two annuals providing nearly all of the forb cover.

2002 TREND ASSESSMENT

Trend for soil is slightly down. Soils are in less than ideal condition with an abundance of bare soils and moderately low levels of vegetation and litter cover. The decline in cheatgrass in 2002 accounts for most of the decrease in vegetative cover. A positive trend is the increase in sum of nested frequency for perennial grasses. The erosion condition class borders on the stable and slight categories in 2002. Trend for browse is down. Although the population of fourwing saltbush appeared vigorous and in a high enough density to increase on the site in 1998, fourwing has declined in density. It had very high decadence and poor vigor estimates (80%) in 2002. There were no young plants sampled in 2002. Drought conditions are the most responsible for these downward trends. Hopefully better precipitation in the future will reverse the direction of fourwing future trends. Further losses in density may take the entire population out of the site for good. The herbaceous understory has a slightly upward trend. Perennial grasses increased in sum of nested frequency overall. Primary and secondary dominance switched between tall and crested wheatgrass between 1998 and 2002, but both provide about equal stabilization and forage value on the site. Cheatgrass drastically declined in 2002 with drought. With perennials increasing at the present time, it appears that cheatgrass will be held in check in the future.

TREND ASSESSMENT

soil - slightly down (2)

browse - down (1)

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --
Herd unit 19B, Study no: 22

| T y p e | Species | Nested Frequency | | Quadrat Frequency | | Average Cover % | |
|-----------------------------|-------------------------------|---------------------|------------------|----------------------|-----|--------------------|-------|
| | | '98 | '02 | '98 | '02 | '98 | '02 |
| G | Agropyron cristatum | _a 133 | _b 193 | 57 | 67 | 5.14 | 10.33 |
| G | Agropyron intermedium | _b 198 | _a 108 | 70 | 45 | 14.29 | 7.15 |
| G | Agropyron smithii | _a - | _b 87 | - | 33 | - | 1.35 |
| G | Agropyron spicatum | - | 5 | - | 1 | - | .15 |
| G | Bromus inermis | 35 | 46 | 17 | 19 | 1.29 | .51 |
| G | Bromus tectorum (a) | _b 334 | _a 14 | 94 | 7 | 9.84 | .06 |
| G | Elymus junceus | 35 | 35 | 16 | 15 | 1.79 | 1.83 |
| G | Oryzopsis hymenoides | - | - | - | - | .00 | - |
| G | Sitanion hystrix | 31 | 21 | 13 | 8 | 1.79 | .48 |
| Total for Annual Grasses | | 334 | 14 | 94 | 7 | 9.84 | 0.06 |
| Total for Perennial Grasses | | 432 | 495 | 173 | 188 | 24.32 | 21.83 |
| Total for Grasses | | 766 | 509 | 267 | 195 | 34.17 | 21.89 |
| F | Agoseris glauca | 3 | - | 1 | - | .00 | - |
| F | Alyssum desertorum (a) | _b 87 | _a 13 | 30 | 6 | .62 | .03 |
| F | Calochortus nuttallii | 2 | - | 1 | - | .00 | - |
| F | Descurainia pinnata (a) | 4 | - | 1 | - | .01 | - |
| F | Senecio multilobatus | 1 | - | 1 | - | .00 | - |
| F | Sisymbrium altissimum (a) | _b 33 | _a 2 | 15 | 1 | 1.91 | .00 |
| F | Sphaeralcea grossulariaefolia | - | 1 | - | 1 | .00 | .00 |
| Total for Annual Forbs | | 124 | 15 | 46 | 7 | 2.54 | 0.03 |
| Total for Perennial Forbs | | 6 | 1 | 3 | 1 | 0.01 | 0.00 |
| Total for Forbs | | 130 | 16 | 49 | 8 | 2.56 | 0.03 |

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

BROWSE TRENDS --
Herd unit 19B, Study no: 22

| T y p e | Species | Strip Frequency | | Average Cover % | |
|------------------|--------------------|--------------------|-----|--------------------|------|
| | | '98 | '02 | '98 | '02 |
| B | Atriplex canescens | 16 | 9 | .33 | .58 |
| B | Opuntia spp. | 0 | 1 | - | - |
| Total for Browse | | 16 | 10 | 0.32 | 0.58 |

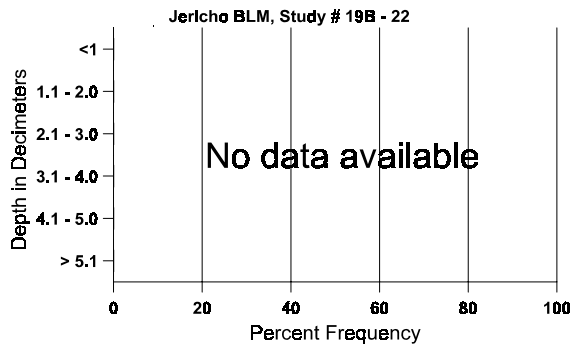
BASIC COVER --
Herd unit 19B, Study no: 22

| Cover Type | Nested Frequency | | Average Cover % | |
|-------------|------------------|-----|-----------------|-------|
| | '98 | '02 | '98 | '02 |
| Vegetation | 413 | 336 | 39.77 | 24.76 |
| Rock | 32 | 37 | .11 | .12 |
| Pavement | 289 | 240 | 2.41 | 2.14 |
| Litter | 484 | 461 | 14.53 | 26.26 |
| Cryptogams | - | 32 | 0 | .04 |
| Bare Ground | 459 | 456 | 49.61 | 56.15 |

SOIL ANALYSIS DATA --
Herd Unit 19B, Study no: 22, Jericho BLM

| Effective rooting depth (inches) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | ds/m |
|----------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 17.5 | 67.4 (17.7) | 7.3 | 44.0 | 30.1 | 25.9 | 2.5 | 4.0 | 364.8 | 0.7 |

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 19B, Study no: 22

| Type | Quadrat Frequency | | Pellet Groups per Acre '02 | Days Use per Acre (ha) '02 |
|--------|-------------------|-----|----------------------------|----------------------------|
| | '98 | '02 | | |
| Sheep | - | 17 | 461 | 35 (88) |
| Rabbit | 1 | 4 | - | - |
| Deer | - | 3 | - | - |

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 22

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Artemisia tridentata tridentata | | | | | | | | | | | | | | | | | | |
| X | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 2640 | | 132 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '98 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |
| Atriplex canescens | | | | | | | | | | | | | | | | | | |
| Y | 98 | 15 | - | - | - | - | - | - | - | - | 15 | - | - | - | 300 | | 15 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 98 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | 17 | 17 | 5 |
| | 02 | 1 | - | 1 | - | - | - | - | - | - | 2 | - | - | - | 40 | 26 | 37 | 2 |
| D | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | 3 | 1 | 1 | - | - | 1 | 2 | - | - | - | - | - | 8 | 160 | | 8 | |
| X | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 60 | | 3 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | -50% | | | | | | | |
| '02 | | 10% | | | 30% | | | 80% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '98 | 400 | Dec: | 0% | | | |
| | | | | | | | | | | | | '02 | 200 | | 80% | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | | |
| M | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 2 | 3 | 0 |
| D | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | 1 | - | - | - | - | - | - | 1 | 20 | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 100% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '98 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | | '02 | 20 | | 100% | | | |

Summary and Comparison of Jericho State Section (19B-21) and Jericho BLM (19B-22)

Studies 19B-21 and 19B-22 were established in 1998 to monitor the recovery of the vegetation community on two treatments following the Leamington wildfire complex that burned through the area in 1996. Study 19B-21 was seeded only, while study 19B-22 was seeded and then one-way chained. These studies were paired to compare differences in restoration efforts between seeding only (19B-21) and seeding followed by one-way chaining (19B-22) to cover the seed and enhance establishment of the seeded species. Seed mixes were not identical however, for the Jericho State Section included yellow sweet clover and alfalfa in its seed mix.

Perennial grasses are the key component in the vegetation community on the Jericho sites. During the initial reading in 1998, perennial grasses had a nearly identical sum of nested frequency value on both sites, although percent cover was higher on the BLM site which was chained following seeding (Figures 1 and 2). In 2002, five years following the treatments, both sum of nested frequency and percent cover of perennial grasses were higher on the BLM site compared to the state section which was seeded but not chained.

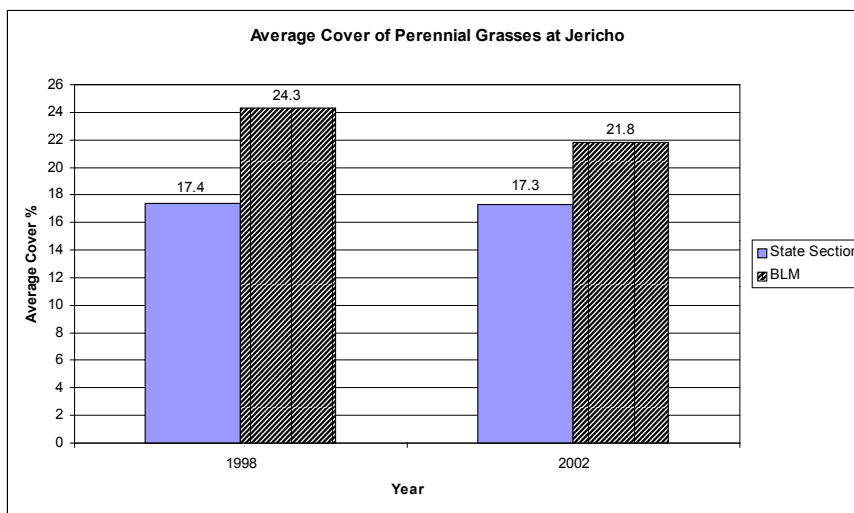


Figure 1. A comparison of percent cover values for perennial grasses from 1998-2002 on the Jericho fire rehabilitation studies.

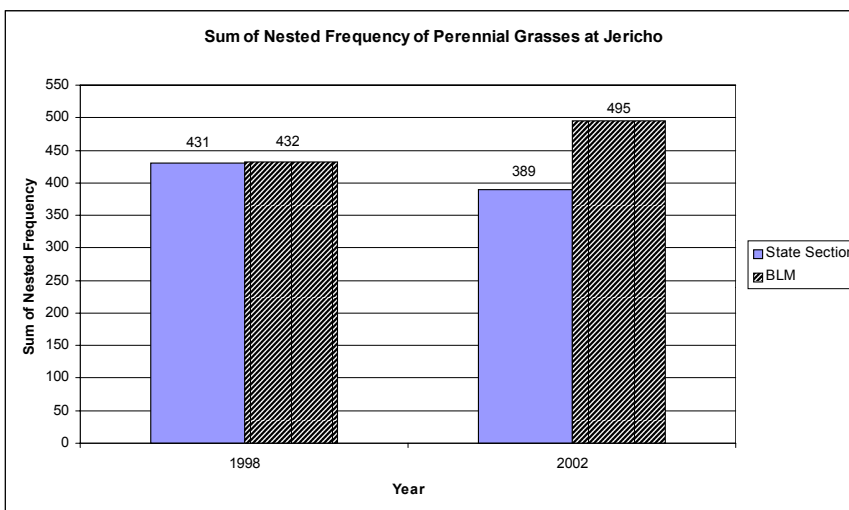


Figure 2. A comparison of sum of nested frequency values for perennial grasses from 1998-2002 on the Jericho fire rehabilitation studies.

It is important to note that the seed mix used for these studies was different. The state section was seeded with two perennial grasses and two forbs. The BLM section was seeded with four perennial grasses and no forbs. Although both sites had nearly the same number of total pounds/acre of seed applied, a total of 8 pounds of grass seed/acre were seeded on the state section, while 9.1 pounds of grass seed/acre were seeded onto the BLM site. The difference in pounds/acre of perennial grass seed applied on these sites may account for at least some of the difference in nested frequency and cover between the two treatments. However, the chaining treatment on the BLM site is likely responsible for increased nested frequency and cover values of perennial grasses as well.

Initially, cheatgrass was very abundant at the Jericho sites (Figures 3 and 4). It is interesting to note that in 1998, cheatgrass had higher percent cover and nested frequency values on the BLM site which was chained compared to the state section which was not. However in 2002, five years following the treatments, nested

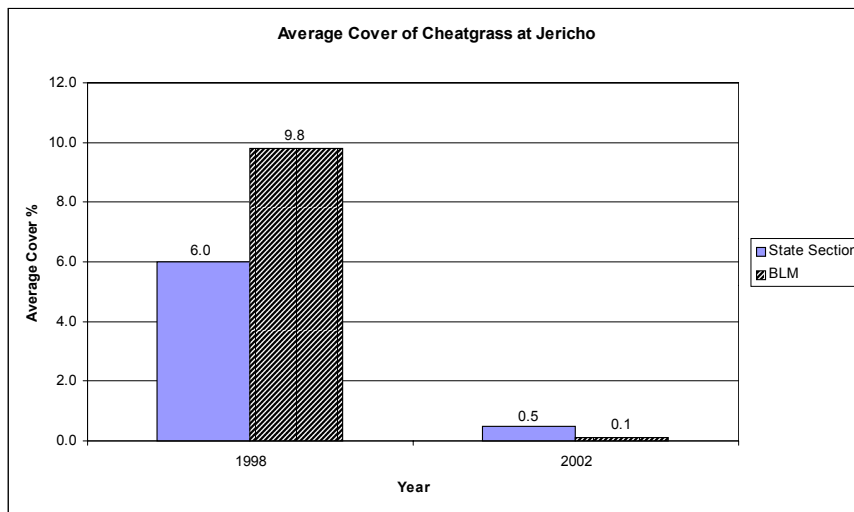


Figure 3. A comparison of percent cover of cheatgrass from 1998-2002 on the Jericho fire rehabilitation studies.

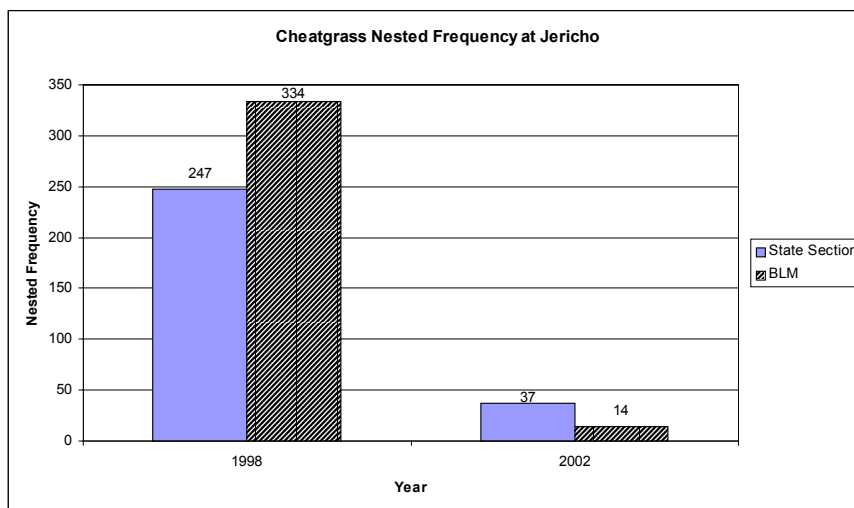


Figure 4. A comparison of cheatgrass nested frequency values from 1998-2002 on the Jericho fire rehabilitation studies.

frequency and percent cover of cheatgrass were slightly higher on the state section, although both parameters were greatly reduced on both sites with drought conditions in 2002.

Very few forbs occur on the BLM site, but no forbs were seeded on this treatment. The state section initially ('98) had a very high cover of forbs due to the abundance of two seeded species, alfalfa and yellow sweet clover. In 2002, alfalfa was still moderately abundant but yellow sweet clover was not sampled. Yellow sweet clover is a short-lived species so this change is not surprising. Drought conditions and Mormon crickets in 2002 resulted in most of alfalfa plants being in poor condition on the state section.

Fourwing saltbush was seeded on the BLM site, while no shrubs were seeded on the state section. The fourwing saltbush population was noted as vigorous and increasing on the BLM site in 1998, but in 2002, the population decreased and most of the population was classified as decadent and having poor vigor. With no young in the population in 2002, this population is in danger of decreasing further and may disappear from the site altogether. No shrubs were sampled on the state section in either sample, and due to the distance of any native seed source, it will remain so in the future unless shrubs are seeded into the site.

Trend Study 21-20-02

Study site name: Leamington Burn .

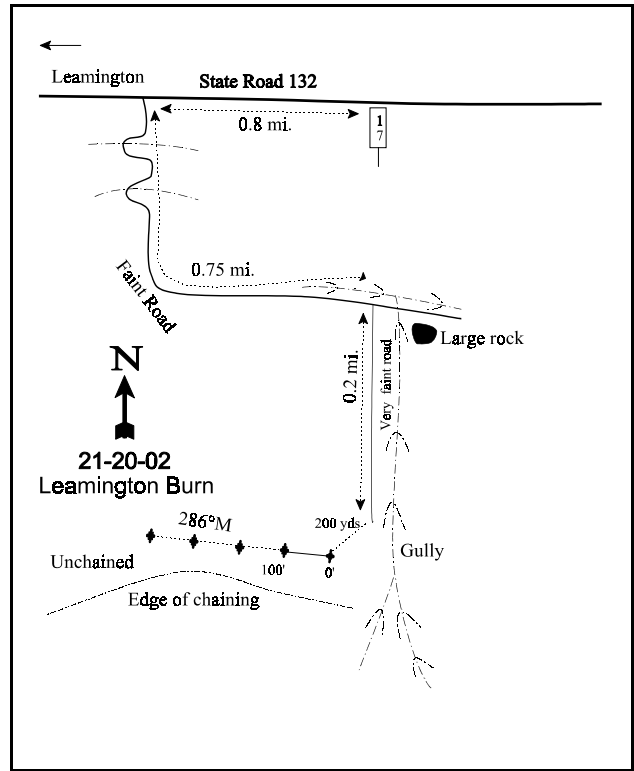
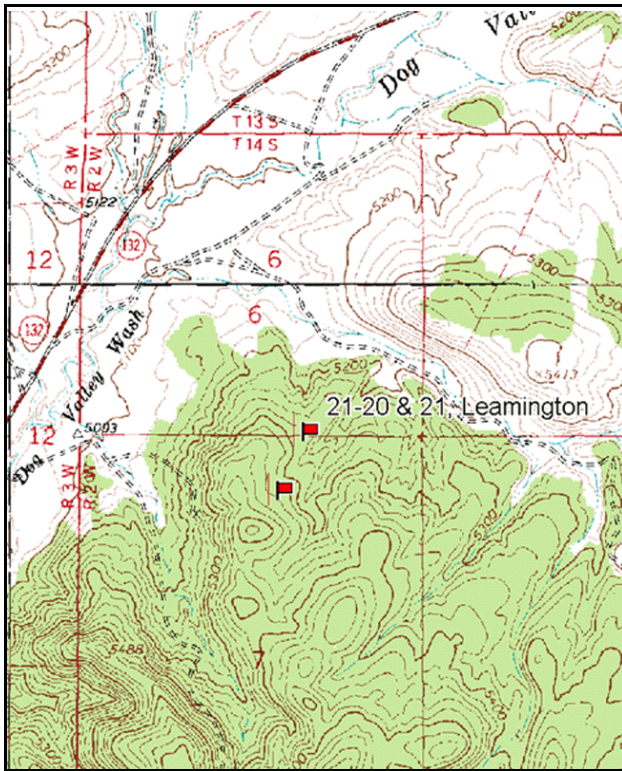
Vegetation type: Burned Pinyon-Juniper .

Compass bearing: frequency baseline 286 degrees magnetic.

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

LOCATION DESCRIPTION

From Nephi, drive about 17.1 miles on State Road 132. Drive west 0.8 miles past mile marker 17 to a faint road on the left. Drive 0.75 miles past a water trough to a gully with a large boulder by the road. Go up the gully 0.2 miles to where it forks. Park here. The study is located on the ridge west of the gully. From the fork, the study is 200 yards away by the edge of the chaining. The study is marked by 12-18 inch, green, steel fenceposts.



Map Name: Sage Valley .

Diagrammatic Sketch

Township 14S Range 2W Section 6

GPS: NAD 27, UTM 12S 4385968 N 404471 E

DISCUSSION

Leamington Burn - Trend Study No. 21-20

This study was established in 1997 on a burned and seeded pinyon-juniper area. It occurs on BLM land about 17 miles west of Nephi and approximately one mile south of SR-132. It is part of the extensive Leamington burn complex that took place during the summer of 1996. This site samples a burned site that was aerially seeded and not chained. The paired site (study 21-21) to this samples a burned area that was aerially seeded then chained. The purpose of these paired studies is to contrast the difference in seeded species establishment and recovery between the two treatments. Pellet group data in 1998 indicated light use of the area by elk with five elk days use/acre (12 edu/ha) being estimated. Wildlife use remained very light with less than one deer day use/acre (2 ddu/ha) and one elk day use/acre (3 edu/ha) being estimated from pellet group transect data in 2002. Livestock were on the site when it was read in 2002. Cattle use was estimated at 13 days use/acre (32 ddu/ha) on the site itself, but use was much heavier in the bottoms near the road.

This site was placed on a ridge that slopes gently (3% to 5%) to the southeast. Elevation is about 5,200 feet. Soil is relatively deep with an effective rooting depth estimated at 14 inches. Texture is a sandy clay loam with a neutral pH (7.0). The soil is loose and lacks structure on the surface. Rocks and pavement are common on the surface and within the profile. Some rocks under the surface have deposits of calcium carbonate. Phosphorus in the soil may be limiting at 8.0 ppm, where 10 ppm are thought necessary for normal plant growth and development. Although there is a considerable amount of bare soil, soil erosion is not a problem on the site due to the abundant vegetation cover and relatively flat terrain. The erosion condition class was determined as stable in 2002.

Prior to the fire, the site was dominated by pinyon and juniper. Now, few remain alive. Shrubs are rare and include small numbers of sprouting species, including rubber rabbitbrush, stickyleaf low rabbitbrush, and broom snakeweed. The ephedra population was estimated at 60 plants/acre in 1997 and 2002. All of the plants were classified as mature in 2002, use was moderate, and vigor normal. Wyoming big sagebrush density was estimated at 20 plants/acre on the immediate site in 2002. There is a clump of unburned juniper intermixed with sagebrush at the end of baseline which contained a higher density of pellet groups.

The majority of the vegetative cover comes from grasses, with forbs being secondary. Grasses and forbs combined to produce a total of almost 13% cover in 1997, 39% in 1998, 31% in 1999, and 19% in 2002. Cheatgrass has been the most common grass on this site in all years. Nested frequency of cheatgrass increased from 1997-1999, then decreased in 2002. It accounted for two-thirds of the total grass cover in 1998 and 1999, but only 29% in 2002. However, it was still sampled in 96% of the sampling quadrats in 2002, so it still has the potential to dominate the site when precipitation returns to normal levels. There is a good mix of seeded and native perennial grasses on the site. They have steadily increased in frequency since 1997. Common grasses include Sandberg bluegrass, crested wheatgrass, bluebunch wheatgrass, and Indian ricegrass. Less abundant species include tall wheatgrass, smooth brome, bottlebrush squirreltail, Russian wildrye, and needle-and-thread. Nearly all of the perennial grasses on the site have stable or higher nested frequency values in 2002 compared to the initial reading in 1997.

The forb component was initially quite diverse, but has steadily declined with each reading. Annual forbs were moderately abundant in 2002 with low growing species like bur buttercup and pale alyssum being the most abundant. The most common perennials initially were Douglas chaenactis and longleaf phlox. In 2002, no perennials were sampled in more than 8% of the quadrats. Sum of nested frequency has decreased in every reading since the site was established in 1997. A few seeded forbs have been sampled including alfalfa and small burnet.

1997 APPARENT TREND ASSESSMENT

The soil trend appears stable at the moment and it should improve as more vegetation becomes established in the future. Current erosion is minimal. Browse is limited to a few resprouting ephedra and some broom snakeweed. The shrub trend will likely improve as more shrubs become established on the burn. The herbaceous understory is not particularly abundant at only 12% cover. The composition of grasses is good with the exception of cheatgrass which currently accounts for 33% of the grass cover. The composition of forbs is poor. The only common species include low growing native forbs and weedy annuals. Seeded forbs occur in such low numbers that they will likely not persist on this site.

1998 TREND ASSESSMENT

Trend for soil appears to be improving and has a slightly upward trend. However, a large amount of bare soil is still exposed (28%). Vegetative cover has increased three-fold, litter cover has increased four-fold, and rock/pavement cover has declined from 32% to 22%. Unfortunately, most of the increase in vegetative cover comes from an increase in cheatgrass. There are few shrubs on the site, yet trend is considered stable. The herbaceous understory trend is down due to a significant increase and dominance in cheatgrass. Cover of cheatgrass has increased eleven-fold since 1997, and it currently accounts for 71% of the grass cover. All other grasses, with the exception of crested wheatgrass, declined in nested frequency but not significantly. Crested wheatgrass increased significantly in nested frequency but it only occurs in 15% of the quadrats. Forbs are diverse with several annual and perennial species sampled, however none are abundant. Cover of forbs has declined two-fold and nested frequency has declined three-fold since 1997.

TREND ASSESSMENT

soil - up slightly (4)

browse - stable but depleted (3)

herbaceous understory - down (1)

2002 TREND ASSESSMENT

Trend for soil is down. Bare ground increased to 45%, while litter and vegetation cover both declined. Although erosion is low, the soil surface has a moderate erosion potential. The main factor minimizing soil erosion is the gentle slope. Trend for browse is stable, but remains depleted. Very few shrubs have colonized into the site since the burn. Ephedra and rubber rabbitbrush have stable but low density populations. Trend for the herbaceous understory is slightly up. Cheatgrass significantly decreased in nested frequency, while sum of nested frequency for perennial grasses more than doubled. There is a good mix of introduced and native perennial grasses on the site. Cheatgrass remains uniformly distributed over the site and could become dominant again with better precipitation in the future.

TREND ASSESSMENT

soil - down (1)

browse - stable (3)

herbaceous understory - slightly up (4)

HERBACEOUS TRENDS --
Herd unit 21 , Study no: 20

| T y p e | Species | Nested Frequency | | | | Average Cover % | | | |
|-----------------------------|-----------------------------|------------------|------|------|------|-----------------|-------|-------|-------|
| | | '97 | '98 | '99 | '02 | '97 | '98 | '99 | '02 |
| G | Agropyron cristatum | a6 | b35 | b36 | c82 | .27 | 1.50 | 1.63 | 3.56 |
| G | Agropyron elongatum | a- | ab3 | ab4 | b11 | - | .04 | .18 | .36 |
| G | Agropyron spicatum | 60 | 41 | 46 | 65 | 2.20 | 3.90 | 5.94 | 4.08 |
| G | Bromus inermis | - | - | 1 | 4 | - | - | .03 | .01 |
| G | Bromus japonicus (a) | - | - | - | 4 | - | - | - | .03 |
| G | Bromus tectorum (a) | a153 | c430 | c454 | b340 | 2.34 | 26.01 | 20.14 | 4.54 |
| G | Elymus junceus | a- | ab4 | a1 | b6 | - | .03 | .03 | .16 |
| G | Oryzopsis hymenoides | 68 | 58 | 49 | 39 | 1.26 | 3.06 | 1.54 | 1.44 |
| G | Poa secunda | b63 | b54 | a7 | c110 | .87 | 1.22 | .04 | 1.51 |
| G | Sitanion hystrix | 16 | 22 | 12 | 7 | .17 | .78 | .18 | .04 |
| G | Stipa comata | - | - | - | 7 | - | - | - | .03 |
| Total for Annual Grasses | | 153 | 430 | 454 | 344 | 2.34 | 26.01 | 20.14 | 4.57 |
| Total for Perennial Grasses | | 213 | 217 | 156 | 331 | 4.78 | 10.55 | 9.60 | 11.22 |
| Total for Grasses | | 366 | 647 | 610 | 675 | 7.13 | 36.57 | 29.75 | 15.80 |
| F | Alyssum desertorum (a) | a1 | a2 | a3 | b81 | .00 | .00 | .00 | .14 |
| F | Arabis spp. | 3 | - | 3 | - | .00 | - | .07 | - |
| F | Astragalus beckwithii | 4 | - | - | - | .06 | .00 | - | - |
| F | Camelina microcarpa (a) | a- | ab6 | ab3 | b16 | - | .06 | .03 | .22 |
| F | Carduus nutans (a) | - | - | - | 2 | - | - | - | .00 |
| F | Calochortus nuttallii | 3 | - | - | 1 | .01 | - | .00 | .00 |
| F | Centaurea spp. | a- | b7 | a- | a- | - | .05 | - | - |
| F | Chaenactis douglasii | b52 | b42 | a2 | a8 | .97 | 1.20 | .00 | .01 |
| F | Crepis acuminata | - | - | - | - | - | .03 | - | - |
| F | Descurainia pinnata (a) | b14 | a- | a6 | a4 | .13 | - | .18 | .00 |
| F | Draba spp. (a) | - | 14 | - | - | - | .02 | - | - |
| F | Eriogonum cernuum (a) | 6 | 3 | - | - | .30 | .03 | - | - |
| F | Erigeron spp. | - | 3 | - | - | - | .03 | - | - |
| F | Gilia spp. (a) | b77 | a- | a- | a- | 1.64 | - | - | - |
| F | Lactuca serriola | a6 | b17 | b45 | a- | .61 | .49 | .37 | - |
| F | Lesquerella spp. | b38 | a- | a- | a- | .19 | - | - | - |
| F | Medicago sativa | 1 | 4 | 3 | - | .00 | .18 | .04 | - |
| F | Nicotiana attenuata (a) | - | 2 | - | - | - | .00 | - | - |
| F | Phlox longifolia | c46 | b13 | a- | b17 | .36 | .03 | - | .06 |
| F | Ranunculus testiculatus (a) | b112 | a3 | a5 | c271 | .76 | .03 | .01 | 2.91 |
| F | Salsola iberica (a) | - | - | 5 | - | - | .15 | .18 | .00 |
| F | Sanguisorba minor | 1 | 2 | - | - | .15 | .15 | - | - |

| T y p e | Species | Nested Frequency | | | | Average Cover % | | | |
|---------------------------|---------------------------|------------------|-----|-----|-----|-----------------|------|------|------|
| | | '97 | '98 | '99 | '02 | '97 | '98 | '99 | '02 |
| F | Sisymbrium altissimum (a) | - | 1 | 8 | - | - | .15 | .18 | - |
| F | Streptanthus cordatus | 7 | - | - | - | .04 | - | - | - |
| F | Tragopogon dubius | 3 | 3 | 4 | 4 | .03 | .10 | .05 | .00 |
| Total for Annual Forbs | | 210 | 31 | 30 | 374 | 2.84 | 0.46 | 0.60 | 3.29 |
| Total for Perennial Forbs | | 164 | 91 | 57 | 30 | 2.44 | 2.28 | 0.53 | 0.09 |
| Total for Forbs | | 374 | 122 | 87 | 404 | 5.28 | 2.74 | 1.13 | 3.38 |

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

BROWSE TRENDS --

Herd unit 21 , Study no: 20

| T y p e | Species | Strip Frequency | | | | Average Cover % | | | |
|------------------|----------------------------------------------|-----------------|-----|-----|-----|-----------------|------|------|------|
| | | '97 | '98 | '99 | '02 | '97 | '98 | '99 | '02 |
| B | Artemisia tridentata vaseyana | 0 | 0 | 0 | 1 | - | - | - | .15 |
| B | Chrysothamnus nauseosus albicaulis | 0 | 1 | 3 | 4 | .00 | - | .38 | .38 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 0 | 1 | 1 | 1 | .03 | .15 | .00 | - |
| B | Ephedra nevadensis | 1 | 0 | 1 | 1 | - | - | - | .00 |
| B | Gutierrezia sarothrae | 3 | 8 | 15 | 13 | .18 | .86 | 1.03 | .65 |
| B | Leptodactylon pungens | 0 | 0 | 4 | 9 | .00 | - | - | .06 |
| Total for Browse | | 4 | 10 | 24 | 29 | 0.22 | 1.00 | 1.42 | 1.25 |

BASIC COVER --

Herd unit 21 , Study no: 20

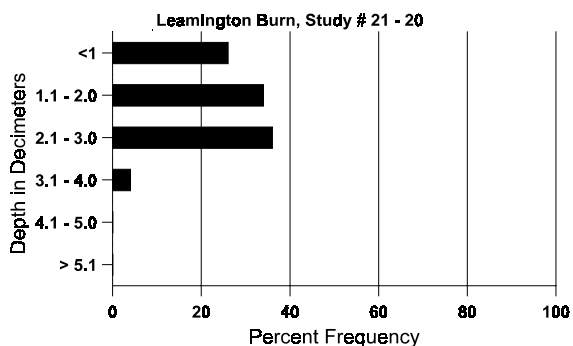
| Cover Type | Nested Frequency | | | | Average Cover % | | | |
|-------------|------------------|-----|-----|-----|-----------------|-------|-------|-------|
| | '97 | '98 | '99 | '02 | '97 | '98 | '99 | '02 |
| Vegetation | 303 | 444 | 462 | 429 | 13.11 | 39.16 | 35.04 | 22.46 |
| Rock | 314 | 251 | 220 | 257 | 11.08 | 9.00 | 6.96 | 7.53 |
| Pavement | 451 | 376 | 338 | 383 | 20.50 | 12.50 | 5.31 | 6.49 |
| Litter | 383 | 489 | 485 | 445 | 7.05 | 28.25 | 39.20 | 27.58 |
| Cryptogams | 108 | 9 | 9 | 16 | 2.08 | .19 | .06 | .22 |
| Bare Ground | 424 | 372 | 308 | 433 | 32.10 | 28.43 | 16.73 | 44.74 |

SOIL ANALYSIS DATA --

Herd Unit 21, Study no: 20, Leamington Burn

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 13.7 | 62.0 (13.5) | 7.0 | 46.7 | 28.4 | 24.8 | 2.4 | 8.0 | 214.4 | 0.6 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 20

| Type | Quadrat Frequency | | | | Pellet Groups per Acre '02 | Days Use per Acre (ha) '02 |
|--------|-------------------|-----|-----|-----|----------------------------|----------------------------|
| | '97 | '98 | '99 | '02 | | |
| Rabbit | 15 | 1 | 24 | 14 | - | - |
| Elk | - | 1 | 4 | - | 17 | 1 (3) |
| Deer | 1 | 1 | 1 | 1 | 9 | 1 (2) |
| Cattle | 1 | - | 2 | 5 | 157 | 13 (32) |

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 20

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|---|-------------------|--------------------------|----------------|----|----|---|
| | | 1 | 2 | 3 | 4 | | | | | | |
| Artemisia tridentata vaseyana | | | | | | | | | | | |
| M | '97 | - | - | - | - | - | - | 0 | - | - | 0 |
| | '98 | - | - | - | - | - | - | 0 | - | - | 0 |
| | '99 | - | - | - | - | - | - | 0 | 11 | 9 | 0 |
| | '02 | 1 | - | - | - | - | - | 20 | 9 | 11 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | |
| | | '97 | | 00% | | 00% | | 00% | | | |
| | | '98 | | 00% | | 00% | | 00% | | | |
| | | '99 | | 00% | | 00% | | 00% | | | |
| | | '02 | | 00% | | 00% | | 00% | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '97 | 0 | Dec: | - | | |
| | | | | | | '98 | 0 | | - | | |
| | | | | | | '99 | 0 | | - | | |
| | | | | | | '02 | 20 | | - | | |

| A Y G R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|--------------------------------------------------|----------------------------|---------------------|---|---|------------------|---|---|-------------------|---|-------------|----------------|-----|-----|--------------------|--------------------------------|----|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Atriplex canescens | | | | | | | | | | | | | | | | | |
| M | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 98 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 46 | 33 | 0 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 24 | 32 | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '97 | 0 | Dec: | - | | |
| | | | | | | | | | | | | '98 | 0 | | - | | |
| | | | | | | | | | | | | '99 | 0 | | - | | |
| | | | | | | | | | | | | '02 | 0 | | - | | |
| Chrysothamnus nauseosus albicaulis | | | | | | | | | | | | | | | | | |
| Y | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 98 | 1 | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 02 | 1 | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 |
| M | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 98 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 99 | 3 | - | - | - | - | - | - | - | - | - | - | - | 60 | 27 | 27 | 3 |
| | 02 | 2 | 1 | 1 | - | - | - | - | - | - | - | - | - | 80 | 30 | 38 | 4 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | +67% | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | +40% | | | | | | |
| '02 | | 20% | | | 20% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '97 | 0 | Dec: | - | | |
| | | | | | | | | | | | | '98 | 20 | | - | | |
| | | | | | | | | | | | | '99 | 60 | | - | | |
| | | | | | | | | | | | | '02 | 100 | | - | | |
| Chrysothamnus viscidiflorus viscidiflorus | | | | | | | | | | | | | | | | | |
| M | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 98 | 1 | - | - | - | - | - | - | - | - | - | - | - | 20 | - | - | 1 |
| | 99 | 2 | - | - | - | - | - | - | - | - | - | - | - | 40 | 13 | 18 | 2 |
| | 02 | 2 | - | - | - | - | - | - | - | - | - | - | - | 40 | 13 | 18 | 2 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | +50% | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '97 | 0 | Dec: | - | | |
| | | | | | | | | | | | | '98 | 20 | | - | | |
| | | | | | | | | | | | | '99 | 40 | | - | | |
| | | | | | | | | | | | | '02 | 40 | | - | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|-----|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Ephedra nevadensis | | | | | | | | | | | | | | | | | | |
| Y | 97 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 60 | | 3 | |
| | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 99 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | 19 | 34 | |
| | 02 | - | 3 | - | - | - | - | - | - | - | 3 | - | - | - | 60 | 21 | 38 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | +33% | | | | | | | |
| '02 | | 100% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '97 | 60 | Dec: | - | | | | |
| | | | | | | | | | | | '98 | 0 | | - | | | | |
| | | | | | | | | | | | '99 | 40 | | - | | | | |
| | | | | | | | | | | | '02 | 60 | | - | | | | |
| Gutierrezia sarothrae | | | | | | | | | | | | | | | | | | |
| S | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 98 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 99 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 97 | 3 | - | - | - | - | 8 | - | - | - | 3 | - | - | - | 220 | - | - | |
| | 98 | 12 | - | - | - | - | - | - | - | - | 12 | - | - | - | 240 | 12 | 20 | |
| | 99 | 25 | - | - | - | - | - | - | - | - | 25 | - | - | - | 500 | 12 | 20 | |
| | 02 | 14 | - | - | - | - | - | - | - | - | 14 | - | - | - | 280 | 7 | 13 | |
| D | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | 3 | - | - | - | - | 1 | - | - | - | 2 | - | - | 2 | 80 | | 4 | |
| X | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 80 | | 4 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | +54% | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | -31% | | | | | | | |
| '02 | | 00% | | | 00% | | | 11% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | '97 | 240 | Dec: | 0% | | | | |
| | | | | | | | | | | | '98 | 240 | | 0% | | | | |
| | | | | | | | | | | | '99 | 520 | | 0% | | | | |
| | | | | | | | | | | | '02 | 360 | | 22% | | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| X | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | 2 | |
| | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 80 | | 4 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '97 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '98 | 0 | | - | | | |
| | | | | | | | | | | | | '99 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |
| Leptodactylon pungens | | | | | | | | | | | | | | | | | | |
| Y | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 99 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | 99 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | 3 | 6 | 2 |
| | 02 | 13 | - | - | - | - | - | - | - | - | 13 | - | - | - | 260 | 5 | 10 | 13 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | +69% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '97 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '98 | 0 | | - | | | |
| | | | | | | | | | | | | '99 | 80 | | - | | | |
| | | | | | | | | | | | | '02 | 260 | | - | | | |

Trend Study 21-21-02

Study site name: Leamington Burn and Chain

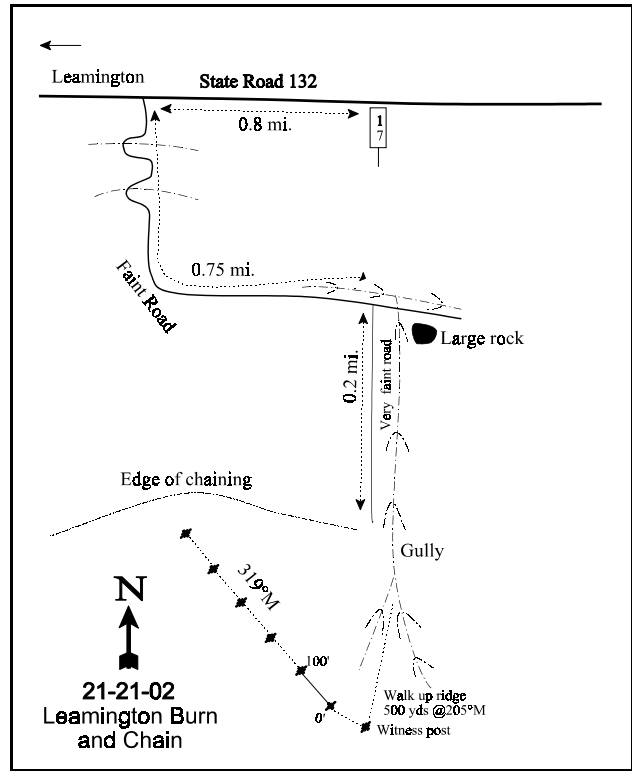
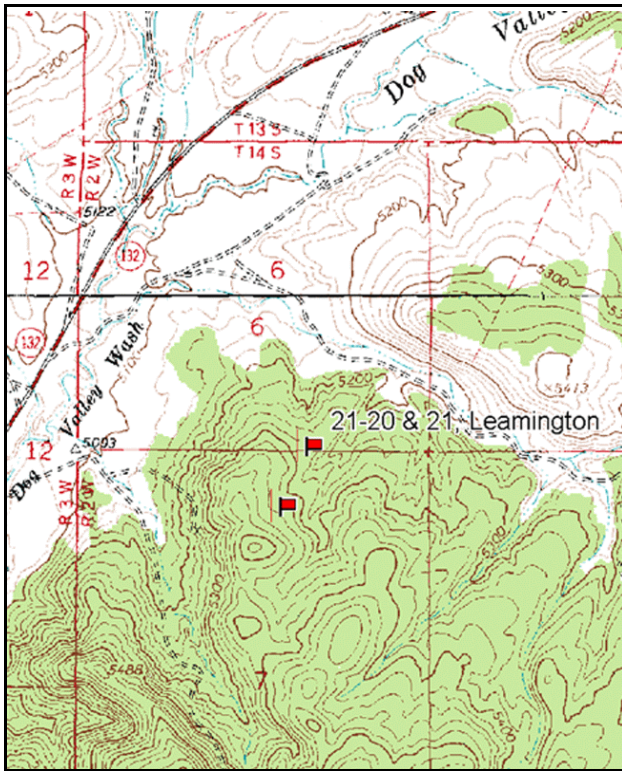
Vegetation type: Chained and Burned P-J

Compass bearing: frequency baseline 319 degrees magnetic.

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

LOCATION DESCRIPTION

From Nephi, drive about 17.1 miles on State Road 132. Drive west 0.8 miles past mile marker 17 to a faint road on the left. Drive 0.75 miles past a water trough to a gully with a large boulder by the road. Go up the gully 0.2 miles to where it forks. Park here. From where the drainage divides in two, walk up the middle ridge about 500 yards at a bearing of 205 degrees magnetic to a witness post. The 0-foot stake is 20 feet from the witness post at about 319 degrees magnetic. The study is marked by 12-18 inch, green, steel fenceposts.



Map name: Sage Valley

Diagrammatic Sketch

Township 14S Range 2W Section 6

GPS: NAD 27, UTM 12S 4385763 N 404379 E

DISCUSSION

Leamington Burn and Chain - Trend Study No. 21-21

This study was established in 1997 to sample a burned, seeded, and chained area west of the Leamington Burn site (21-20). It was established to contrast secondary succession and establishment of seeded grasses and forbs with the nearby burned and seeded treatment that made no attempt to cover the seed. This site has a slope of 10% to 12% with a east-southeast aspect at an elevation of 5,300 feet. The area burned during the summer of 1996 and is part of the previously mentioned Leamington burn complex. Seed was aerially applied and then the site was one-way chained with an Ely chain to cover the seed and enhance establishment of seeded species. The area has had very little use by wildlife in all readings. Pellet group transect data indicated <1 deer and 1 elk use day/acre in 1997, and up to 8 elk days use/acre (20 edu/ha) by 1998. In 2002, pellet transect data estimated 3 elk days use/acre (8 edu/ha), and less than 1 deer day use/acre (2 ddu/ha). Cattle were grazing in the area when the site was read in 2002. Cattle use was estimated at only 9 days use/acre (21 cdu/ha) on the immediate site, although use was much higher in the bottoms below the site.

Soil on the site is very similar to the Leamington Burn site (21-20). Effective rooting depth is estimated at almost 14 inches. Rocks and pavement are abundant on the surface and are also common throughout the soil profile. Soil texture is a sandy clay loam with a neutral pH (7.0). Percent organic matter was higher compared to the burn and seeded site (3% vs 2.4%). Percent bare ground was quite high at 39% in 1997, declining to 29% in 2002. Herbaceous vegetation and litter are moderately abundant and well dispersed and minimize erosion. The erosion condition class was determined to be stable in 2002.

Browse is limited to some seeded fourwing saltbush that was applied with a seed dribbler, and a few rubber rabbitbrush, stickyleaf low rabbitbrush, and ephedra. Broom snakeweed has the highest density of all browse species in all readings.

The herbaceous understory, especially grasses, is the dominant vegetative type on the site. Perennial grasses, primarily seeded exotics, have steadily increased over the site since the first reading in 1997. The most common perennial grass is crested wheatgrass. This species has had a stable nested frequency in all years. It provides nearly 30% of the total grass cover in 1999 and 2002. Tall wheatgrass has significantly increased in nested frequency since 1997, providing 21% of the grass cover in 2002. Other seeded species include smooth brome, orchard grass, and Russian wildrye. Native grasses are also well represented although they are less abundant than the seeded species. Bluebunch wheatgrass has a low frequency, but plants are large and vigorous and provide 18% of the total grass cover in 2002. Other native perennials include western wheatgrass, mutton bluegrass, Indian ricegrass, and Sandberg bluegrass. In 1998, perennial grasses were noted as being vigorous and robust with some reaching 3 to 4 feet in height. In 2002, perennial grasses had been moderately utilized over the entire site, with some of the large bunchgrasses having been heavily used. Cheatgrass is present on the site, but occurs in lower numbers compared to study 21-20. Cheatgrass accounted for 15% of the grass cover in 1997, 34% in 1998, 42% in 1999, and 23% in 2002. Cheatgrass nested frequency increased in 1998 and 1999, but declined in 2002 with drought. Even with the decline in 2002, it was still sampled in 89% of the quadrats and remains uniformly distributed over the site. Cheatgrass appears to have reached its peak, and with a good stand of competitive perennial grasses on the site, it should be held in check in the future.

The forb component has been fairly diverse, but all species occur infrequently. Forb cover was highest in 1997 at only 2%. It has decreased with every reading since. In 2002 with drought conditions, forbs were insignificant. Alfalfa and small burnet were seeded on the site, but have been sampled in only a handful of quadrats.

1997 APPARENT TREND ASSESSMENT

The soil trend appears stable due to the good establishment of seeded and native herbaceous species along with litter cover provided by chained dead trees. Grasses and forbs will increase in the future and provide even more soil protection. The browse trend will depend on how well the seeded fourwing saltbush becomes established. The few plants seeded around the site are vigorous and will likely increase in the future. The herbaceous understory is diverse with 8 perennial grasses and 11 perennial forbs encountered. There are fewer annual forbs here than on the adjacent site (21-20). There is nothing to suggest that the herbaceous trend will not continue to improve in the future.

1998 TREND ASSESSMENT

Trend for soil is improving as more perennial vegetation becomes established on the site. Percent cover of bare ground has declined from 39% to 27%, which is still high, but erosion is not currently a problem due to the well dispersed vegetation and litter cover. The browse trend is up slightly due to an increase in density of browse. Shrubs are still in low numbers but some fourwing saltbush and ephedra are becoming established. Broom snakeweed is still the most abundant shrub on the site even though the density has declined slightly since 1997. Trend for the herbaceous understory is up for grasses yet down slightly for forbs. Grasses increased in cover from 9% in 1997 to 29% in 1998. Cheatgrass is the most abundant grass on the site with a significant increase in nested frequency and a seven-fold increase in cover since 1997. It currently accounts for 34% of the grass cover even though plants are small in stature compared to the perennial grasses. The most common perennial grass, crested wheatgrass, remained at a similar frequency compared to 1997. Most of the other perennial grasses increased significantly in nested frequency. Forbs are not abundant and declined slightly in nested frequency since 1997. However, much of the change is due to several annual forbs disappearing from the site. Trend for the herbaceous understory is considered slightly up.

TREND ASSESSMENT

soil - slightly up (4)

browse - up slightly but still depleted (4)

herbaceous understory - slightly up (4)

2002 TREND ASSESSMENT

Trend for soil is stable. Compared to the 1999 data, bare ground increased in 2002 with drought conditions, but herbaceous vegetation and litter have remained steady, and erosion is minimal. The erosion condition class was determined as stable. Trend for browse is stable, but the browse component is very limited. Fourwing saltbush, ephedra, Wyoming big sagebrush, white-stemmed rubber rabbitbrush, and bitterbrush are scattered around the site in very low densities. Although these species remain on the site, they haven't increased since the initial reading in 1997. Trend for the herbaceous understory is stable overall. Perennial grasses have increased in sum of nested frequency since the 1999 reading, but perennial forbs have decreased. Cheatgrass declined in nested frequency and cover, but still remains moderately abundant and well distributed over the site.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3) but limited

herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 21 , Study no: 21

| T y p e | Species | Nested Frequency | | | | Average Cover % | | | |
|-----------------------------|-----------------------------|------------------|-------|------|------|-----------------|-------|-------|-------|
| | | '97 | '98 | '99 | '02 | '97 | '98 | '99 | '02 |
| G | Agropyron cristatum | 144 | 152 | 130 | 132 | 3.69 | 6.94 | 5.96 | 5.63 |
| G | Agropyron elongatum | a39 | bc96 | ab74 | c113 | .98 | 4.71 | 2.33 | 4.30 |
| G | Agropyron smithii | - | - | - | 5 | - | - | - | .03 |
| G | Agropyron spicatum | 27 | 47 | 31 | 47 | 1.25 | 3.46 | 2.72 | 3.67 |
| G | Bromus inermis | a9 | ab30 | ab20 | b39 | .22 | .73 | .65 | .24 |
| G | Bromus japonicus (a) | - | - | - | 3 | - | - | - | .03 |
| G | Bromus tectorum (a) | a98 | bc318 | c351 | b294 | 1.35 | 9.86 | 9.38 | 4.69 |
| G | Dactylis glomerata | b18 | b28 | ab10 | a- | .70 | .65 | .09 | - |
| G | Elymus junceus | a- | b22 | a3 | b27 | - | .91 | .15 | .67 |
| G | Oryzopsis hymenoides | 26 | 28 | 25 | 17 | .37 | 1.47 | .95 | .35 |
| G | Poa fendleriana | 4 | - | - | - | .01 | - | - | - |
| G | Poa secunda | a4 | ab19 | a11 | b38 | .06 | .58 | .05 | .61 |
| Total for Annual Grasses | | 98 | 318 | 351 | 297 | 1.35 | 9.86 | 9.38 | 4.73 |
| Total for Perennial Grasses | | 271 | 422 | 304 | 418 | 7.30 | 19.46 | 12.91 | 15.55 |
| Total for Grasses | | 369 | 740 | 655 | 715 | 8.66 | 29.33 | 22.29 | 20.28 |
| F | Alyssum desertorum (a) | a- | ab2 | ab4 | b10 | - | .00 | .00 | .03 |
| F | Astragalus beckwithii | 3 | - | - | 5 | .00 | - | - | .04 |
| F | Astragalus calycosus | 12 | 7 | 14 | 1 | .12 | .09 | .07 | .00 |
| F | Astragalus spp. | 6 | 6 | 3 | - | .18 | .19 | .03 | - |
| F | Camelina microcarpa (a) | - | 2 | - | - | - | .03 | - | - |
| F | Carduus nutans (a) | b16 | a- | a- | a- | .04 | - | - | - |
| F | Calochortus nuttallii | - | - | - | - | .00 | - | - | - |
| F | Chaenactis douglasii | b10 | ab10 | a- | a- | .32 | .24 | - | - |
| F | Cryptantha spp. | 1 | - | - | - | .00 | - | - | - |
| F | Descurainia pinnata (a) | b15 | a1 | a- | a- | .10 | .02 | - | - |
| F | Draba spp. (a) | - | 1 | 1 | - | - | .00 | .00 | - |
| F | Gilia spp. (a) | b23 | a- | a- | a- | .92 | - | - | - |
| F | Lactuca serriola | a- | b15 | b30 | a- | - | .38 | .53 | - |
| F | Lesquerella spp. | 5 | 4 | - | - | .01 | .16 | - | - |
| F | Medicago sativa | 1 | 4 | 1 | 1 | .11 | .29 | .01 | .03 |
| F | Nicotiana attenuata (a) | 1 | - | - | - | .00 | - | - | - |
| F | Phlox hoodii | - | 1 | 1 | 4 | - | .00 | .00 | .18 |
| F | Phlox longifolia | 4 | - | 3 | - | .01 | - | .00 | - |
| F | Ranunculus testiculatus (a) | a7 | a- | a- | b52 | .02 | - | - | .24 |
| F | Salsola iberica (a) | - | - | 1 | - | - | - | .00 | - |
| F | Sanguisorba minor | 2 | 3 | 2 | - | .15 | .18 | .03 | - |
| F | Senecio multiflobatus | - | 2 | - | - | - | .03 | - | - |

| T y p e | Species | Nested Frequency | | | | Average Cover % | | | |
|---------------------------|---------------------------|------------------|----------------|----------------|----------------|-----------------|------|------|------|
| | | '97 | '98 | '99 | '02 | '97 | '98 | '99 | '02 |
| F | Sisymbrium altissimum (a) | - | - | 1 | - | - | - | .03 | - |
| F | Streptanthus cordatus | _b 8 | _a - | _a - | _a - | .02 | - | - | - |
| F | Tragopogon dubius | - | - | 4 | - | - | - | .00 | - |
| Total for Annual Forbs | | 62 | 6 | 7 | 62 | 1.09 | 0.05 | 0.04 | 0.27 |
| Total for Perennial Forbs | | 52 | 52 | 58 | 11 | 0.95 | 1.57 | 0.69 | 0.25 |
| Total for Forbs | | 114 | 58 | 65 | 73 | 2.05 | 1.63 | 0.74 | 0.52 |

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

BROWSE TRENDS --

Herd unit 21 , Study no: 21

| T y p e | Species | Strip Frequency | | | | Average Cover % | | | |
|------------------|----------------------------------------------|-----------------|-----|-----|-----|-----------------|------|------|------|
| | | '97 | '98 | '99 | '02 | '97 | '98 | '99 | '02 |
| B | Atriplex canescens | 0 | 1 | 1 | 1 | .03 | - | - | .15 |
| B | Chrysothamnus viscidiflorus viscidiflorus | 0 | 1 | 0 | 0 | - | - | - | - |
| B | Ephedra nevadensis | 0 | 1 | 0 | 1 | - | - | - | .00 |
| B | Gutierrezia sarothrae | 16 | 11 | 22 | 19 | .07 | .59 | .52 | .31 |
| B | Purshia tridentata | 0 | 1 | 1 | 0 | - | - | - | - |
| Total for Browse | | 16 | 15 | 24 | 21 | 0.10 | 0.59 | 0.52 | 0.46 |

BASIC COVER --

Herd unit 21 , Study no: 21

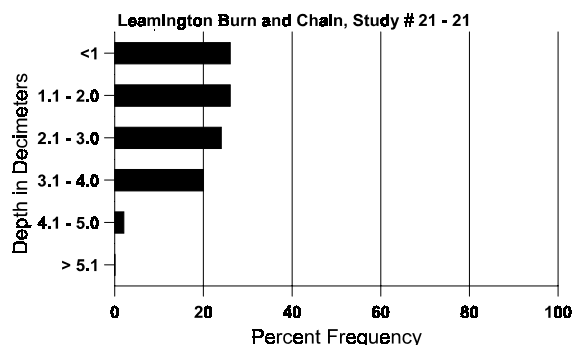
| Cover Type | Nested Frequency | | | | Average Cover % | | | |
|-------------|------------------|-----|-----|-----|-----------------|-------|-------|-------|
| | '97 | '98 | '99 | '02 | '97 | '98 | '99 | '02 |
| Vegetation | 257 | 406 | 409 | 397 | 10.43 | 34.11 | 25.44 | 24.21 |
| Rock | 372 | 350 | 335 | 357 | 16.54 | 20.72 | 15.36 | 20.31 |
| Pavement | 444 | 380 | 342 | 381 | 13.43 | 10.18 | 3.30 | 5.80 |
| Litter | 388 | 476 | 446 | 473 | 9.42 | 27.58 | 21.86 | 30.73 |
| Cryptogams | 45 | - | - | 8 | 1.96 | 0 | 0 | .01 |
| Bare Ground | 446 | 402 | 402 | 379 | 39.39 | 27.02 | 21.77 | 29.36 |

SOIL ANALYSIS DATA --

Herd Unit 21, Study no: 21, Leamington Burn and Chain

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 13.8 | 62.8 (14.4) | 7.0 | 46.0 | 33.1 | 20.9 | 3.0 | 12.3 | 195.2 | 0.9 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 21

| Type | Quadrat Frequency | | | | Pellet Groups per Acre '02 | Days Use per Acre (ha) '02 |
|--------|-------------------|-----|-----|-----|----------------------------|----------------------------|
| | '97 | '98 | '99 | '02 | | |
| Rabbit | 2 | 3 | 11 | 5 | - | - |
| Elk | 1 | 4 | 2 | - | 44 | 3 (8) |
| Deer | 3 | - | 1 | 2 | 9 | 1 (2) |
| Cattle | - | - | 4 | 2 | 104 | 9 (21) |

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 21

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total | | | | |
|------------------------------------------------|----------------------------|---------------------|---|------------------|---|-------------------|--------------------------|----------------|---|----|----|---|
| | | 1 | 2 | 3 | 4 | | | | | | | |
| Artemisia tridentata vaseyana | | | | | | | | | | | | |
| M | '97 | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '98 | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '99 | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '02 | - | - | - | - | - | - | - | 0 | 17 | 24 | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> | | | | |
| | '97 | 00% | | 00% | | 00% | | | | | | |
| | '98 | 00% | | 00% | | 00% | | | | | | |
| | '99 | 00% | | 00% | | 00% | | | | | | |
| | '02 | 00% | | 00% | | 00% | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '97 | 0 | Dec: | - | | | |
| | | | | | | '98 | 0 | | - | | | |
| | | | | | | '99 | 0 | | - | | | |
| | | | | | | '02 | 0 | | - | | | |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| <i>Atriplex canescens</i> | | | | | | | | | | | | | | | | | | |
| S | '97 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| | '98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| M | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '98 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 34 | 41 | 1 |
| | '99 | - | - | - | - | - | - | - | - | 1 | 1 | - | - | - | 20 | 31 | 28 | 1 |
| | '02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 26 | 30 | 1 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | + 0% | | | | | | | |
| '99 | | 00% | | | 100% | | | 00% | | | + 0% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '97 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '98 | 20 | | - | | | |
| | | | | | | | | | | | | '99 | 20 | | - | | | |
| | | | | | | | | | | | | '02 | 20 | | - | | | |
| <i>Chrysothamnus nauseosus albicaulis</i> | | | | | | | | | | | | | | | | | | |
| M | '97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | 0 |
| | '98 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 23 | 20 | 0 |
| | '99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 27 | 26 | 0 |
| | '02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 12 | 12 | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '97 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '98 | 0 | | - | | | |
| | | | | | | | | | | | | '99 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |

| A Y G R E | Form Class (No. of Plants) | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total |
|--------------------------------------------------|----------------------------|---------------------|---|------------------|---|--------------------|--------------------------------|----------------|
| | | 1 | 2 | 3 | 4 | | | |
| <i>Chrysothamnus viscidiflorus viscidiflorus</i> | | | | | | | | |
| Y | 97 | - | - | - | - | - | 0 | 0 |
| | 98 | 1 | - | - | - | - | 20 | 1 |
| | 99 | - | - | - | - | - | 0 | 0 |
| | 02 | - | - | - | - | - | 0 | 0 |
| M | 97 | - | - | - | - | - | 0 | - - 0 |
| | 98 | - | - | - | - | - | 0 | - - 0 |
| | 99 | - | - | - | - | - | 0 | 18 31 0 |
| | 02 | - | - | - | - | - | 0 | - - 0 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> |
| | '97 | 00% | | 00% | | 00% | | |
| | '98 | 00% | | 00% | | 100% | | |
| | '99 | 00% | | 00% | | 00% | | |
| | '02 | 00% | | 00% | | 00% | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '97 | 0 | Dec: - |
| | | | | | | '98 | 20 | - |
| | | | | | | '99 | 0 | - |
| | | | | | | '02 | 0 | - |
| <i>Ephedra nevadensis</i> | | | | | | | | |
| Y | 97 | - | - | - | - | - | 0 | 0 |
| | 98 | 1 | - | - | - | - | 20 | 1 |
| | 99 | - | - | - | - | - | 0 | 0 |
| | 02 | - | - | - | - | - | 0 | 0 |
| M | 97 | - | - | - | - | - | 0 | - - 0 |
| | 98 | - | - | - | - | - | 0 | 16 22 0 |
| | 99 | - | - | - | - | - | 0 | 11 28 0 |
| | 02 | 1 | - | - | - | - | 20 | 19 28 1 |
| % Plants Showing | | <u>Moderate Use</u> | | <u>Heavy Use</u> | | <u>Poor Vigor</u> | | <u>%Change</u> |
| | '97 | 00% | | 00% | | 00% | | |
| | '98 | 00% | | 00% | | 00% | | |
| | '99 | 00% | | 00% | | 00% | | |
| | '02 | 00% | | 00% | | 00% | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | '97 | 0 | Dec: - |
| | | | | | | '98 | 20 | - |
| | | | | | | '99 | 0 | - |
| | | | | | | '02 | 20 | - |

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|------------------------------------------------|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Gutierrezia sarothrae | | | | | | | | | | | | | | | | | | |
| S | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 98 | 1 | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 | |
| | 99 | 1 | - | - | - | - | - | - | - | - | - | - | - | 20 | | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| Y | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 98 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 99 | 5 | - | - | - | - | - | - | - | - | - | - | - | 100 | | | 5 | |
| | 02 | 2 | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 | |
| M | 97 | 25 | - | - | - | - | - | - | - | - | - | - | - | 500 | - | - | 25 | |
| | 98 | 20 | - | - | - | - | - | - | - | - | - | - | - | 400 | 12 | 18 | 20 | |
| | 99 | 36 | - | - | - | - | - | - | - | - | - | - | - | 720 | 11 | 16 | 36 | |
| | 02 | 27 | - | - | - | - | - | - | - | - | - | - | - | 540 | 6 | 10 | 27 | |
| D | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 98 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | 5 | - | - | - | - | - | - | - | - | - | - | 4 | 100 | | | 5 | |
| X | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 98 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | | 2 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | -20% | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | +51% | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | -17% | | | | | | | |
| '02 | | 00% | | | 00% | | | 12% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '97 | 500 | Dec: | 0% | | | |
| | | | | | | | | | | | | '98 | 400 | | 0% | | | |
| | | | | | | | | | | | | '99 | 820 | | 0% | | | |
| | | | | | | | | | | | | '02 | 680 | | 15% | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| X | 97 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 98 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | 60 | | | 3 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '97 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '98 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '97 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '98 | 0 | | - | | | |
| | | | | | | | | | | | | '99 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |

| A G R E | Y R E | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | Total |
|------------------------------------------------|-------------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|----|------|--------------------|--------------------------------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | |
| Purshia tridentata | | | | | | | | | | | | | | | | | |
| Y | 97 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| | 98 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 |
| | 99 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | |
| | '97 | 00% | | | 00% | | | 00% | | | | | | | | | |
| | '98 | 00% | | | 00% | | | 00% | | | + 0% | | | | | | |
| | '99 | 00% | | | 00% | | | 00% | | | | | | | | | |
| | '02 | 00% | | | 00% | | | 00% | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '97 | 0 | Dec: | - | | |
| | | | | | | | | | | | | '98 | 20 | | - | | |
| | | | | | | | | | | | | '99 | 20 | | - | | |
| | | | | | | | | | | | | '02 | 0 | | - | | |

SUMMARY

Summary and Comparison between Leamington Burn (21-20) and Leamington Burn and Chain (21-21)

Studies 21-20 and 21-21 were established in 1997 to monitor the recovery of the vegetation community on two treatments following the Leamington wildfire complex that burned in 1996. These studies were paired to compare differences in restoration efforts between seeding only (21-20) and seeding followed by one-way chaining (21-21) to cover the seed and enhance establishment of the seeded species. Both of these studies were seeded with the same seed mix.

As with the previous fire rehabilitation studies, the herbaceous understory, primarily the grass component, dominates the vegetation community at the Leamington sites. Perennial grasses have had higher cover and sum of nested frequency values on the burned, seeded, and chained site than on the burned, seeded, and unchained site in all years (Figures 1 and 2). The importance of chaining following seeding is to increase the

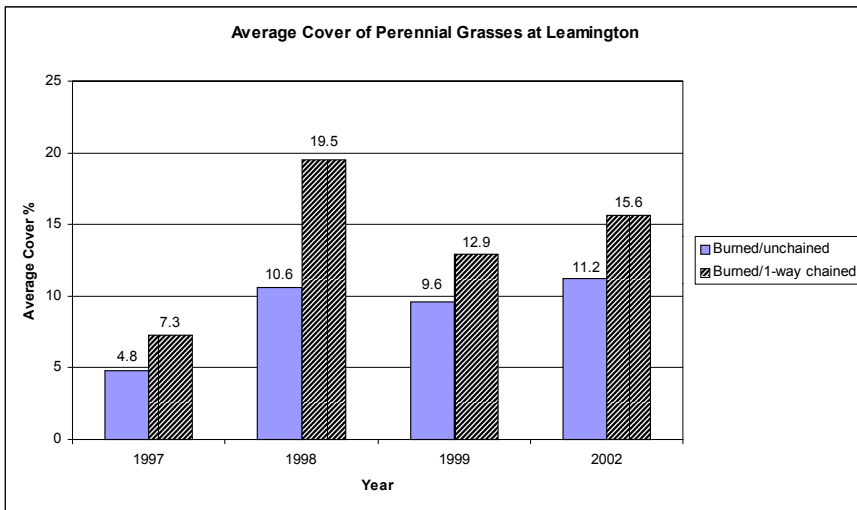


Figure 1. A comparison of percent cover values for perennial grasses from 1997-2002 on the Leamington fire rehabilitation studies.

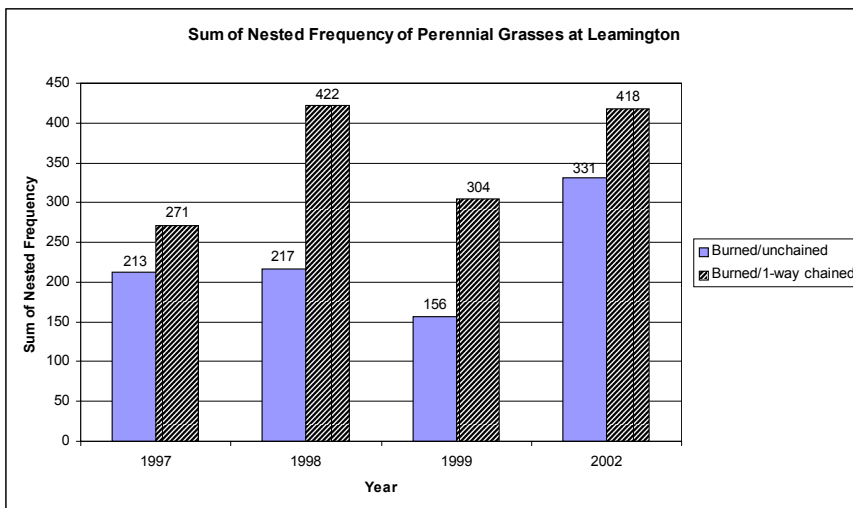


Figure 2. A comparison of sum of nested frequency values for perennial grasses from 1997-2002 on the Leamington fire rehabilitation studies.

number of safe sites for seeds to establish, and to cover the seed so it is not laying exposed on the soil surface. Getting perennial grasses established during the first growing season following seeding is critical to ensure the site does not become dominated by cheatgrass. Figures three and four show the cover and nested frequency values for cheatgrass between the two sites. Cheatgrass had a higher nested frequency value on the site that was burned, seeded, and unchained compared to the site that was burned, seeded, and chained, both initially and five years after the treatments were conducted. Percent cover of cheatgrass was higher the first three readings on the unchained site, and nearly the same on both sites in 2002, five years after treatment.

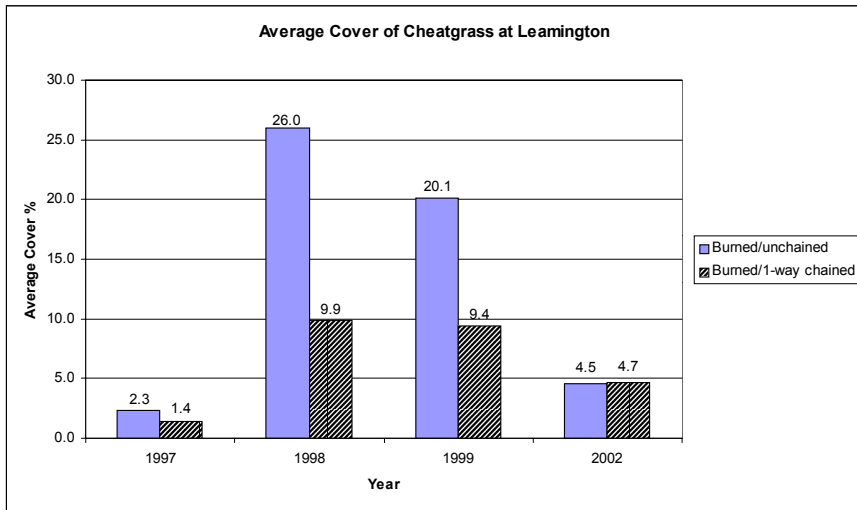


Figure 3. A comparison of percent cover of cheatgrass from 1997-2002 on the Leamington fire rehabilitation studies.

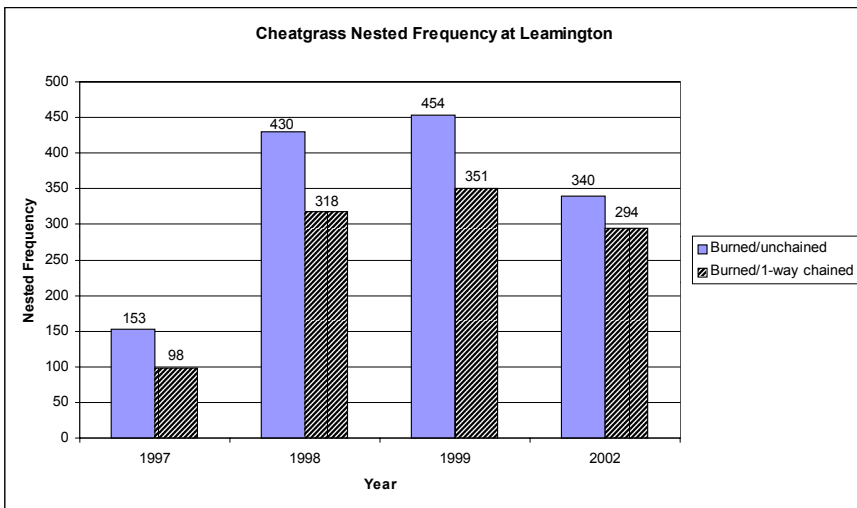


Figure 4. A comparison of cheatgrass nested frequency values from 1997-2002 on the Leamington fire rehabilitation studies.

Forbs have actually been more abundant on the unchained site at Leamington. Although both sites have a very limited and poor forb component, cover and sum of nested frequency values for perennial forbs were higher the first two years on the unchained site, and about equal on both sites in 1999 and 2002. The seeded forbs, alfalfa and small burnet, have been virtually non-existent on both sites in all readings. The browse component on both sites is very sparse. Fourwing saltbush was seeded with a dribbler, but occurs only sporadically on either site.

Trend Summary - Special Studies

| | Category | 2002 | |
|--------------------------------------------|-----------------------|------|------|
| 10R-32 PR Spring Total Exclosure | soil | est | |
| | browse | est | |
| | herbaceous understory | est | |
| 10R-33 PR Spring Livestock Exclosure | soil | est | |
| | browse | est | |
| | herbaceous understory | est | |
| 10R-34 PR Spring Outside Exclosure | soil | est | |
| | browse | est | |
| | herbaceous understory | est | |
| | Category | 1998 | 2002 |
| 19B-19 Paul Bunyan Burn | soil | est | 4 |
| | browse | est | N/A |
| | herbaceous understory | est | 3 |
| 19B-20 Paul Bunyan Burn and Chain | soil | est | 3 |
| | browse | est | 1 |
| | herbaceous understory | est | 3 |
| 19B-21 Jericho State Section | soil | est | 3 |
| | browse | est | N/A |
| | herbaceous understory | est | 2 |
| 19B-22 Jericho BLM | soil | est | 2 |
| | browse | est | 1 |
| | herbaceous understory | est | 4 |

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up,
 (est)= established, (n/a) = no trend, (susp) = suspended, (NR) = not read

| | Category | 1997 | 1998 | 2002 |
|---------------------------------------|-----------------------|------|------|------|
| 21-20 Leamington Burn | soil | est | 4 | 1 |
| | browse | est | 3 | 3 |
| | herbaceous understory | est | 1 | 4 |
| 21-21 Leamington Burn and Chain | soil | est | 4 | 3 |
| | browse | est | 4 | 3 |
| | herbaceous understory | est | 4 | 3 |

(1) = down, (2), slightly down, (3) = stable, (4) = slightly up, (5) = up,
(est)= established, (N/A) = no trend, (susp) = suspended, (NR) = not read

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