

UTAH BIG GAME RANGE TREND STUDIES 1997 Volume 2



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REPORT FOR FEDERAL AID PROJECT W-135-R-18**

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

**UTAH BIG GAME
RANGE TREND STUDIES
1997 Volume 2**

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Performance Report for Federal Aid Project W-135-R-18

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UTAH DEPARTMENT OF NATURAL RESOURCES
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PROGRAM NARRATIVE

State: UTAH

Project Number: W-135-R

Project Title: Statewide Big Game Range Trend Studies

Problem and Need: The ability to monitor vegetation composition changes (range trend) on key big game areas is an important part of a big game management program. The health and vigor of big game populations are closely associated with the quality and quantity of forage in key areas. Key areas are defined as those areas "where deer or other big game have demonstrated a definite pattern of use during normal climatic conditions over a long period." This project will emphasize deer and elk habitat although monitoring efforts may include other big game species as needed. Winter ranges for both deer and elk will comprise the bulk of the trend studies, although there are certain herd units where summer range is the portion of the unit that limits carrying capacity. Most of the key areas are located on public lands (BLM, USFS or State Lands) that are impacted by livestock grazing programs. Most of these programs are summarized in allotment management plans (USFS) or resource management plans (BLM) which are used to direct the management of a variety of resources on public lands (rangelands, watersheds, energy and minerals, recreational opportunities, etc.). This project was initiated to direct the attention of local interagency committees on the proper management of key big game areas throughout the state. The Division adopted monitoring guidelines established by the Utah State Interagency Committee (staff level biologists from BLM, USFS and DWR) which assures that data collected by DWR is compatible with that collected by both federal agencies. This limits the amount of duplication involved in monitoring certain key areas where either BLM, USFS or DWR may have overlapping responsibilities or concerns about range trend.

- Objectives:**
1. Continue to monitor range trend in all key areas within a DWR administrative region annually. This could also include requests for any area of the state that has need of current range trend information because of special habitat needs or concerns regarding big game and livestock interactions.
 2. Classify every trend study site according to ecological site and identify habitat objectives based on site potential.
 3. Prepare an annual report which will include herd unit descriptions, trend study narratives and herd unit evaluations for all herd units in a region annually.
 4. Foster cooperative efforts among interagency personnel with respect to trend study site selection, sharing trend data, development of trend monitoring procedures and data analysis, and the identification of management objectives for study sites.
 5. Monitor vegetation in wildlife habitat improvement projects.
 6. Use the information generated by this project to inform local interagency committees of key habitat areas that are declining in value for big game.
 7. Propose management strategies that are designed to correct habitat limitations in key areas.

Expected Results and Benefits:

Every five years the trend studies in each of the five regions will be reread and the status of the vegetation in key areas of each herd unit will be evaluated. The local interagency committee will be able to use the information to determine if key areas are declining in habitat value and if so, to recommend adjustments in management programs that would help restore big game habitat.

REMARKS

The work completed during the 1997 field season and reported in this publication involves the reading of interagency range trend studies in the DWR Central and Southern Regions. Trend studies surveyed in these management units were established in 1983, 1987, and 1989 with rereads in 1989, 1991, 1992, and 1997. Some new sites were established in 1997 as well.

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

Dixie National Forest
Powell Ranger District

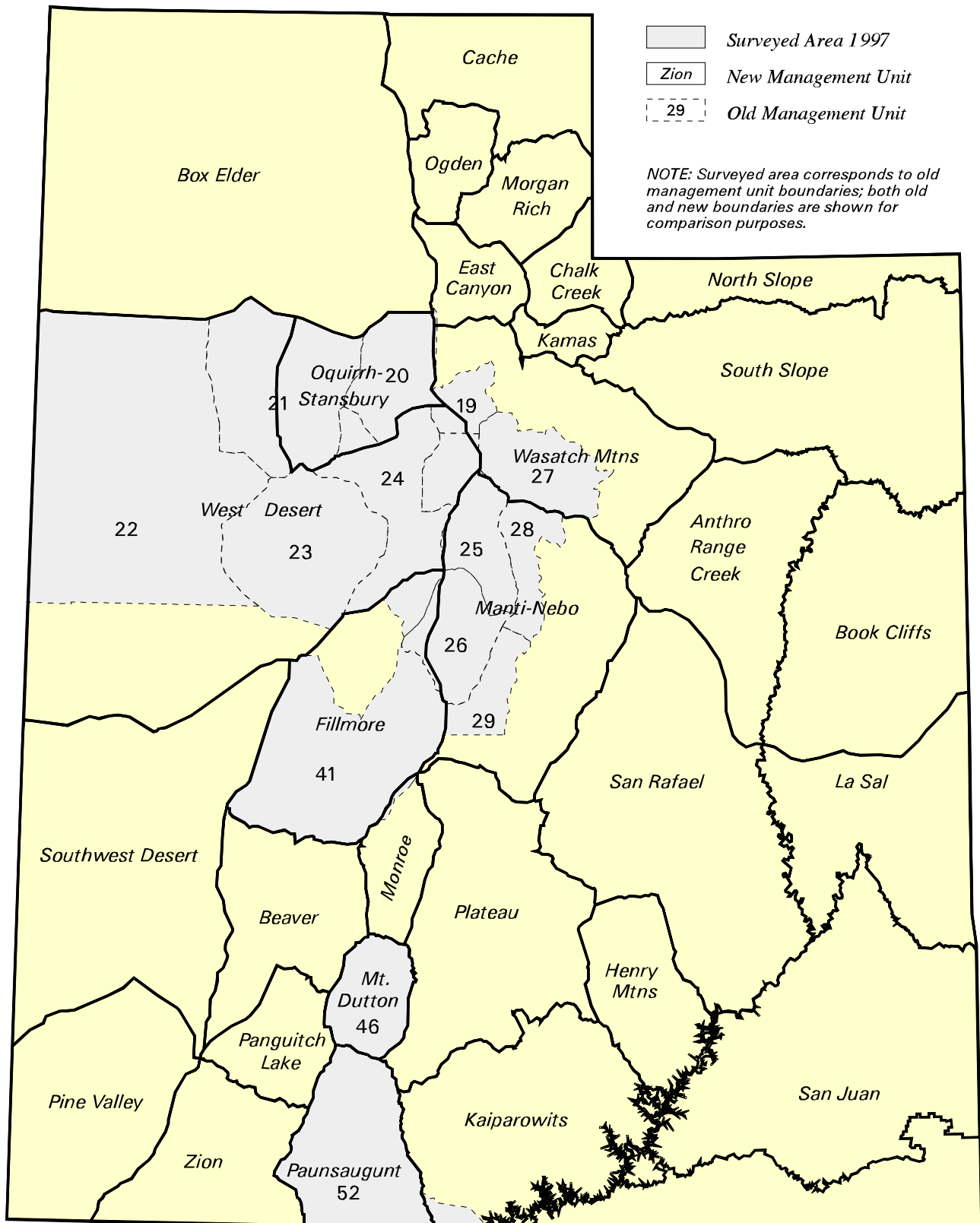
Wasatch-Cache National Forest
Salt Lake/Tooele Ranger District

Fish Lake National Forest
Fillmore Ranger District
Richfield Ranger District

Bureau of Land Management
House Range Resource Area
Warm Springs Resource Area

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

Management Units Surveyed in 1997



RANGE TREND STUDY METHODS

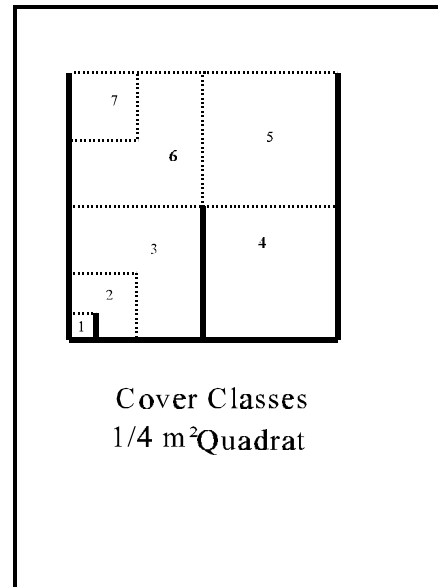
Trend monitoring studies depend greatly on site selection, especially when dealing with large geographic areas such as wildlife management units. Since it is impossible to intensively monitor all vegetative or habitat types within a unit, it is necessary to concentrate on specific sites and/or "key" 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, the 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 the transects proper identification.

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 base line 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. 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.

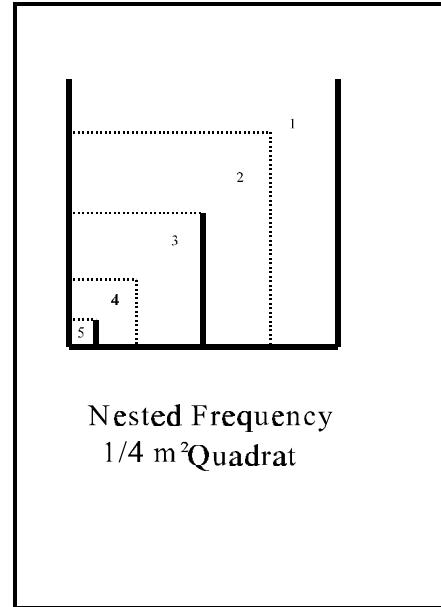
Currently, cover is determined using a slightly modified Daubenmire (1959) cover class method. The seven cover class are: 1) .01-1%, 2) 1.1-5%, 3) 5.1-25%, 4) 25.1-50%, 5) 50.1-75%, 6) 75.1-95%, 7) 95.1-100%. For example, to estimate vegetative cover with this method, an observer would visualize which 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.

Canopy cover of shrubs or trees above eye level 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.



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.

Higher nested frequency scores represent a higher abundance for that plant species. These values are used to help determine changes in trend and composition through time. It has been found to be a more sensitive measurement for changes taking place within plant communities than quadrat frequency (Mosley and others 1986). Plant cover and density values are not reliable indicators of trend 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 to give 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 “Vegetative 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. Strip frequency is determined by dividing each of the five 100 foot belts into 20 equal five foot segments, allowing 100 five foot segments. For example, if a species was rooted in 25 of the shrub strips, strip frequency for this species would be 25%. All shrubs rooted within each strip are counted and placed in the following 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.

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.

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 actual trends in shrub populations with low numbers. Each 100th acre shrub strip is divided into 20, 5 foot segments. Presence or absence is now determined by 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.

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. Tree density is determined by the point-center quarter method centered on each end of the 5, 100 ft base lines. 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.

TREND DETERMINATION

The methods described above rely on relative and absolute measurements of plant composition as determined from the frequency and density data. In addition, estimates of plant vigor, height, crown diameter, form class, and age class are utilized to characterize 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 determine trend on key browse species through time. These include:

- 1) changes in density or number of plants/acre
- 2) proportion of decadent plants
- 3) biotic potential or proportion of seedlings in population
- 4) proportion of young plants in population
- 5) proportion of individuals heavily browsed
- 6) proportion of plants in poor vigor
- 7) changes in height and crown diameter measurements
- 8) changes in browse composition
- 9) strip frequency values

Trends in herbaceous plants as a group or as a single “key” species are 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 these basic ground cover measurements and cover composition (herbs vs shrubs) between years as well as comparing photos and observer observations between readings. On newly established studies, a more subjective or apparent assessment is made from qualitative comparisons.

The following tables and partial tables have been taken from Herd Unit 33-1 vegetative trends summary to help illustrate some basic comparisons that can be made with the data. The “vegetative trends” table summarizes average cover, quadrat frequency, and nested frequency data for individual grass and forb species. The table contains all the grass species found on site 33-1. The 1987 readings included only nested and quadrat frequency data for perennial species. The 1994 trend studies have data for all perennial and annual species as well as cover estimates for individual species. Grasses had a combined total cover of 11.52%. *Agropyron cristatum* for example, had a sum of nested frequency of 135. By 1994, the sum of nested frequency value declined to 106. The asterisk indicates that the change was statistically significant. Quadrat frequency also indicated a decline from 55 to 39. Cover was estimated at 2.46% for *A. cristatum*. Trend for this grass is down due to a significant decline in nested frequency. In 1987, perennial grasses had a sum of nested frequency value of 560. This value declined to 485 by 1994, indicating a slightly downward trend for grasses on this site.

VEGETATIVE TRENDS --

Herd unit 33, Study no: 1

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover % '94
		'87	'94	'87	'94	
G	Agropyron cristatum	135	*106	55	39	2.46
G	Bouteloua gracilis	15	19	5	6	1.07
G	Bromus inermis	75	*67	31	27	.63
G	Koeleria cristata	61	*3	23	1	.03
G	Oryzopsis hymenoides	-	3	-	1	.00
G	Poa bulbosa	220	*256	81	85	7.14
G	Poa fendleriana	-	*16	-	7	.06
G	Sitanion hystrix	6	1	3	1	.00
G	Stipa comata	48	*14	21	7	.11
Total for Grasses		560	485	219	174	11.52

* indicates a significant difference at " = .10

The browse trends table below summarizes strip frequency and cover for all shrub species. Three of the shrubs found on site 33-1 are listed. Wyoming sagebrush, for example has a stip frequency of 86 out of a possible 100. Cover is estimated at 16.28%.

BROWSE TRENDS --

Herd unit 30A, Study no: 1

Type	Species	Average Cover %	
		'87	'94
B	Amelanchier utahensis	18	2.25
B	Artemisia tridentata wyomingensis	86	16.28
B	Chrysothamnus viscidiflorus	71	3.62
Total for Browse		175	26.85

The basic cover table summarizes nested frequency and average cover of vegetation, rock, pavement, litter, cryptogams, and bare ground. Average cover for the previous method used ('87) adds up to only 100%, while cover with the current method ('94) can estimate several layers of plant and ground cover and will usually exceed 100%. For vegetation cover, the previous method only sampled basal vegetative cover (15.25) while the new method estimates projected vegetational cover (33.38). 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 33, Study no: 1

Cover Type	Nested Frequency '94	Average Cover %	
		'87	'94
Vegetation	333	15.25	33.38
Rock	10	0	.02
Pavement	18	0	.03
Litter	387	61.00	46.05
Cryptograms	111	3.50	1.50
Bare Ground	301	20.25	32.20

The soil analysis table summarizes data for the site. Effective rooting depth is an average of 25 soil pentrometer 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, 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., 61.2°F), with the average depth (in inches) as the lower measurement (18.3). Chemical and textural characteristics are also listed and were determined by a soils laboratory analysis of a composite sample taken near each of the 5 baseline starting stakes.

SOIL ANALYSIS DATA --
Herd Unit 33, Study no: 01

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
19.7	61.2 (18.3)	8.2	43.6	34.4	28.0	1.6	15.5	700.8	.61

The descriptive terms to use 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

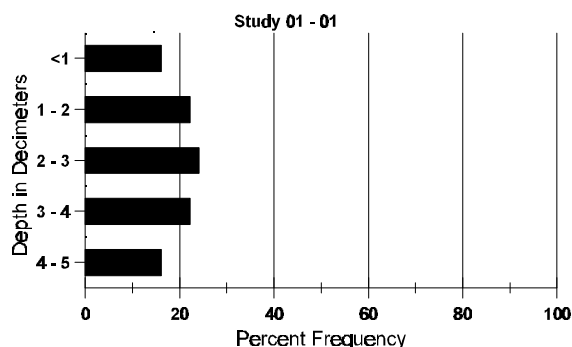
Percent organic matter (%OM) refers to the amount of organic matter in the top 12 inches of soil. Parts per million of phosphorus and potassium are also included. Values for phosphorus and potassium less than 10 ppm and 70 ppm respectively may be limiting to vegetation growth.

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 get a better awareness 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 there is from 1 to >5 decimeters.

Stoniness Index



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 1992. For example in 1994, rabbit pellet groups were found in 44% of the quadrats placed on study 33-1, 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 36, Study no: 1

Type	Quadrat Frequency '94
Rabbit	44
Elk	28
Deer	14

It was determined that we needed additional information on pellet-groups. Therefore, a much larger sample distributed over a larger area is now read in conjunction with the vegetative transects. The pellet-group transect has a minimum of 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 trend transect. 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 and the pellet groups within the circular plots are removed or marked.

The following is part of a browse table which summarizes characteristics of shrubs on study 33-1. Total plants/acre for Wyoming big sagebrush, excluding seedlings (S) and dead (X) was 3,199 in 1987 and 4,800 in 1994. Seedlings are excluded from the population estimate because with summer drought, they may all die by late fall causing great fluctuations in population estimates from year to year. Since 1992, a much larger shrub sample is utilized to better characterize the shrub populations. Therefore, changes in density do not necessarily indicate changes in trend. Especially those species that are clumped and/or have discontinuous distributions. This is where smaller samples can either over estimate or under estimate populations depending where they were sampled. Other characteristics like percent decadency, vigor, percent heavy hedging, biotic and reproductive potential, etc. should be given more weight in determining shrub trend. The following data on Wyoming big sagebrush shows the proportion of decadent shrubs (abbreviated as Dec: in the table) in the population increased from 12% in 1987 to 42% by 1994. This kind of change in percent decadence has not been unusual with prolonged drought since 1986. More seedlings were encountered in 1994, yet the number of young plants remained about the same. Only 2% of the sagebrush displayed poor vigor or were classified as dying in 1987, this increased to 10% by 1994. This 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 8% in 1987 to only 2% by 1994. 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 gone from 42% in 1987 down to 13% in 1994. This is determined by dividing the number of shrubs in form classes 2 and 5 by the total number of shrubs sampled. The average height of sagebrush and crown diameter has increased from 13" x 17" to 18" x 32" indicating large healthy plants. Considering all these factors, trend for sagebrush is stable to slightly up due to an improved biotic potential (number of seedlings), lack of heavy use, good vigor, and the moderately high decadency rate is tolerable for only 10% of the decadent plants are classified as having poor vigor or dying.

BROWSE CHARACTERISTICS --

Herd unit 33, Study no: 1

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches)		Total				
		1	2	3	4		Ht.	Cr.					
<i>Artemisia tridentata wyomingensis</i>													
S	87	-	-	-	-	-	-	-	-	0		0	
	94	45	-	-	2	-	-	-	-	47	-	-	47
Y	87	2	1	1	-	-	-	-	-	4	-	-	4
	94	10	-	-	-	-	-	-	-	10	-	-	10
M	87	20	15	3	-	-	-	-	-	37	-	1	38
	94	96	26	3	4	-	-	-	-	121	-	8	129
D	87	2	4	-	-	-	-	-	-	6	-	-	6
	94	94	4	2	1	-	-	-	-	85	-	3	101
X	87	-	-	-	-	-	-	-	-	-	-	-	0
	94	-	-	-	-	-	-	-	-	-	-	-	120
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'87		42%		08%		02%		+33%					
'94		13%		02%		10%							
Total Plants/Acre (excluding Dead & Seedlings)										'87	3199	Dec:	13%
										'94	4800		42%

Management background information, photos, 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 line and a close-up picture of a quadrat from

each belt are used 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.

Other types of sampling have been added to the overall trend survey methodology because it was felt that more information was needed with regard to the soils. Now we measure soils for: effective soil depth, amount of rock in the upper soil profile (stoniness index), and soil temperature at approximately 21 inches in depth. A composite soil sample is taken from each of the vegetative sampling belts. Soil analysis includes: pH, texture analysis (percent sand, silt, and clay), percent organic matter, and amounts of trace elements (phosphorus, potassium, and electrical conductivity).

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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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.

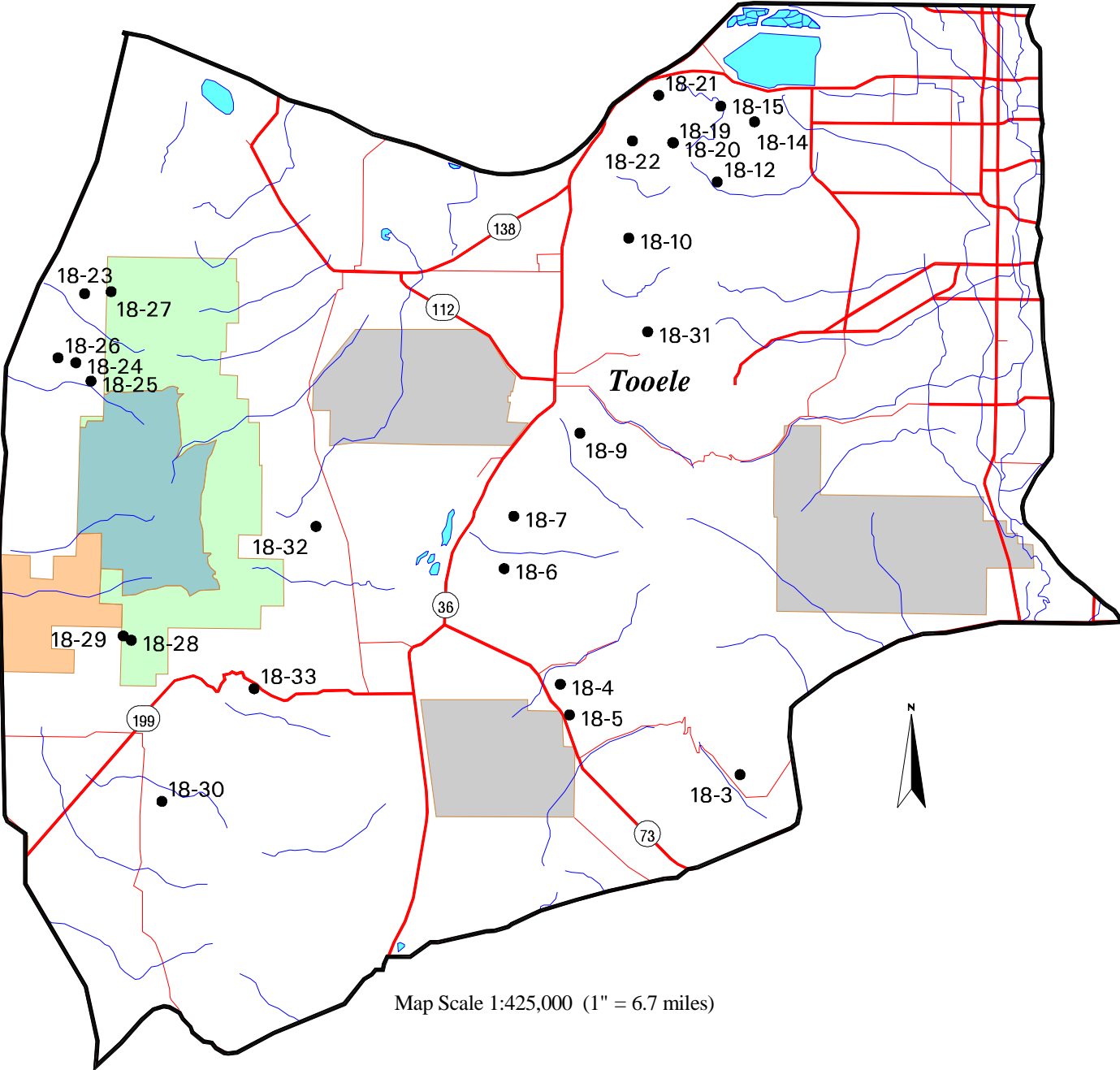
The name of the site and directions for locating the site are given on the location page. Due to many changes in management unit boundaries, trend studies have been renumbered. The previous trend study number is found in parenthesis following the trend study number currently being used. Also included on this page are the range 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

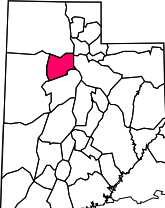


Map Scale 1:425,000 (1" = 6.7 miles)

Legend

- Wasatch National Forest
- Deseret Peak NWA
- Skull Valley Indian Reservation
- Military Reservation
- Water Body
- Transect Location
- Primary Road
- Secondary Road
- Water Course

Unit Location



MANAGEMENT UNIT - 18 (20,21) - 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

Herd unit numbers have changed names and numerical designation three times since 1993. Originally this new Management Unit, which had its boundaries realigned most recently in 1997, was mostly made up of Deer Herd Units 20 (Heaston) and 21 (Stansbury). These herd units were originally made up of Deer Herd Units 11a, 11b, 11c (Heaston), and 12 (Stansbury). Big game activity of the new unit basically 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 6% and 14% of the summer and winter range respectively. 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 wintering browse species. Study sites were originally established on the unit in 1983. Rereads occurred on some of the sites in 1989, 1990 and 1997. Several sites were discontinued but text from these sites has been retained. Past reports (1983, 1989 and 1990) will have to be referenced to obtain data table summaries.

DISCUSSION

Trend Study No. 18-1 (20-1)

***This study has been dropped but text from the 1983 report has been retained. Refer to the 1983 Utah Range Trend Studies Report for data tables.

The Barney Canyon study samples normal winter range located slightly north of Barney Canyon on land owned by Kennecott Copper Corporation. The site is on a gentle (15%-20%) south to southeast facing hillside at 6,550 feet elevation. This site is thought to represent the middle to upper portion of normal winter range. Deer pellet groups occur frequently and elk pellet groups occur much less. Forage utilization by big game was difficult to determine at that time because of intensive sheep grazing. This also makes distinguishing deer pellet groups difficult. The range type is mixed Gambel oakbrush with openings of mountain big sagebrush.

Soil is shallow and rocky but otherwise has a rather fine texture. Vegetative and litter cover are good under the oak clones, however much less in the sagebrush openings. Numerous roads and sheep trails crisscross the area. These are obvious beginning points for erosion. Soil deposition occurs primarily under the oak canopies. Sagebrush openings suffer from light to moderate sheet erosion.

The most prevalent browse plant is Gambel oak. On the density plots, it comprised 97% of the browse density. The population varies in height from knee-high to just over 10 feet. About 75% was estimated as available. Utilization is moderate and occasionally even heavy. Age structure is dominated by mature plants and followed by significant numbers of young plants. Other shrubs are of secondary importance. Mountain big sagebrush occurs periodically in openings, but appears on the decline. Sagebrush is not heavily utilized, yet is suffering from competition with the oak and a vigorous herbaceous understory. Many young oak can be found in the interspaces between the oak clones.

Grasses are scarce on this site. Only two species, both of which occur rarely, were encountered. Grasses show light levels of current sheep utilization. The forb component comprises the dominant understory. Although a good mix of species was observed, mulesears wyethia is by far the most abundant. It makes up 56% of the measured forb density and ranks first in frequency of occurrence. Mulesears wyethia, along with a few other increaser forb species are becoming more numerous in response to sheep use. Almost all forbs showed evidence of current sheep utilization in 1983. Mountain dandelion especially appeared to be preferred.

1983 APPARENT TREND ASSESSMENT

Soil condition is only fair due to extensive disturbance from roads and vehicle abuse. If vehicles can be restricted to the main road, many of the old trails should stabilize. Sheep grazing does not appear especially damaging, except where they have trailed along raw road cuts. However, sheep are having an effect on vegetative composition. Increaser forbs such as mulesears wyethia and goldenrod appear to be rapidly increasing, especially in the oak interspaces. These openings may not remain for very long. Many young oak sprouts can be found throughout them. In contrast, mountain big sagebrush is probably going out.

DISCUSSION

Trend Study No. 18-2 (20-2)

***This study has been dropped but text from the 1983 report has been retained. Refer to the 1983 Utah Range Trend Studies Report for data tables.

The City Canyon study is located on what is considered high winter or transition spring-fall range in City Canyon. The study is at 6,400 feet elevation on a steep (65%) south to southeast slope. The range type is a mixed Gambel oak and basin big sagebrush with a vigorous and diverse herbaceous understory. Deer use appeared to be light in 1983. At that time cattle use was limited to the canyon bottom with little use up the steep hillsides.

Soil is shallow, coarse textured, rocky and well drained. Parent material appears to be sandstone and a grey colored shale-like rock. There is ongoing soil erosion, but it is not extensive for this steep of a slope. Vegetative and litter cover are adequate.

Browse composition is dominated by Gambel oak and basin big sagebrush. Both populations are stable with light utilization, high vigor and reproduction adequate for stand maintenance. Gambel oak tends to be low growing and many young plants are present indicating it may be increasing slightly. Other shrubs occur occasionally, but none appear to be increasing or decreasing in abundance. They include: mountain snowberry, Saskatoon serviceberry, Utah juniper, broom snakeweed, pricklypear cactus, true mountain mahogany, and stickyleaf low rabbitbrush.

Grasses are common yet not abundant. The two most frequent are bluebunch wheatgrass and Sandberg bluegrass. The latter species seems especially vigorous at this site. Another fairly frequent grass would be Letterman needlegrass. Utilization of grasses are uniformly light. Forbs are the most abundant understory component. Twenty species encountered on the frequency and density plots represent the most commonly occurring forbs. In addition, another 8-10 species were observed but not encountered. A fair number of annual forbs occurred on the site but none were abundant. Forbs show more evidence of current use than any other class of forage. Most preferred were the two Lomatium species, arrowleaf balsamroot, tapertip hawksbeard, spring parsley, and showy goldeneye.

1983 APPARENT TREND ASSESSMENT

Both the data and subjective evaluation of the site indicate that soil and vegetation trend are stable. Erosion is within acceptable limits, forage diversity and density are adequate and few signs of large scale vegetative change are apparent. Overall utilization is light.

Trend Study 18-3-97

Study site name: Manning Canyon.

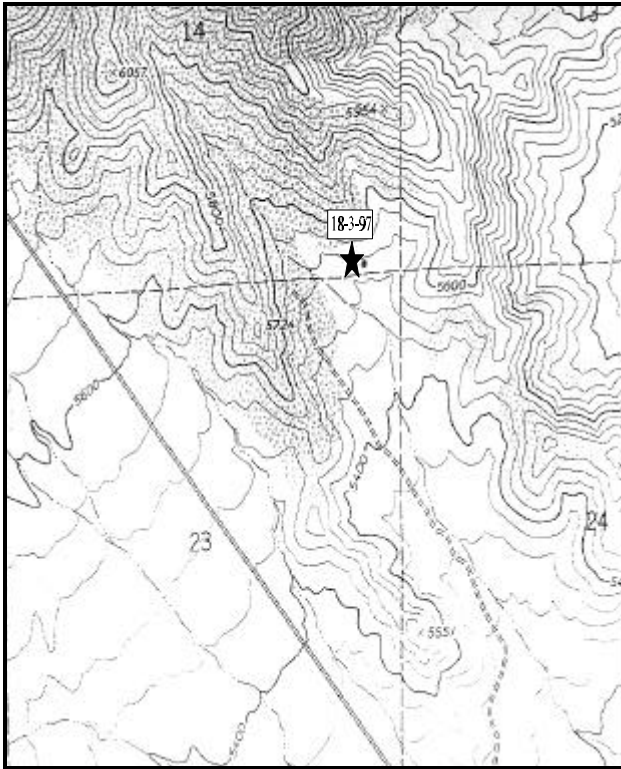
Range type: Juniper - Pinyon

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

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft).

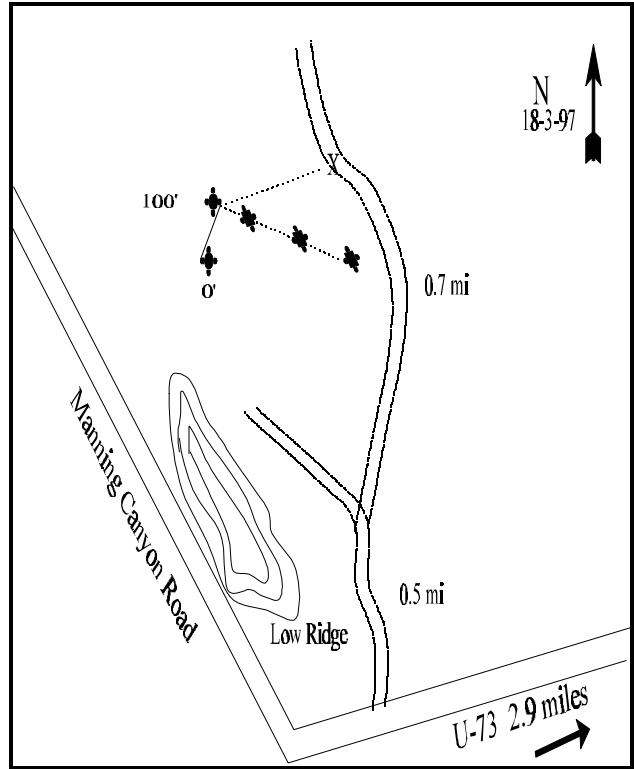
LOCATION DESCRIPTION

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 (i.e., to the right) on a dirt road for 0.5 miles to a fork. Take the right fork (i.e., east) for an additional 0.7 mile. Walk south on an azimuth of 180 degrees 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, Utah

Township 6S , Range 3W , Section 14



Diagrammatic Sketch

UTM 4460408.501 N, 402956.103 E

DISCUSSION

Trend Study No. 18-3 (20-3)

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. Deer use of the area appears to have been heavy in the past. Currently, deer use is still moderately heavy with a quadrat frequency of pellet groups at 52% and elk use is light at only 2% quadrat frequency. In addition, there has been domestic sheep and cattle use noted in past readings. This area is managed by the BLM. Physically the site is nearly level with an elevation of 5,500 feet. The range type is essentially a pinyon-juniper, big sagebrush-grass ecotone.

The study is on an alluvial floodplain with soils that are gravelly to cobbly. There appears to be no strong development of distinct horizons. Soil textural analysis indicates it to be a clay loam soil. Effective rooting depth (see methods) is over 14 inches with a soil temperature nearly 49°F at 17 inches. Phosphorus is low at 7.7 ppm and when below 10 ppm can be a limiting factor to plant development. Analysis of the soil also show it to have a pH of 7.9 which is considered moderately alkaline and could restrict the establishment of some species. Ground cover is fair and only the gentle terrain prevents serious erosion and soil loss. 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 currently makes up 61% of the browse cover. 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 was a cause of some concern because it had increased to 88% by 1990. By 1997, the estimated sagebrush population has increased, but that is the result of the significantly increased sample size which gives significantly better population estimates for browse populations. Furthermore, there was evidence that a large proportion of the population had died off in the last 10 years or so with about 42% of the plants categorized as dead. This downward trend appears to be slowing down, but currently 38% of the decadent plants were still classified as dying (about 260 plants/acre). Other browse species for 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. Juniper and pinyon are at relatively low densities. Point-quarter estimated densities are 34 and 7 plants/acre respectively. Occasionally found browse species include: fourwing saltbush, grey horsebrush, and a small rabbitbrush.

Grasses, especially annuals, are one of the principal understory components. Cheatgrass brome, in places, is capable of carrying a fire. Perennial grasses are all bunch grasses which show evidence of considerable past grazing use. Clumps 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 strong increasers such as rock goldenrod, are indicative of heavy grazing use. The area is also characterized by at least four species of milkvetch or locoweed, of which none are abundant. Annual forbs are common. Pale allysum is of particular note because, when dry, it often is thick and vigorous enough to provide a good fuel source for carrying a wildfire.

1983 APPARENT TREND ASSESSMENT

Soil trend is barely stable. 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 allysum. Vegetative trend is down. The key browse species, Wyoming big sagebrush, appears to be declining. Increaser shrubs and forbs appear to be expanding. Grasses are stable, but a slowly thickening juniper stand may threaten all classes of vegetation.

1990 TREND ASSESSMENT

The Wyoming big sagebrush component continues to show signs of serious decline as evidenced by the sharp increase in percent decadence. It has now gone from 25% to 88%, while 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. The trees appear to be increasing. The point-centered quarter method 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 increasingly covered by erosion pavement. However, percent bare soil has decreased from 26% to 16% and vegetative basal cover has increased.

TREND ASSESSMENT

soil - slightly improved, but still only fair

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

herbaceous understory - stable

1997 TREND ASSESSMENT

The trend for soil is still slightly improving with further decreases in percent bare soil. In addition, the proportion of herbaceous cover to total vegetative cover is excellent at 68%. The herbaceous cover is more protective of the soils than aerial cover from shrubs and trees. Trend for the key browse, Wyoming big sagebrush, is starting to show signs of improvement. However, 38% of the decadent plants are classified as dying. Percent decadence has decreased from the high of 88% in 1990 to only 31% currently and vigor has improved. The 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 the Wyoming big sagebrush. The herbaceous understory shows a slight improvement, mostly by bluebunch wheatgrass. Annuals still contribute too much to the composition. Two annuals, cheatgrass brome and pale allysum make up 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

browse - slightly improving for Wyoming big sagebrush

herbaceous understory - slightly improved, but poor composition with too many annuals

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 3

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'90	'97	'83	'90	'97	
G	<i>Agropyron spicatum</i>	110	133	162	40	54	52	9.96
G	<i>Bromus tectorum</i> (a)	-	-	282	-	-	84	6.69
G	<i>Oryzopsis hymenoides</i>	_b 77	_{ab} 64	_a 41	38	29	20	1.82
G	<i>Poa secunda</i>	_a 1	_a 15	_b 39	1	7	15	.28
G	<i>Sitanion hystrix</i>	89	55	33	47	25	17	.53
G	<i>Stipa comata</i>	_a 11	_{ab} 29	_b 54	5	13	21	2.65
Total for Grasses		288	296	611	131	128	209	21.96
F	<i>Alyssum alyssoides</i> (a)	-	-	315	-	-	95	3.25
F	<i>Astragalus</i> spp.	6	-	1	2	-	1	.03
F	<i>Castilleja linariaefolia</i>	_a -	_a -	_b 11	-	-	5	.07
F	<i>Calochortus nuttallii</i>	_b 17	_a -	_b 15	11	-	8	.04
F	<i>Cirsium</i> spp.	-	-	1	-	-	1	.00
F	<i>Descurainia pinnata</i> (a)	-	-	3	-	-	1	.03
F	<i>Erodium cicutarium</i> (a)	-	-	3	-	-	1	.00
F	<i>Eriogonum umbellatum</i>	-	-	4	-	-	2	.01
F	<i>Gilia</i> spp. (a)	-	-	3	-	-	1	.00
F	<i>Lathyrus brachycalyx</i>	3	-	4	1	-	2	.06
F	<i>Lactuca serriola</i>	-	-	-	-	-	-	.00
F	<i>Petroradia pumila</i>	23	37	22	10	16	7	.94
F	<i>Phlox hoodii</i>	-	-	4	-	-	1	.00
F	<i>Phlox longifolia</i>	2	-	-	1	-	-	-
F	<i>Ranunculus testiculatus</i> (a)	-	-	3	-	-	1	.00
F	<i>Sphaeralcea coccinea</i>	20	21	24	9	8	12	.28
F	<i>Streptanthus cordatus</i>	_b 9	_a -	_{ab} 6	4	-	3	.16
F	<i>Vicia americana</i>	-	2	3	-	1	1	.15
Total for Forbs		80	60	422	38	25	142	5.07

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 18 , Study no: 3

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata wyomingensis	61	7.70
B	Chrysothamnus viscidiflorus stenophyllus	11	.48
B	Ephedra viridis	1	.85
B	Gutierrezia sarothrae	7	.19
B	Juniperus osteosperma	1	3.34
B	Opuntia spp.	2	-
Total for Browse		83	12.57

BASIC COVER --

Herd unit 18 , Study no: 3

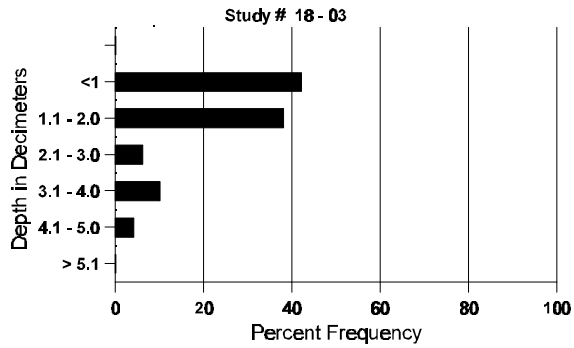
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'90	'97
Vegetation	376	1.50	5.25	38.40
Rock	159	5.25	7.25	6.62
Pavement	251	4.25	25.75	13.51
Litter	380	59.25	41.00	39.88
Cryptogams	170	4.00	4.75	4.61
Bare Ground	195	25.75	16.00	8.93

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 03

Effective rooting depth (inches)	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	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 18 , Study no: 3

Type	Quadrat Frequency '97
Rabbit	10
Elk	2
Deer	52

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 3

A G 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 nova																							
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0					
	90	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	33	8	10	1		
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	12	15	0		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>					<u>%Change</u>										
		'83			00%			00%			00%		Appeared										
		'90			100%			00%			00%		Died out										
		'97			00%			00%			00%												
Total Plants/Acre (excluding Dead & Seedlings)														'83		0		Dec:					
														'90		33							
														'97		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>Artemisia tridentata wyomingensis</i>															
Y	83	3	1	-	-	-	-	-	-	4	-	-	133		4
	90	1	-	-	-	-	-	-	-	1	-	-	33		1
	97	2	-	-	-	-	-	-	-	2	-	-	40		2
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
D	83	-	-	12	-	-	-	-	-	2	-	10	400		12
	90	15	21	1	1	-	-	-	-	26	-	7	1266		38
	97	22	4	-	1	6	1	-	-	21	-	-	680		34
X	83	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	-	-	-	-	-	-	-	-	-	-	-	1580		79
% 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%									
Total Plants/Acre (excluding Dead & Seedlings)										'83	1599	Dec:	25%		
										'90	1432		88%		
										'97	2160		31%		
<i>Chrysothamnus viscidiflorus stenophyllus</i>															
S	83	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	1	-	-	-	-	-	-	-	1	-	-	20		1
Y	83	5	-	-	-	-	-	-	-	5	-	-	166		5
	90	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	1	-	-	-	-	-	-	-	1	-	-	20		1
M	83	6	-	-	-	-	-	-	-	6	-	-	200	12 16	6
	90	-	1	-	-	-	-	-	-	1	-	-	33	5 4	1
	97	15	-	-	-	-	-	-	-	15	-	-	300	11 12	15
D	83	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	1	-	-	-	-	-	-	-	-	-	1	33		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%		-82%							
'90		50%		00%		50%		+81%							
'97		00%		06%		06%									
Total Plants/Acre (excluding Dead & Seedlings)										'83	366	Dec:	0%		
										'90	66		50%		
										'97	340		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>Cowania mexicana stansburiana</i>																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	1	-	-	1	-	-	-	33		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	83	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	2	-	-	-	-	-	-	2	-	-	-	66		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	83	-	-	1	-	-	-	-	-	-	1	-	-	-	33	33	28	1
	90	-	-	1	-	-	-	-	-	-	1	-	-	-	33	35	26	1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	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%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	66	Dec:	-			
												'90	99		-			
												'97	0		-			
<i>Ephedra viridis</i>																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	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
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	4	-	-	-	-	-	-	-	-	3	-	1	-	133		4	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	200	Dec:	0%			
												'90	232		57%			
												'97	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				
<i>Gutierrezia sarothrae</i>																		
Y	83	5	-	-	-	-	-	-	-	-	5	-	-	-	166			5
	90	6	-	-	-	-	-	-	-	-	6	-	-	-	200			6
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	83	7	-	-	-	-	-	-	-	-	7	-	-	-	233	9	7	7
	90	21	-	-	1	-	-	-	-	-	21	-	1	-	733	5	6	22
	97	7	-	-	-	-	-	-	-	-	7	-	-	-	140	10	10	7
D	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	100			3
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	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%			+58%							
'90		00%			00%			03%			-85%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	432	Dec:	8%				
											'90	1033		10%				
											'97	160		0%				
<i>Juniperus osteosperma</i>																		
Y	83	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	91	69	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%			+ 0%							
'90		00%			00%			00%			-70%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	66	Dec:	-				
											'90	66		-				
											'97	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				
Opuntia spp.																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	1	-	-	-	-	-	-	-	1	-	33		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	83	2	-	-	-	-	-	-	-	-	2	-	-	-	66	7	5	2
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	133	6	7	4
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80	8	14	4
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	66	Dec:	-				
											'90	166		-				
											'97	80		-				

Trend Study 18-4-97

Study site name: Silverado Canyon .

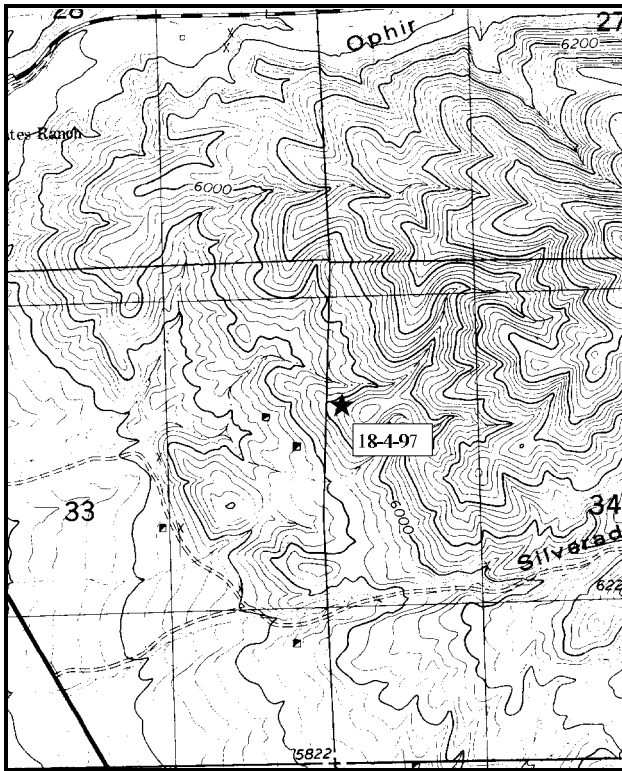
Range type: Juniper - Pinyon

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

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

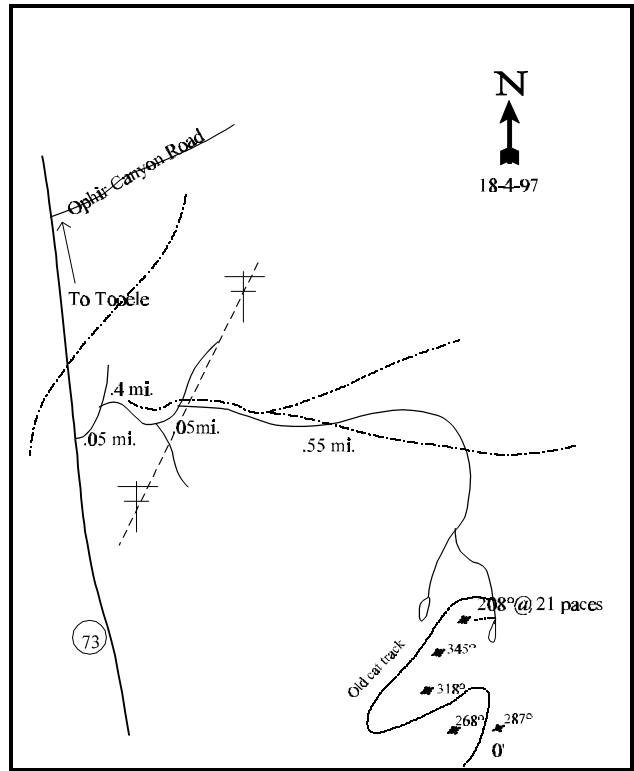
LOCATION DESCRIPTION

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 for 0.05 miles to a fork. Take the right fork for 0.40 miles to another fork. Take the left fork for 0.05 miles to another fork. Take the right fork for 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 a 208 degree azimuth to the 400-foot marker 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, Utah .

Township 5 S , Range 4 W , Section 33



Diagrammatic Sketch

UTM 4466663.084 N , 390520.262 E

DISCUSSION

Trend Study No. 18-4 (20-4)

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 that it is relatively low at only 13%. The understory is severely depleted of forage with herbaceous cover totaling only slightly 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 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 nearly 8 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. Soil is a heavy clay loam derived from shale and shale in the form of small rocks and pavement form 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 making them difficult to distinguish. The majority have the physical characteristics of black sagebrush. The average size of sagebrush plants (even mature individuals) is relatively small, averaging under 10 inches in height. Although shrub density is moderate, 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.

An herbaceous understory is almost nonexistent only contributing slightly over 2% 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 continue declining. Erosion is excessive and little soil fertility remains. Vegetative trend is also 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

down with percent decadence up to 66% and 25% of the population expressing poor vigor. The herbaceous understory is slightly down and still in very poor condition only contributing about 2% cover.

TREND ASSESSMENT

soil - up slightly but still poor

browse - down slightly

herbaceous understory - down slightly and very poor

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 decreased from 66% to 18% and only 3% are classified as having poor vigor. The decrease in density is more reflective of the much larger sample size used at this time. The larger sample gives significantly better population estimates for browse populations that are discontinuous and/or clumped in their distributions. Another positive characteristic is that the majority of the population is now classified as mature (77%) not decadent (18%). Also, 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

browse - stable

herbaceous understory - stable, but very poor

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 4

Type	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 Grasses		137	127	151	63	55	63	0.59
F	Astragalus mollissimus	1	1	3	1	1	1	.00
F	Calochortus nuttallii	3	-	-	1	-	-	-
F	Chaenactis douglasii	2	-	3	1	-	2	.01
F	Chorispora tenella (a)	-	-	13	-	-	5	.54
F	Cryptantha spp.	2	2	3	1	1	1	.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	Descurainia pinnata (a)	-	-	6	-	-	3	.04
F	Draba spp. (a)	-	-	5	-	-	2	.01
F	Lappula occidentalis (a)	-	-	4	-	-	2	.01
F	Physaria australis	1	3	-	1	2	-	-
F	Ranunculus testiculatus (a)	-	-	233	-	-	76	1.04
F	Sisymbrium altissimum (a)	-	-	20	-	-	10	.35
F	Tragopogon dubius	1	-	-	1	-	-	-
Total for Forbs		10	6	290	6	4	102	2.02

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 18 , Study no: 4

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia nova	43	2.01
B	Juniperus osteosperma	10	7.90
B	Pinus monophylla	8	7.34
Total for Browse		61	17.28

BASIC COVER --

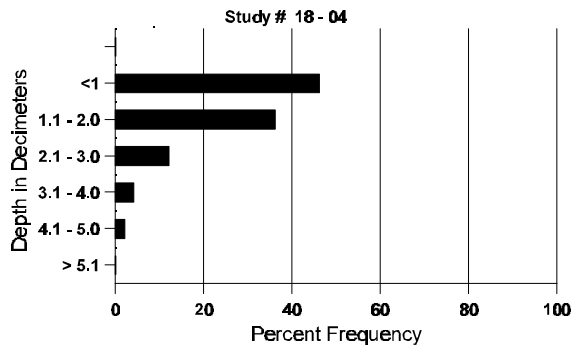
Herd unit 18 , Study no: 4

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: 04

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
7.9	52.0 (12.28)	7.3	29.6	33.8	36.6	3.9	9.6	121.6	.5

Stoniness Index



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 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	-	-	-	-	-	-	-	-	-	-	-	-	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%				Appeared						
'89		00%		00%		00%				Died out						
'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 18-5-97

Study site name: Big Dip Gulch .

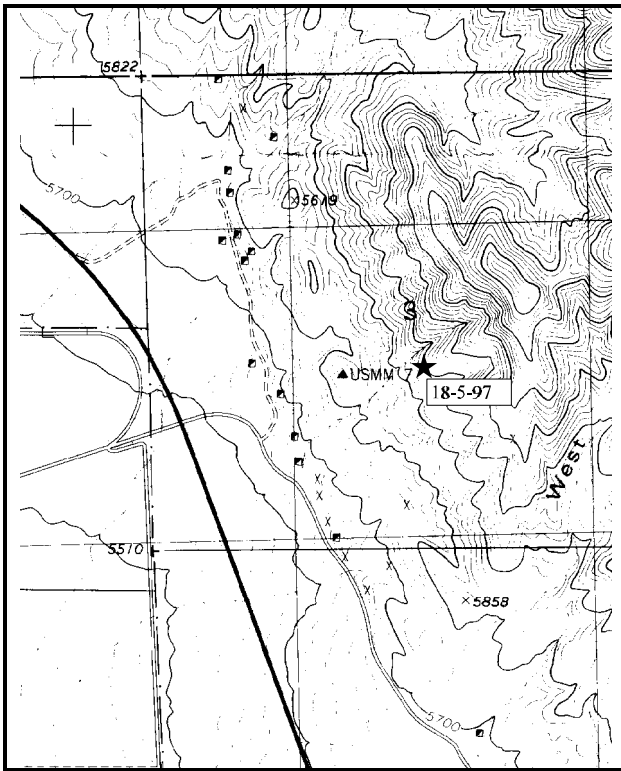
Range type: Black Sagebrush .

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

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

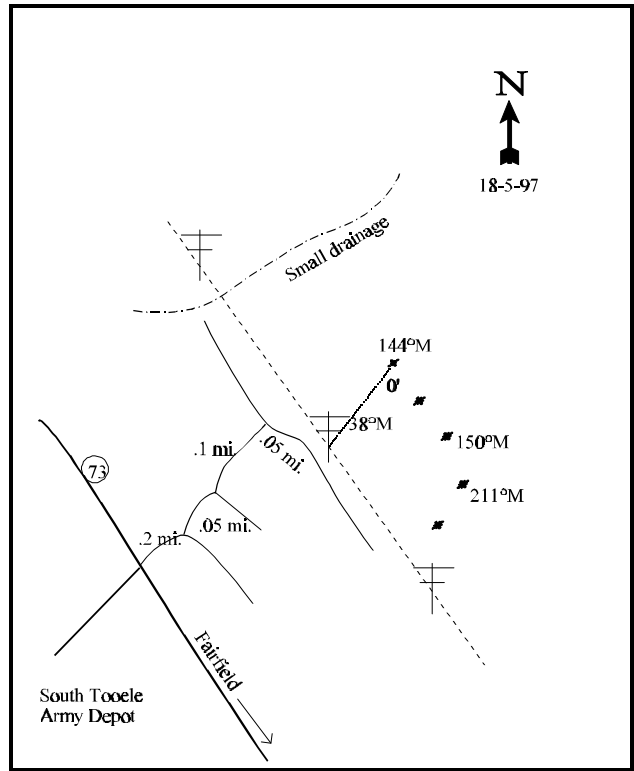
LOCATION DESCRIPTION

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, for 0.20 miles to an intersection. Turn left for 0.05 miles to another intersection. Turn left again for 0.10 miles to another intersection. Turn right and proceed 0.05 miles along a powerline until you come to two power poles. The 0-foot mark of the frequency baseline is located 76 paces from the two power poles on an azimuth of 38° M. It is marked by a green steel fencepost 15 inches in height with a red browse tag, number 3969.



Map Name: Ophir, Utah .

Township 6 S , Range 4 W , Section 3



Diagrammatic Sketch

UTM 4464543.525 N , 391145.793 E

DISCUSSION

Trend Study No. 18-5 (20-5)

The Big Dip Gulch study is located slightly south of study number 18-4 (11-4), on a black sagebrush hillside between Silverado Canyon and West Dip Gulch. Elevation of the site is 5,700 feet with a variably moderate slope of 25% to 30% and an aspect to the west. 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. An herbaceous understory is noticeably lacking. The area is thought to be critical deer winter range, and in the past has shown evidence of domestic sheep use. Currently, deer use appears moderately heavy with a frequency for pellet groups of 42%. Browse forage in the draws, consisting of cliffrose and highlined juniper, are more heavily utilized.

Soil is similar to that on study number 18-4 (11-4). Textural analysis shows it to be a clay loam soil containing abundant shale fragments and a mildly alkaline pH (7.5). Effective rooting depth (see methods) is 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 development. Drainage is poor and potential erodibility is severe. No litter or soil organic matter has accumulated in any significant amounts. Vegetative 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 just over 70% since 1983.

The majority of the browse forage comes from black sagebrush. These comprise a relatively uniform, low growing, and evenly spaced shrub community that initially numbered approximately 8,932 plants/acre. Now the density of the shrubs stands at about 5,640 plants/acre. Only about 12% of the decrease can be explained by the number of dead plants found on the site. Therefore, most of the difference can be attributed to the larger sample size giving better estimates of shrub populations. Eighty-seven percent of the shrubs were classified as heavily used in 1983. In 1989, none were heavily browsed but 56% were categorized as moderately utilized. Currently, 48% are thought to be moderately browsed. Percent decadence is much improved where only 7% are identified as such in 1997. They are in generally good vigor and exhibit acceptable levels of decadence. 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.

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 all low growing species such as rose pussytoes, milkvetch, and Douglas chaenactis.

1983 APPARENT TREND ASSESSMENT

Soil condition is poor and trend appears to continue to decline. Excessive erosion must be controlled before any soil or vegetative improvement can occur. Vegetative trend is stable. The key browse species 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 that of rock and pavement which together make up 71%. Even with the stable soil trend, it is still in very poor condition and relatively shallow. Browse trend is stable, yet the percent decadence 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

browse - stable

herbaceous understory - up

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 herbaceous understory is down with losses to the grasses and forbs. Annuals make up only 19% of the herbaceous understory. Browse trend is stable for black sagebrush with lower rates of decadence and lower rates of utilization.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - down

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 5

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron spicatum	_a 49	_b 119	_a 74	25	51	32	2.37
G	Bromus tectorum (a)	-	-	192	-	-	62	.51
G	Oryzopsis hymenoides	_a 3	_b 9	_{ab} 5	1	7	2	.04
G	Poa secunda	_a 160	_b 222	_a 182	69	87	71	1.37
G	Sitanion hystrix	4	1	-	2	1	-	.00
Total for Grasses		216	351	453	97	146	167	4.31
F	Allium spp.	-	-	2	-	-	1	.00
F	Antennaria rosea	1	-	-	1	-	-	-
F	Arabis spp.	-	-	3	-	-	1	.00
F	Astragalus spp.	-	-	3	-	-	1	.00
F	Castilleja chromosa	-	2	-	-	1	-	-
F	Chaenactis douglasii	11	22	19	5	10	8	.04
F	Cryptantha spp.	2	3	-	1	1	-	-
F	Erodium cicutarium (a)	-	-	10	-	-	3	.01

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	Eriogonum spp.	-	1	-	-	1	-	-
F	Lactuca serriola	-	6	-	-	2	-	-
F	Lygodesmia spinosa	7	-	-	2	-	-	-
F	Phlox hoodii canescens	-	7	-	-	2	-	-
F	Ranunculus testiculatus (a)	-	-	134	-	-	47	.41
Total for Forbs		21	41	171	9	17	61	0.47

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 18 , Study no: 5

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

BASIC COVER --

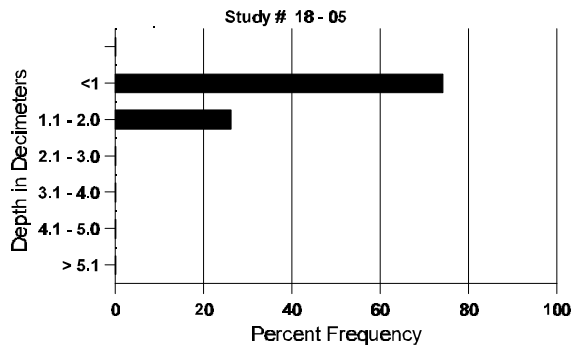
Herd unit 18 , Study no: 5

Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	324	.75	10.00	13.81
Rock	331	16.25	33.00	25.22
Pavement	376	54.25	37.75	45.94
Litter	351	15.00	9.75	7.81
Cryptogams	187	0	.75	1.14
Bare Ground	186	13.75	8.75	2.12

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 05

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	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	.5

Stoniness Index



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

Type	Quadrat Frequency '97
Rabbit	9
Horse	1
Deer	42

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			
<i>Artemisia nova</i>								
S	83	1	-	-	-	-	-	1
	89	25	-	-	-	-	-	25
	97	17	-	-	-	-	-	17
Y	83	-	18	34	-	-	-	52
	89	24	11	-	-	-	-	35
	97	36	8	-	-	-	-	44
M	83	-	2	73	-	-	-	75
	89	4	20	-	-	-	-	24
	97	100	110	-	3	6	-	219
D	83	-	-	16	-	-	-	16
	89	32	45	-	-	-	-	77
	97	7	11	-	1	-	-	19
X	83	-	-	-	-	-	-	0
	89	-	-	-	-	-	-	0
	97	-	-	-	-	-	-	420
% 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%				
Total Plants/Acre (excluding Dead & Seedlings)				'83	9532	Dec:	11%	
				'89	9066		57%	
				'97	5640		7%	
<i>Chrysothamnus viscidiflorus stenophyllus</i>								
Y	83	1	-	-	-	-	-	1
	89	-	-	-	-	-	-	0
	97	2	-	-	-	-	-	2
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>			
'83		00%	00%	00%	Died out			
'89		00%	00%	00%	Appeared			
'97		00%	00%	00%				
Total Plants/Acre (excluding Dead & Seedlings)				'83	66	Dec:	-	
				'89	0		-	
				'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				
<i>Cowania mexicana stansburiana</i>																		
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%			None							
'89		00%			00%			00%			Appeared							
'97		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	20		-			
<i>Gutierrezia sarothrae</i>																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	97	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	186	-	-	-	-	-	-	-	-	186	-	-	-	3720	7	9	
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	20	-	-	-	-	-	-	-	-	18	-	-	2	400		20	
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		00%			00%			00%			Appeared							
'89		00%			00%			00%			+97%							
'97		00%			00%			.93%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	0%			
												'89	133		0%			
												'97	4300		9%			
<i>Juniperus osteosperma</i>																		
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%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	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				
Opuntia spp.																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	83	1	-	-	-	-	-	-	-	-	1	-	-	-	66	6	6	1
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	8	14	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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	66	Dec:	-			
												'89	66		-			
												'97	20		-			
Tetradymia glabrata																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	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%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	20		-			

Trend Study 18-6-97

Study site name: South of Soldier Creek .

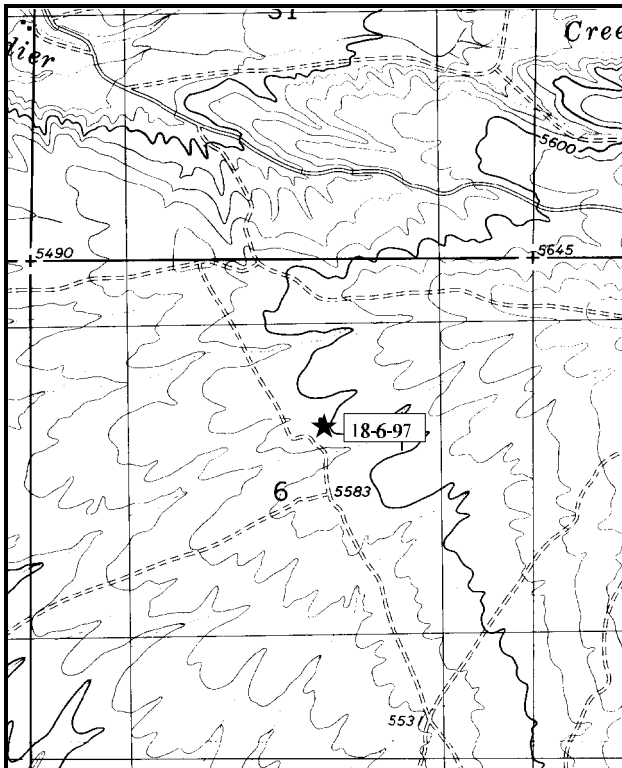
Range type: Chained, Seeded Pinyon - Juniper

Compass bearing: frequency baseline 338 M degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

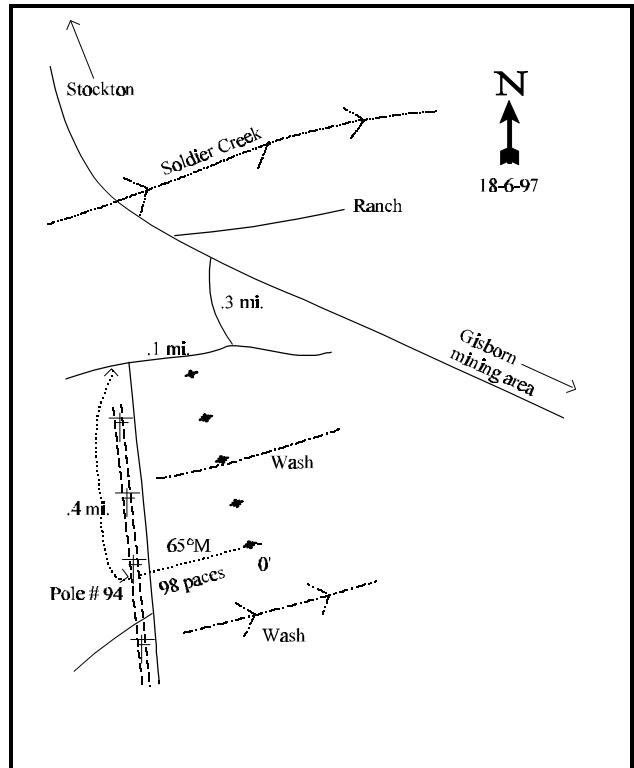
LOCATION DESCRIPTION

From the town of Stockton, proceed south on the Soldier Creek Road until the road crosses over the creek. Then take the first right (i.e. to the south) 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 (i.e. west) for 0.10 miles to another intersection. Turn left (i.e. south) for 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°M to the 0-foot mark of the frequency baseline, marked by a steel fencepost 15 inches in height.



Map Name: Stockton, Utah .

Township 5 S , Range 4 W , Section 6



Diagrammatic Sketch

UTM 4474663.322 N , 386627.457 E

DISCUSSION

Trend Study No. 18-6 (20-6)

The South of Soldier Canyon study is located on an old BLM chained and seeded area immediately south of Soldier Creek. The study site is a gentle (5% slope) west facing bench formerly occupied with a dense cover of juniper and pinyon trees and an elevation of 5,580 feet. The seeded area is within the limits of severe winter range for deer. However, judging from observations during 1983, the number of pellet groups and the level of forage utilization indicate that relatively few deer occupy the area in the winter. Utilization by domestic livestock appeared more significant. Currently, pellet group quadrat frequency (19%) indicate that deer use is light, and the key browse also shows only light to moderate use. There was also scattered signs of use by elk and cattle. Most use was associated with the washes running through the bench.

Soil is moderately shallow and fairly rocky on the surface, but otherwise rather fine textured. Soil textural analysis indicates it to be a clay loam soil with a soil reaction that is slightly alkaline (pH 7.5). Effective rooting depth (see methods) is 11 inches with a soil temperature of 59°F at 12 inches. Phosphorus is fairly low (5.6 ppm) where 10 ppm is thought to be minimal for normal plant development. Parent material appears to be sedimentary limestone or shale. Vegetative and litter cover are not distributed very well and it is interrupted by expansive areas of bare soil and erosion pavement. Erosion is not a significant factor only because of the lack of significant slope on the site.

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 that initially had a density of 1,333 plants/acre in 1983. The sagebrush currently contributes 24% of the browse cover with the density being estimated at only 680 plants/acre. Percent decadence is improved and the percentage of the plants showing moderate use has declined from a high of 38% in 1989 to 18% in 1997. The decline cannot be explained by the number of dead plants within the population, therefore most of the disparity would have to be because of the larger sample size used in 1997. This gives better population estimates for browse species that are discontinuous and/or clumped in their respective distributions. Narrowleaf low rabbitbrush is the next most productive browse species where it makes up 28% of the browse cover. This species is low in palatability (shows only light use) and appears to be increasing slightly in its density, now up to 3,220 plants/acre. Percent decadence has been shown to be fairly stable the last two sampling periods, yet moderately high for this species. Less abundant shrubs include broom snakeweed and a few Utah junipers. Point-quarter measurements estimate the juniper to have a density of 33 trees/acre, while pinyon have a somewhat lower density at only 5 trees/acre. Neither of these show evidence of rapid increase.

In 1997, grasses consisted of one seeded species, three native, and one exotic annual which provide a fair but scattered cover and low to moderate forage productivity. Light to moderate grazing use was observed on all species in 1983. Annual grasses were also present at that time, but relatively unimportant. Crested wheatgrass is the only species on this site that has shown a significant increase in its nested frequency value since 1989. All other perennial species have values that have declined substantially in 1997.

Forb composition consists of species possessing relatively poor forage value. Density and productivity are significantly less than for grasses as they produce only 29% of the herbaceous cover. No evidence of commonly seeded forbs, such as alfalfa, small burnet, or yellow sweetclover was observed anywhere on the treated 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 is stable because of the nearly level terrain. Vegetative condition may be very slowly changing. Both narrowleaf low rabbitbrush and mountain big sagebrush are slowly increasing. Grasses and forbs seem relatively static. Significant reinvasion by 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, but poor. There was a significant increase in bluebunch wheatgrass and Sandberg bluegrass, where crested wheatgrass was more 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 there could be some problems with a substantial increase in percent decadence and percent of plants showing moderate use. With the extended drought, this could cause some die-off.

TREND ASSESSMENT

soil - up slightly

browse - stable

herbaceous understory - up

1997 TREND ASSESSMENT

The trend for soil appears to continue 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 vegetative cover is contributed by the herbaceous species which better protect 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 the poor site potential. Trend for the key browse is stable even with the lower density, which is mostly reflective of the larger sample size. The herbaceous understory trend is down with losses to both the grasses and the forbs, especially bluebunch wheatgrass.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - down

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 6

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron cristatum	_a 106	_a 101	_b 159	46	43	61	6.64
G	Agropyron spicatum	_b 146	_c 210	_a 74	53	72	30	3.30
G	Bromus tectorum (a)	-	-	82	-	-	28	3.16
G	Oryzopsis hymenoides	22	14	8	9	8	4	.22
G	Poa secunda	_a 60	_c 177	_b 128	24	70	48	2.21
G	Sitanion hystrix	7	4	-	3	2	-	-
Total for Grasses		341	506	451	135	195	171	15.55
F	Antennaria rosea	-	1	1	-	1	1	.00
F	Arabis spp.	-	-	4	-	-	2	.01
F	Astragalus beckwithii	-	-	13	-	-	6	.27
F	Astragalus tenellus	-	-	13	-	-	5	.36
F	Astragalus spp.	1	4	6	1	2	4	.03
F	Camelina microcarpa (a)	-	-	3	-	-	1	.00
F	Calochortus nuttallii	-	2	6	-	1	4	.02
F	Cryptantha spp.	-	2	-	-	1	-	-
F	Erodium cicutarium (a)	-	-	6	-	-	3	.01
F	Erigeron pumilus	1	3	1	1	1	1	.03
F	Lathyrus spp.	-	-	19	-	-	7	1.04
F	Petradoria pumila	_a 19	_a 26	_b 51	9	12	20	2.09
F	Phlox hoodii canescens	69	93	66	33	48	30	.98
F	Phlox longifolia	-	-	13	-	-	4	.02
F	Ranunculus testiculatus (a)	-	-	175	-	-	59	1.40
F	Sisymbrium altissimum (a)	-	-	3	-	-	1	.03
Total for Forbs		90	131	380	44	66	148	6.34

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 18 , Study no: 6

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata vaseyana	24	2.31
B	Chrysothamnus viscidiflorus stenophyllus	61	2.71
B	Gutierrezia sarothrae	14	.36

Type	Species	Strip Frequency '97	Average Cover % '97
B	Juniperus osteosperma	5	3.76
B	Opuntia spp.	3	.15
B	Pinus edulis	1	.38
Total for Browse		108	9.69

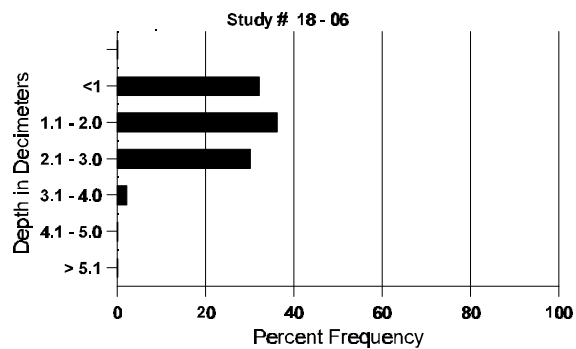
BASIC COVER --
Herd unit 18 , Study no: 6

Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	333	5.50	10.00	29.22
Rock	115	1.25	2.25	1.96
Pavement	295	25.75	30.25	17.02
Litter	377	38.00	34.75	31.13
Cryptogams	221	3.00	8.50	7.60
Bare Ground	265	26.50	14.25	13.67

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 06

Effective rooting depth (inches)	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	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 18 , Study no: 6

Type	Quadrat Frequency '97
Rabbit	29
Elk	1
Deer	19

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 6

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.		
Artemisia tridentata vaseyana																		
Y	83	9	-	-	-	-	-	-	-	-	5	4	-	-	300			9
	89	13	1	-	-	-	-	-	-	-	14	-	-	-	466			14
	97	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
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
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	4	6	-	-	-	-	-	-	-	8	-	1	1	333			10
	97	-	2	-	-	1	-	-	-	-	2	-	-	1	60			3
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	160			8
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	1333	Dec:	0%			
												'89	1332		25%			
												'97	680		9%			

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 stenophyllus																	
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	83	18	-	-	-	-	-	-	-	-	18	-	-	-	600		18
	89	31	-	-	-	-	-	-	-	-	31	-	-	-	1033		31
	97	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10
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
D	83	1	-	-	-	-	-	-	-	-	-	-	-	1	33		1
	89	12	-	-	-	-	-	-	-	-	12	-	-	-	400		12
	97	30	-	-	3	-	-	-	-	-	10	-	-	23	660		33
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	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%									
Total Plants/Acre (excluding Dead & Seedlings)												'83	2766	Dec:	1%		
												'89	1933		21%		
												'97	3220		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				
<i>Gutierrezia sarothrae</i>																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10	
Y	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	89	7	-	-	-	-	-	-	-	-	7	-	-	-	233		7	
	97	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	83	13	-	-	-	-	-	-	-	-	13	-	-	-	433	8 12	13	
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33	8 13	1	
	97	32	-	-	-	-	-	-	-	-	32	-	-	-	640	6 8	32	
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
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%			-36%							
'89		11%			00%			00%			+62%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	466	Dec:	0%				
											'89	299		11%				
											'97	780		0%				
<i>Juniperus osteosperma</i>																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	83	5	-	-	-	-	-	-	-	-	5	-	-	-	166	60 44	5	
	89	5	-	-	-	-	-	-	-	-	5	-	-	-	166	73 55	5	
	97	4	-	-	-	-	-	1	-	-	5	-	-	-	100	- -	5	
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%			+17%							
'89		00%			00%			00%			-50%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	166	Dec:	-				
											'89	199		-				
											'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.																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	2	-	-	-	-	-	-	-	-	1	-	1	-	66		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	6	-	-	-	-	-	-	-	-	6	-	-	-	120	6 16	6	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'83		00%			00%			00%			Appeared							
'89		00%			00%			50%			+45%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	66		-			
												'97	120		-			
Pinus edulis																		
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%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	20		-			

Trend Study 18-7-97

Study site name: Calumet Mine .

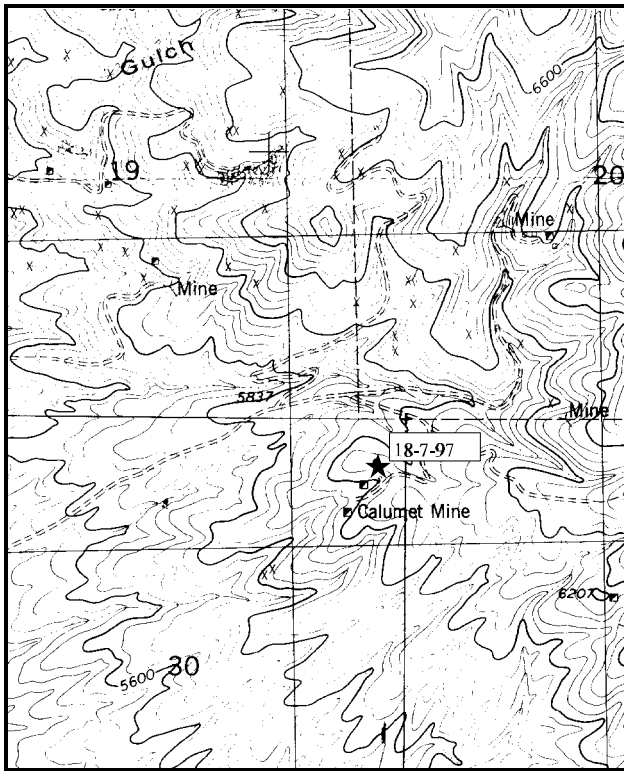
Range Type: Mixed oak-sage

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

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 71ft), line 2 (95ft), line 3 (59ft), line 4 (34ft).

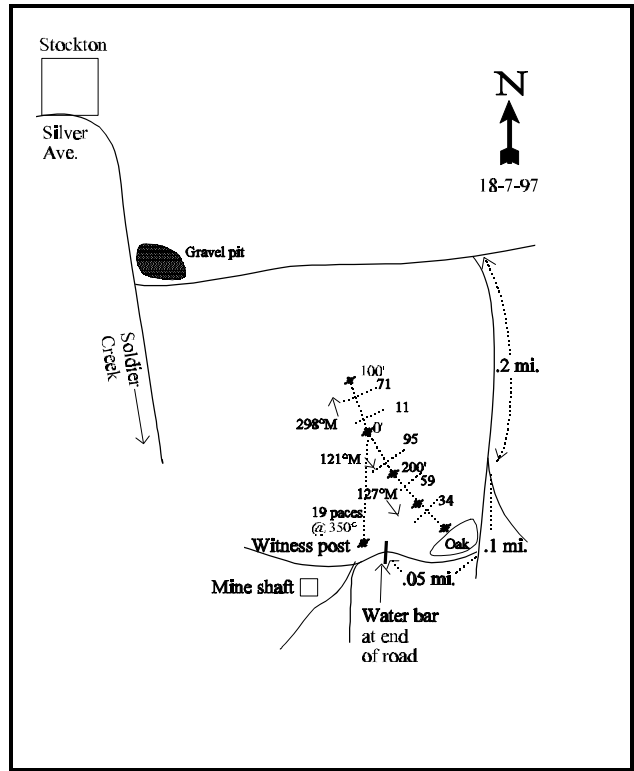
LOCATION DESCRIPTION

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 up this road 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 19 paces at 350°M into the oak brush to the 0-foot mark of the baseline.



Map Name: Stockton, Utah .

Township 4S , Range 4W , Section 30



Diagrammatic Sketch

UTM 4478291.024 N, 387292.688 E

DISCUSSION

Trend Study No. 18-7 (20-7)

The Calumet Mine study is located on important deer winter range east of Stockton. The site has an elevation of 5,800 feet on a north slope (10%). The study site 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 an 8% quadrat frequency.

Soil has some rock on the surface (about 7% cover), but otherwise it is moderately fine textured. Effective rooting depth (see methods) 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 development. Soil textural analysis indicates that it is 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 cover and show evidence of moderate erosion.

Low growing Gambel oak comprises the bulk of mid and overstory vegetation, as it now contributes 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 been generally 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. The population is now 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 is still the case at the present time. The three species of 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, 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 is 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 was 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 was slightly upward with increases for both grasses and forbs.

TREND ASSESSMENT

soil - stable

browse - down slightly

herbaceous understory - up slightly

1997 TREND ASSESSMENT

Trend for soils would be considered slightly improved with further decreases in percent bare soil (12% to 7%). Protective cover, litter and herbaceous cover, is good. The trend for browse, primarily sagebrush and stickyleaf low rabbitbrush are 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, however most of the improvement is with the grasses.

TREND ASSESSMENT

soil - slightly up

browse - up

herbaceous understory - slightly up

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 7

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron spicatum	a13	a2	b118	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-	b26	-	-	8	1.54
G	Poa fendleriana	a14	b45	b50	7	20	21	.91
G	Poa pratensis	a151	b203	a134	48	60	41	6.51
G	Poa secunda	b105	a72	a53	44	27	22	.70
G	Secale spp.	-	-	3	-	-	1	.00
G	Sitanion hystrix	a2	b23	ab19	1	10	10	.45
Total for Grasses		291	350	498	107	120	176	17.41

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

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	<i>Polygonum douglasii</i> (a)	-	-	16	-	-	5	.02
F	<i>Ranunculus testiculatus</i> (a)	-	-	43	-	-	17	.11
F	<i>Tragopogon dubius</i>	_a 1	_{ab} 10	_b 12	1	5	6	.08
F	<i>Veronica biloba</i> (a)	-	-	6	-	-	2	.01
F	<i>Zigadenus paniculatus</i>	-	7	3	-	3	1	.00
Total for Forbs		153	285	616	69	144	270	5.96

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 18 , Study no: 7

Type	Species	Strip Frequency '97	Average Cover % '97
B	<i>Ambrosia</i> spp.	-	.38
B	<i>Artemisia tridentata vaseyana</i>	65	10.65
B	<i>Chrysothamnus nauseosus albicaulis</i>	5	.15
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	47	2.07
B	<i>Gutierrezia sarothrae</i>	5	.21
B	<i>Juniperus osteosperma</i>	2	1.70
B	<i>Opuntia</i> spp.	8	.18
B	<i>Pinus edulis</i>	0	1.00
B	<i>Quercus gambelii</i>	45	17.18
B	<i>Tetradymia canescens</i>	2	.15
Total for Browse		179	33.71

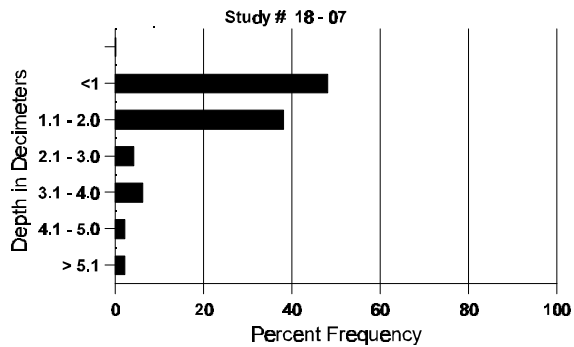
BASIC COVER --
Herd unit 18 , Study no: 7

Cover Type	Nested Frequency '97	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: 07

Effective rooting depth (inches)	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 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	1	-	-	-	-	-	-	20		1
Y	83	3	-	-	-	-	-	-	200		3
	89	1	1	-	-	-	-	-	133		2
	97	11	-	-	-	-	-	-	220		11
M	83	15	4	-	-	-	-	-	1266	21 28	19
	89	7	1	-	1	-	-	-	600	19 24	9
	97	77	16	5	11	-	-	-	2180	49 56	109
D	83	-	7	-	-	-	-	-	466		7
	89	6	3	-	-	-	-	-	600		9
	97	17	6	1	2	-	-	-	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	-	-	-	-	-	-	120		6
M	83	-	-	-	-	-	-	-	0	- -	0
	89	-	-	-	-	-	-	-	0	- -	0
	97	-	-	-	1	-	-	-	20	20 22	1
D	83	-	-	-	-	-	-	-	0		0
	89	-	-	-	-	-	-	-	0		0
	97	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%		None			
'89		00%		00%		00%		Appeared			
'97		00%		00%		22%					
Total Plants/Acre (excluding Dead & Seedlings)						'83	0	Dec:	0%		
						'89	0		0%		
						'97	180		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				
<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%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	-				
											'89	0		-				
											'97	440		-				

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	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%			None						
'89		00%			00%			00%			Appeared						
'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 10	8
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'83		00%			00%			00%			None						
'89		00%			00%			00%			Appeared						
'97		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	-			
											'89	0		-			
											'97	160		-			
Pinus edulis																	
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%			None						
'89		00%			00%			00%			None						
'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%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	-				
											'89	0		-				
											'97	60		-				

DISCUSSION

Trend Study No. 18-8 (20-8)

***This site was not read in 1997 but text from the 1983 and 1989 reports is retained.

The Silcox Canyon study monitors a mixed Gambel oak-big sagebrush type located on a moderately steep (40%) northeast exposure. Elevation is approximately 5,700 feet. This portion of Silcox Canyon is deer winter range that had been heavily grazed by domestic sheep in the past. The herbaceous composition and density were badly depleted and the entire drainage was seriously eroded. Since that time, sheep use has been greatly reduced. As a result, the data in 1989 showed that there was an increase in forb density and diversity. There were also higher numbers of sagebrush with improved vigor and little sign of sheep trails or serious erosion.

Soil condition varies directly with density of vegetative cover. Under Gambel oak clones, litter is adequate to protect the soil. However, the more open areas which occupy a much greater portion of the area are subject to soil loss.

Since this study is located on an oakbrush hillside, Gambel oak is the obvious key browse species. Mountain big sagebrush is much less common in the oakbrush and in the interspaces, and has been nearly eliminated. Oak interspaces are occupied primarily by annual grasses and weeds. The Gambel oak population is lightly hedged and comprised principally of young plants less than three feet in height. Although not noticeably expanding, oak appears to be thickening and gradually out competing the remaining big sagebrush. Mountain big sagebrush also is lightly hedged. Its numbers have increased as well as has its vigor.

Initially the grass composition consisted primarily of Sandberg bluegrass, bulbous bluegrass, and annuals such as cheatgrass brome and sixweeks fescue. Forage quality was poor. Annual grasses are especially prevalent outside of the oakbrush clones. In 1989, the small bluegrasses were still the only perennial grass species, but there was a definite increase in the occurrence and density of forbs. However, weedy species were still the most common.

1983 APPARENT TREND ASSESSMENT

If one looks at the entire winter range in this area, the overall trend is most definitely down. Heavy sheep use is causing accelerated erosion and has nearly eliminated browse and most other perennial plants outside of the oakbrush type. Within the oakbrush type, soil condition is marginally better but vegetative diversity is still poor. These areas are slowly developing into oak monocultures with essentially no herbaceous understory. Oak leaf litter is virtually the only effective ground cover present.

1989 TREND ASSESSMENT

It appears that the soil trend is improved, but soil erosion is still a problem to the area. The trend for sagebrush is improved with an increase in numbers and vigor. There was not much of an improvement for the grasses, but there was a noticeable improvement for the forbs.

Trend Study 18-9-97

Study site name: Left Fork Settlement Canyon.

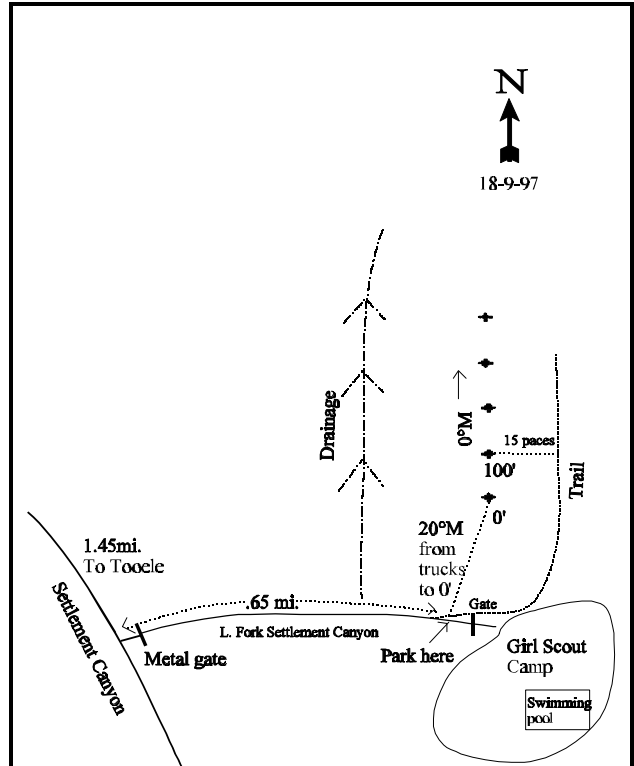
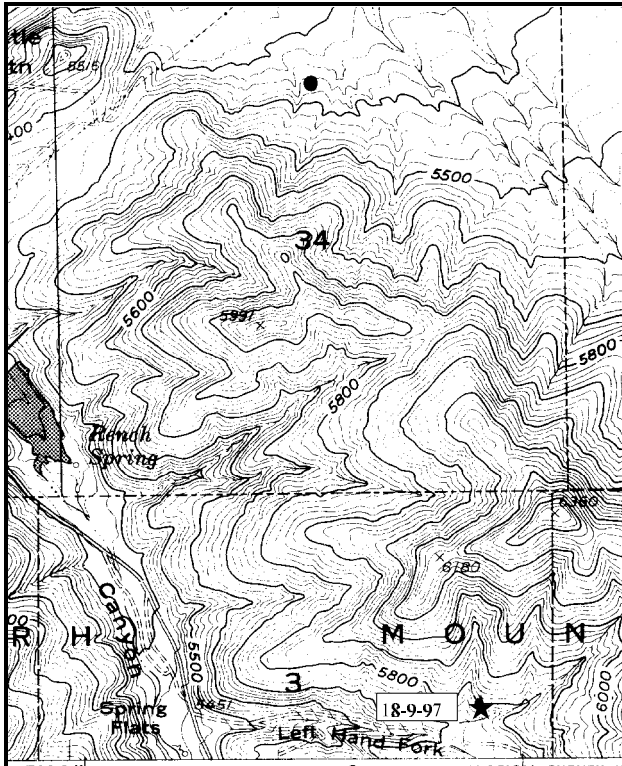
Range type: Gambel Oakbrush

Compass bearing: frequency baseline 0 M degrees.

First frame placement on frequency belts 5 feet. 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 (i.e., left) on the lefthand fork road for 0.65 miles. Turn north on an indistinct dirt road, directly across from the Girl Scout Camp for 0.05 miles to the base of a moderately steep dugway. From the dugway the 0-foot mark is at an azimuth of 20° M. There is a trail that goes up the dugway. Follow this trail up, the 100-foot stake is 15 paces to the left of the trail, the 0-foot stake is 100 feet to the south and is marked with a red browse tag, number 3930.



Map Name: Tooele, Utah .

Diagrammatic Sketch

Township 4 S , Range 4 W , Section 3

UTM 4484038.678 N , 391867.468 E

DISCUSSION

Trend Study No. 18-9 (20-9)

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 20% of the ground cover. Effective rooting depth was a little over 10 inches. Soil textural analysis indicates it to be 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 larger sample size giving a much 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 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 is 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 is also stable. Although oak is 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 is increasing but not rapidly. If oak continues to spread, snakeweed will become less of a competitive factor. Mountain big sagebrush is currently important, 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 for the majority of the browse cover is contributed by oakbrush, where 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

browse - stable

herbaceous understory - up

1997 TREND ASSESSMENT

Soil trend is considered stable with percent bare soil decreasing down 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

browse - stable

herbaceous understory - up, but mostly composed of weedy species

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 9

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron spicatum	84	63	91	36	26	30	3.62
G	Aristida purpurea	a-	a2	b36	-	2	20	1.08
G	Bromus tectorum (a)	-	-	189	-	-	71	1.79
G	Festuca spp.	-	-	6	-	-	2	.03
G	Oryzopsis hymenoides	b13	b20	a2	6	7	2	.18
G	Poa bulbosa	a-	b17	c165	-	7	54	6.28
G	Poa pratensis	a4	b27	ab21	2	11	7	.42
G	Poa secunda	a14	b34	ab27	7	16	10	.64
G	Sitanion hystrix	1	-	-	1	-	-	-
Total for Grasses		116	163	537	52	69	196	14.07

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
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>Calochortus nuttallii</i>	-	4	15	-	3	7	.06
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 paniculatum</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 boreale</i>	-	-	104	-	-	36	2.44
F	<i>Gayophytum ramosissimum</i> (a)	-	45	89	-	24	31	1.22
F	<i>Gilia aggregata</i>	3	2	-	2	1	-	-
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>Lappula occidentalis</i> (a)	-	-	11	-	-	7	.06
F	<i>Lactuca serriola</i>	_a -	_b 18	_b 14	-	11	8	.04
F	<i>Lithospermum ruderales</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	-	-
F	<i>Phlox longifolia</i>	_a -	_c 46	_b 21	-	19	9	.09
F	<i>Polygonum douglasii</i> (a)	-	-	28	-	-	10	.05
F	<i>Ranunculus testiculatus</i> (a)	-	-	23	-	-	8	.09
F	<i>Senecio</i> spp.	-	2	-	-	1	-	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	Silene spp.	-	-	5	-	-	3	.01
F	Solidago sparsiflora	_c 75	_b 43	_a -	26	17	-	-
F	Tragopogon dubius	31	17	34	14	10	18	.27
F	Trifolium spp.	_a -	_b 15	_b 21	-	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	_a 2	_b 40	_a 2	2	20	2	.01
Total for Forbs		215	395	880	92	193	358	12.47

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 18 , Study no: 9

Type	Species	Strip Frequency '97	Average Cover % '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 --

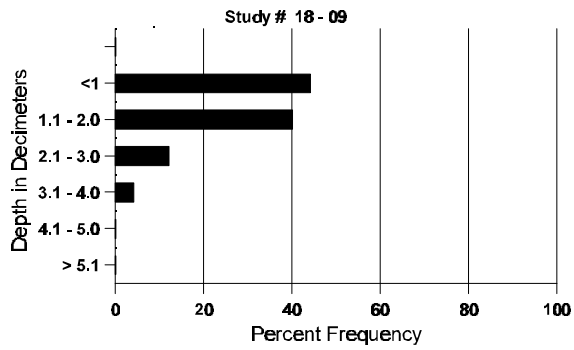
Herd unit 18 , Study no: 9

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: 09

Effective rooting depth (inches)	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 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	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	83	-	2	-	-	-	-	-	-	-	2	-	-	-	133	20	20	2
	89	2	1	-	-	-	-	-	-	-	3	-	-	-	200	15	17	3
	97	3	1	-	-	-	-	-	-	-	4	-	-	-	80	15	26	4
D	83	-	1	-	-	-	-	-	-	-	-	-	1	-	66		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%			

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>Gutierrezia sarothrae</i>										
S	83	-	-	-	-	-	-	-	0	0
	89	21	-	-	-	-	-	-	1400	21
	97	23	-	-	-	-	-	-	460	23
Y	83	42	-	-	-	-	-	-	2800	42
	89	42	-	-	-	-	-	-	2800	42
	97	34	-	-	-	-	-	-	700	35
M	83	93	-	-	-	-	-	-	6200	10 7 93
	89	53	-	-	-	-	-	-	3533	11 6 53
	97	649	-	-	1	-	-	-	13000	9 11 650
D	83	-	-	-	-	-	-	-	0	0
	89	26	-	-	-	-	-	-	1733	26
	97	2	-	-	-	-	-	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%			
<i>Opuntia spp.</i>										
Y	83	-	-	-	-	-	-	-	0	0
	89	1	-	-	-	-	-	-	66	1
	97	-	-	-	-	-	-	-	0	0
M	83	1	-	-	-	-	-	-	66	4 10 1
	89	1	-	-	-	-	-	-	66	5 10 1
	97	25	-	-	-	-	-	-	500	6 12 25
D	83	-	-	-	-	-	-	-	0	0
	89	-	-	-	-	-	-	-	0	0
	97	6	-	-	-	-	-	5	120	6
% 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%			

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																	
S	83	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8
	89	224	1	-	-	-	-	-	-	-	224	-	1	-	15000		225
	97	102	-	-	-	-	-	-	-	-	102	-	-	-	2040		102
Y	83	93	49	-	-	-	-	-	-	-	141	1	-	-	9466		142
	89	194	161	4	-	-	-	-	-	-	198	60	101	-	23933		359
	97	124	-	-	31	-	-	49	-	4	208	-	-	-	4160		208
M	83	-	80	30	-	-	-	-	-	-	110	-	-	-	7333	29 16	110
	89	1	1	2	-	-	-	-	-	-	2	-	2	-	266	66 39	4
	97	370	4	-	53	-	-	-	-	-	427	-	-	-	8540	31 23	427
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	5	25	8	-	-	-	-	-	-	7	1	30	-	2533		38
	97	18	-	-	1	-	-	-	-	-	19	-	-	-	380		19
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	2140		107
% 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 .

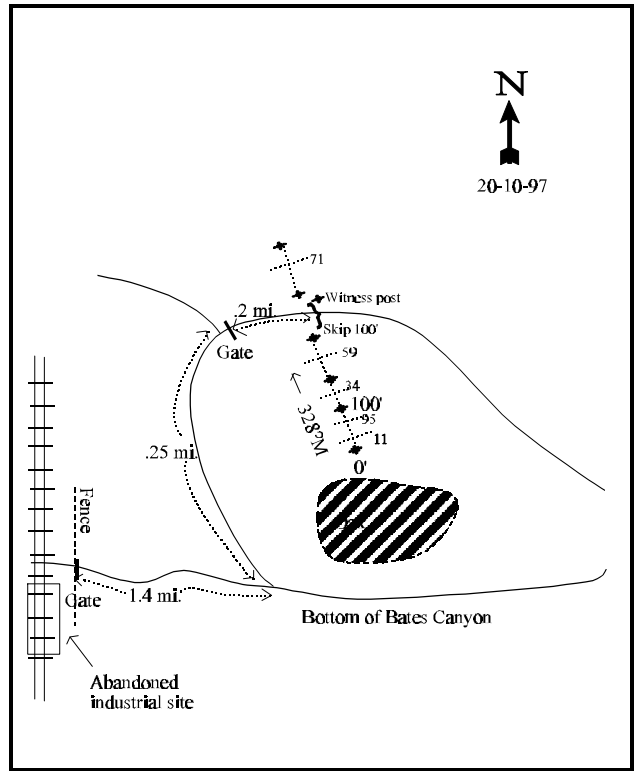
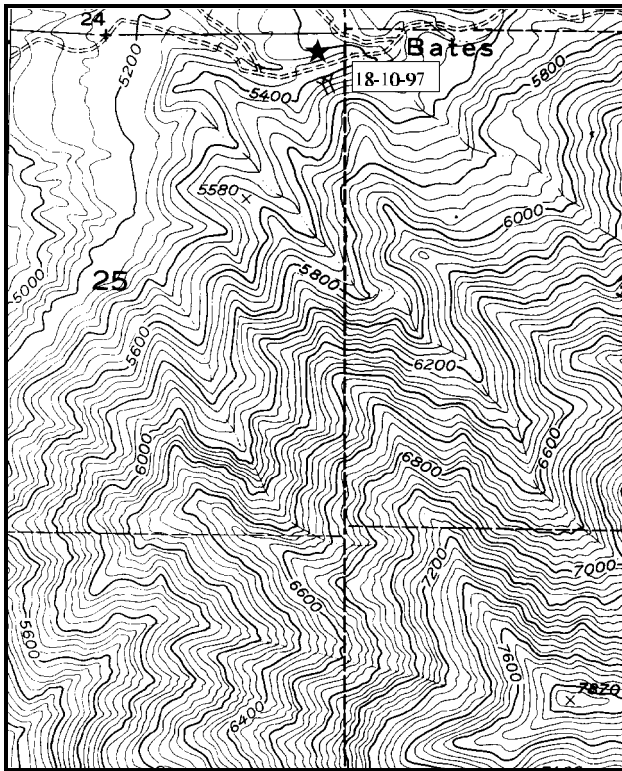
Range type: Big Sagebrush

Compass bearing: frequency baseline 328 M degrees.

First frame placement on frequency belts 5 feet. 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 road fork. Turn left (i.e., north) for approximately 0.50 miles to where there is a green steel fencepost 15 inches in height, on the right (i.e., 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. The 0-foot mark is marked by a green steel fencepost with a red browse tag, number 3916, attached.



Map Name: Bingham Canyon, Utah .

Diagrammatic Sketch

Township 2 S , Range 4 W , Section 25

UTM 4497536.691 N , 395249.923 E

DISCUSSION

Trend Study No. 18-10 (20-10)

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 (i.e. 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, however 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 but 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 being important for 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 increased significantly, from 3 to 11 to 23 in 1997.

1983 APPARENT TREND ASSESSMENT

Soil trend is stable to slightly declining. Although most of the ground surface is barren, only moderate soil loss is 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%, 42% of the decadent plants were classified as having poor vigor or dying and those individuals with poor vigor increased from 10% to 24%. Together this points to a sagebrush community that is experiencing a downward trend mostly caused by the extended period of drought, intraspecific competition, and moderate to heavy use noted on over 60% of the plants. This will cause some thinning of the population. The trend for the herbaceous understory was up, with increases in species diversity and abundance. However, much of the herbaceous species are classified as weedy increaser species.

TREND ASSESSMENT

soil - up

browse - down

herbaceous understory - improved, but is dominated by weedy species

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 would be improved with a decrease in percent decadence, but the majority of these plants were classified as dying. The percentage of plants classified as having moderate to heavy use has also increased again 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. However, this will not be able to be determined until the next sampling date in 2002. The trend for the herbaceous understory is up with increases for perennial species for grasses and forbs. 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 a minor component of the herbaceous understory. One species, bulbous bluegrass, contributes to 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

browse - improved

herbaceous understory - improved, but is dominated by weedy species

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 10

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	<i>Bromus japonicus</i> (a)	-	-	16	-	-	7	.03
G	<i>Bromus tectorum</i> (a)	-	-	77	-	-	30	.20
G	<i>Poa bulbosa</i>	_a 12	_b 251	_c 309	6	82	87	14.98
G	<i>Poa fendleriana</i>	_a -	_b 19	_a 4	-	8	1	.38
G	<i>Poa secunda</i>	_b 84	_a 23	_b 57	30	9	22	1.41
Total for Grasses		96	293	463	36	99	147	17.02
F	<i>Agoseris glauca</i>	_{ab} 6	_a -	_b 14	3	-	7	.04
F	<i>Ambrosia psilostachya</i>	_a -	_a -	_b 23	-	-	9	.32
F	<i>Arabis</i> spp.	-	3	3	-	1	1	.00
F	<i>Asclepias asperula</i>	-	1	-	-	1	-	-
F	<i>Astragalus utahensis</i>	-	-	6	-	-	3	.21
F	<i>Castilleja chromosa</i>	_a -	_b 25	_b 35	-	12	18	.27
F	<i>Caulanthus crassicaulis</i>	_a -	_a -	_b 10	-	-	5	.07
F	<i>Calochortus nuttallii</i>	_a 2	_{ab} 11	_b 18	1	6	10	.05
F	<i>Collomia linearis</i> (a)	-	-	32	-	-	13	.09
F	<i>Collinsia parviflora</i> (a)	-	-	5	-	-	2	.01
F	<i>Descurainia</i> spp. (a)	-	-	4	-	-	1	.00
F	<i>Draba</i> spp. (a)	-	-	75	-	-	27	.16
F	<i>Epilobium paniculatum</i> (a)	-	-	199	-	-	79	.49
F	<i>Galium boreale</i>	-	-	1	-	-	1	.00
F	<i>Grindelia squarrosa</i>	_a -	_b 5	_c 86	-	4	32	1.82
F	<i>Helianthus annuus</i> (a)	-	66	-	-	31	-	-
F	<i>Heterotheca villosa</i>	-	-	-	-	-	-	.00
F	<i>Holosteum umbellatum</i> (a)	-	-	30	-	-	11	.10
F	<i>Lactuca serriola</i>	_a -	_b 22	_a -	-	10	-	-
F	<i>Lesquerella</i> spp.	-	5	-	-	2	-	-
F	<i>Lomatium triternatum</i>	_a -	_b 13	_a 2	-	5	1	.00
F	<i>Microsteris gracilis</i> (a)	-	-	1	-	-	1	.00
F	<i>Phlox hoodii</i>	-	-	2	-	-	1	.03
F	<i>Polygonum douglasii</i> (a)	-	-	25	-	-	9	.04
F	<i>Tragopogon dubius</i>	_a -	_a -	_b 98	-	-	46	.41
F	Unknown forb-perennial	_a -	_b 76	_a -	-	36	-	-
F	<i>Viola</i> spp.	-	1	1	-	1	1	.00
F	<i>Wyethia amplexicaulis</i>	-	-	3	-	-	1	.03

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	Zigadenus paniculatus	_a 21	_b 88	_a 46	11	43	23	.20
Total for Forbs		29	316	719	15	152	302	4.41

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 18 , Study no: 10

Type	Species	Strip Frequency '97	Average Cover % '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

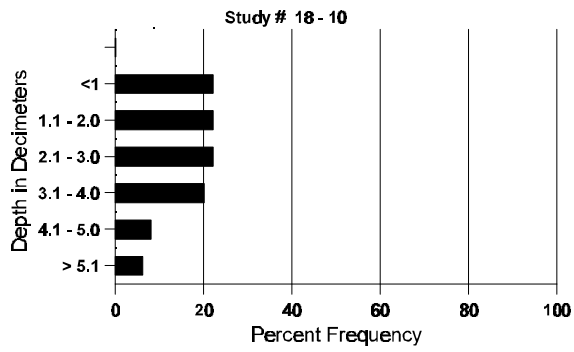
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	368	.50	6.50	42.57
Rock	153	1.25	1.00	1.74
Pavement	268	25.50	26.50	10.59
Litter	394	46.00	39.50	36.64
Cryptogams	265	6.00	23.75	16.48
Bare Ground	180	20.75	2.75	3.25

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 10

Effective rooting depth (inches)	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				
Artemisia tridentata vaseyana																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	188	-	-	-	-	-	-	131	-	-	-	-	319	10633		319	
	97	42	-	-	1	-	-	-	-	-	-	-	-	43	860		43	
Y	83	22	2	-	-	-	-	-	-	-	-	-	-	24	800		24	
	89	2	-	-	-	-	-	-	-	-	-	-	-	2	66		2	
	97	53	-	100	1	-	100	-	-	-	-	-	-	254	5100		255	
M	83	22	48	6	-	-	-	-	-	-	-	-	-	73	2533	15 33	76	
	89	25	10	2	-	-	-	-	-	-	-	-	-	35	1233	11 22	37	
	97	164	179	27	-	-	-	-	-	-	-	-	-	270	7420	16 31	371	
D	83	1	8	8	-	-	-	-	-	-	-	-	-	8	566		17	
	89	39	13	-	-	-	-	-	-	-	-	-	-	29	1733		52	
	97	27	59	2	-	-	-	-	-	-	-	-	-	23	1760		88	
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		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%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	40		-			

DISCUSSION

Trend Study No. 18-11 (20-11)

***This site was not read in 1997 but text from the 1983 report has been retained. Consult the 1983 Utah Range Trend Studies Report for maps and data tables.

The Rose Canyon Spring study is located on high winter or spring-fall range near Rose Canyon Spring. Typical fawning habitat occurs on adjacent north slopes. Another animal use is cattle grazing, an ongoing activity at the time of study establishment. Slightly lower down in the canyon, extensive road and residential home development is underway. The study is at an elevation of 6,440 feet on a moderately steep (35%) southwest aspect. The range type is mixed mountain brush with sparse Gambel oak. Deer use, as evidenced by the number of pellet groups and the level of browse utilization, is moderate to heavy.

Soil is rocky, well drained and moderately deep. Litter and vegetative cover are adequate to prevent serious erosion. Overall soil condition is fair to good.

Browse composition consists of a scattered oak stand with significant numbers of mountain big sagebrush, antelope bitterbrush, mountain snowberry, Saskatoon serviceberry, with increasers such as broom snakeweed and pricklypear cactus interspersed throughout. With the exception of the latter two species, all browse plants were at least moderately hedged. On a comparative basis, mountain big sagebrush and Gambel oak show the least utilization while bitterbrush and serviceberry are the most heavily hedged. Vigor of all species is good and all appear to be stable populations.

Understory grasses are moderately abundant and primarily include wheatgrass and bluegrass species. Cheatgrass brome is common but nowhere forms a dense cover.

Forbs are considerably less productive than grasses. Species composition is dominated by low value perennials and biennials. Preferred and palatable perennial forbs are uncommon. Overall forb composition and density are well below optimum for this type of site.

1983 APPARENT TREND ASSESSMENT

Both soil and vegetative trends appear stable. Erosion is not a problem because of the relatively dense shrub and grass cover. Shrub populations appear self-sustaining and no single species is increasing at the expense of another. Grass cover is fair and only lightly utilized. Forb composition and density are deficient but not obviously deteriorating further.

DISCUSSION

Trend Study No. 18-12 (11-12)

***This study was not read in 1997 but text from the 1983 and 1990 reports is included. Consult the 1983 and 1990 Utah Range Trend Studies report for maps and data tables.

The Coon Canyon study is on deer and elk transitional range in the upper portion of Coon Canyon. Moderate numbers of pellet groups from both big game species were observed during study site establishment in 1983. Cattle were also seen in the area. Kennecott Copper Corporation owns the land and along with KSL-TV, maintains a road leading to the television tower on the mountaintop to the west. Although access is strictly controlled, there is still a fair amount of traffic on this road. The study site is on a steep (70%) southeast facing, Gambel oakbrush hillside at 6,200 feet elevation.

Soil is coarse textured, shallow and rocky. Apart from oakbrush crowns, the bulk of ground cover comes from annual grasses. Erosion is severe, especially in the oak interspaces where vegetative cover is sparse and characteristically annuals.

Browse composition consists chiefly of slow growing Gambel oak and a large vigorous population of broom snakeweed. Judging from the age structure, both species appear to be increasing in abundance. Small numbers of mountain big sagebrush, mountain snowberry, and bigtooth maple comprise the remainder of browse composition. Except for mountain big sagebrush which is declining, these species have stable populations. Overall browse utilization is light, although oak and snowberry occasionally show heavier use.

Grass cover comes primarily from cheatgrass brome which is very abundant, especially in the oak interspaces. Perennial grasses are diverse but no single species is very numerous. Overall, the perennial grasses provide only minimal soil protection or forage. Grasses show evidence of light to moderate grazing from cattle.

Forbs are more diverse and abundant than grasses, however they are still deficient for this site. The most important species include: arrowleaf balsamroot, western yarrow, mulesears wyethia, wayside gromwell, and Pacific aster. All of these show evidence of grazing use. Annual forbs and perennial increasers are common and probably expanding.

1983 APPARENT TREND ASSESSMENT

Soil trend is almost certainly down. Ground cover is fair under oak clones but poor elsewhere. Obvious soil movement is occurring over the entire area. Vegetative trend is also declining. Both Gambel oak and broom snakeweed are increasing while mountain big sagebrush is slowly disappearing. Unacceptably high densities of annual grasses and weeds are indicative of declining range condition.

1990 TREND ASSESSMENT

The scattered, low-growing oakbrush clones are expanding very slowly, as nested frequency is almost unchanged since 1983. The oak tend to show light to moderate hedging by deer and elk that utilize the south-facing slope. The frequency of mountain big sagebrush remains low, but the shrubs are vigorous and have a lightly hedged growth form. Broom snakeweed decreased from its previously very high density. Perennial grasses have increased significantly and fewer annuals were noted. The site supports a high diversity and density of perennial forbs, however, current soil trend indicators are downward. An increase in perennial grasses with an associated buildup of litter would lessen soil disturbance and soil movement.

TREND ASSESSMENT

soil - downward

browse - up, good increase in sagebrush and corresponding decline in broom snakeweed

herbaceous understory - slightly up, some increases for many grasses and forbs

DISCUSSION

Trend Study No. 18-13 (11-13)

***This study was not read in 1997 but text from the 1990 report has been retained. Consult the 1990 Utah Range Trend Studies report for maps and data tables.

The Kessler Park study is the first of 10 new studies that were established on Kennecott property in 1990. The Kessler Peak study was similar to other seeded sites sampled on the mountain. It is located at an elevation of 7,500 feet on a 40% north-facing slope, dominated by perennial grasses. The vigorous population of Kentucky bluegrass, mountain brome, and wheat grasses show evidence of moderate utilization. Nine species of native perennial forbs were identified. Browse species were uncommon, but include Douglas fir, maple, and oak. There is comparatively less rock cover on this site, leaving bare interspaces susceptible to continued soil erosion. Increasing vegetative cover, especially herbaceous cover, will improve the soil trend.

Trend Study 18-14-97

Study site name: Little Valley .

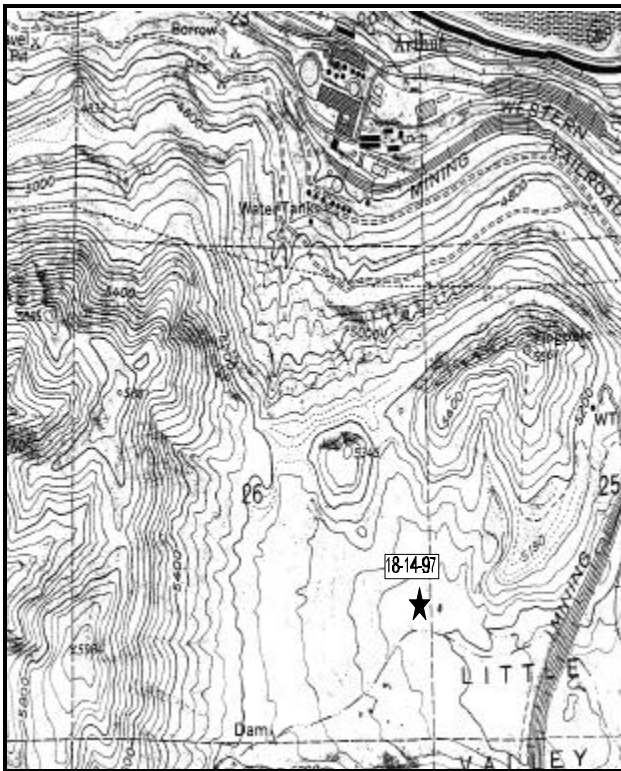
Range type: Perennial grass .

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

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

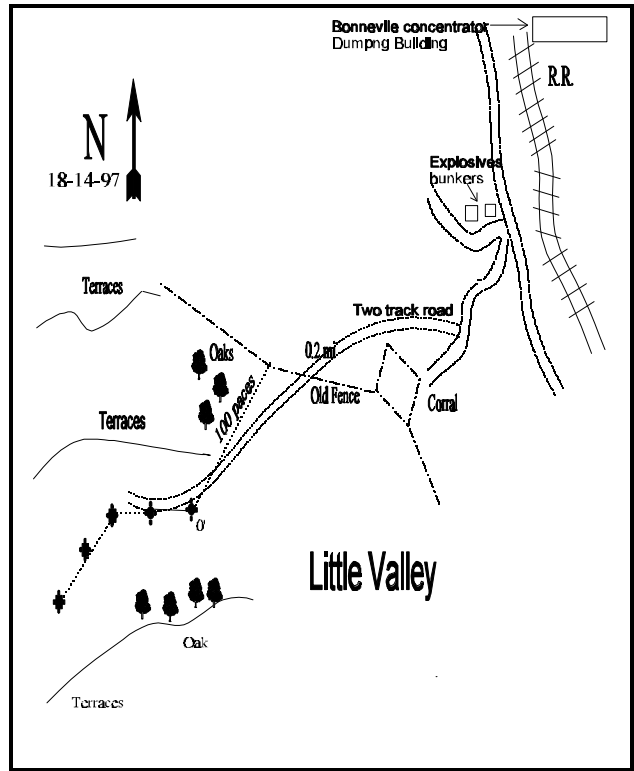
LOCATION DESCRIPTION

From the Bonneville concentrator, proceed south 0.1 miles along the railroad tracks to a three-way fork. Take the middle fork past some explosives bunkers 0.15 miles to an old corral. Just before the corral is a two track road. Take this road 0.2 miles. to a bend in the old fence. 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 cut fenceposts.



Map Name: Farnsworth Peak

Township 1S, Range 3W, Section 25



Diagrammatic Sketch

UTM 4506012.602 N, 403956.826 E

DISCUSSION

Trend Study No. 18-14 (11-14)

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 occurred year-round. Elk use was mainly in winter and spring. A pellet group transect read in conjunction with the trend study in 1997 (see methods) indicated elk use at 48 elk days use/acre and deer use at less than 1.

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 species of plants. Effective rooting depth (see methods) 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 grass 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 is stable even with 38% bare soil because of the lack of slope and good herbaceous cover, litter cover, and terracing. 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 is downward.

1997 TREND ASSESSMENT

Soil trend is improved with bare soil down to 7% with good herbaceous cover and good litter cover. There is no trend for shrubs for 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 - improved

browse - no shrubs on site

herbaceous understory - down, decrease for western wheatgrass and mostly weeds (90% cover)

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 14

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover % '97
		'90	'97	'90	'97	
G	Agropyron smithii	266	*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	1	*40	1	14	1.81
G	Poa secunda	-	6	-	3	.01
G	Secale cereale (a)	143	110	57	37	8.12
Total for Grasses		410	626	139	216	20.67
F	Alyssum alyssoides (a)	-	2	-	1	.00
F	Ambrosia psilostachya	48	*165	21	52	9.80
F	Aster chilensis	15	*-	10	-	-
F	Cardaria draba	-	*31	-	13	.14
F	Convolvulus arvensis	9	*45	3	20	.40
F	Comandra pallida	1	4	1	1	.03
F	Epilobium paniculatum (a)	-	148	-	61	3.50
F	Grindelia squarrosa	213	*129	72	52	2.25
F	Helianthus annuus (a)	12	*69	6	30	3.22
F	Lactuca serriola	-	*35	-	18	.34
F	Linaria dalmatica	3	6	2	2	.15
F	Machaeranthera canescens	22	*-	10	-	-
F	Nicotiana attenuata (a)	16	-	7	-	-
F	Polygonum douglasii (a)	-	129	-	48	2.12
F	Rumex crispus	-	*41	-	19	.52
F	Tragopogon dubius	7	*41	4	19	.70
Total for Forbs		346	845	136	336	23.21

* Indicates significant difference at % = 0.10 (annuals excluded)

BASIC COVER --

Herd unit 18 , Study no: 14

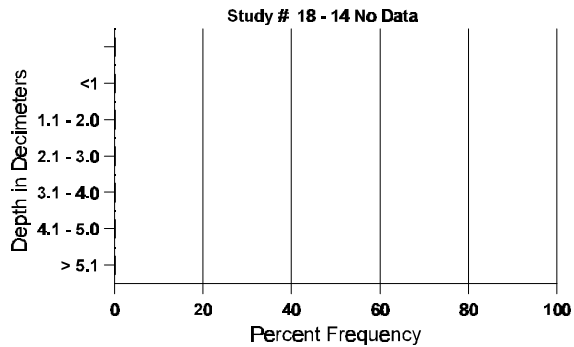
Cover Type	Nested Frequency '97	Average Cover %	
		'90	'97
Vegetation	376	4.75	58.24
Rock	9	0	.07
Pavement	21	.25	.09
Litter	390	53.00	59.97
Cryptogams	115	4.00	4.53
Bare Ground	193	38.00	6.90

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 14

Effective rooting depth (inches)	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 '97
Elk	28
Deer	3

Trend Study 18-15-97

Study site name: Upper Kessler Canyon.

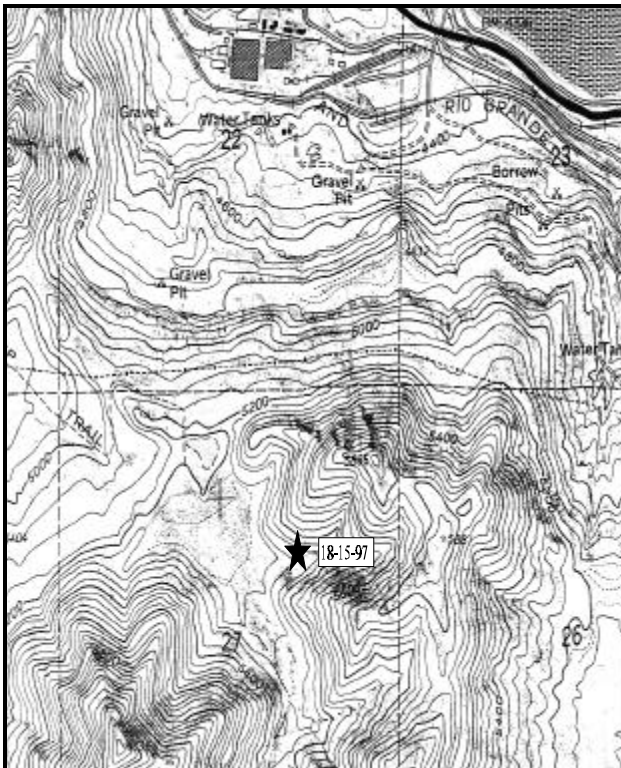
Range type: Perennial grass.

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

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

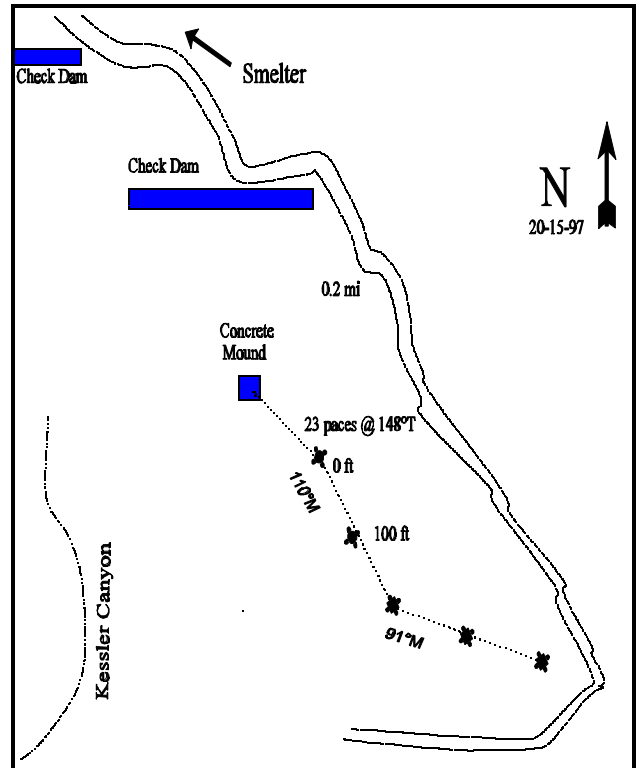
LOCATION DESCRIPTION

From the check dam in upper Kessler Canyon (Smelter Canyon) continue on into the valley for approximately ¼ mile to a concrete mound. From the concrete mound, walk 23 paces bearing 148° M 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

UTM 4506662.887 N, 401615.151 E

DISCUSSION

Trend Study No. 18-15 (11-15)

The Upper Kessler Canyon study is located in the upper canyon bottoms where it had 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 (quadrat frequency of 32%) with no sign of deer use.

The soil surface appears to be a hard-packed clay with a relatively large amount of rock on the surface and throughout the profile. It is very shallow, with an effective rooting depth of only 5 inches. This is the most shallow measurement recorded within this unit. Soil textural analysis shows it to be a sandy clay loam with a neutral to slightly acid soil reaction (pH of 6.6). Soil temperature is one of the highest that have been measured a 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 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 at that time in the canyon bottom was a large and very robust intermediate wheatgrass. By 1997, not much has changed, with intermediate wheatgrass and slender wheatgrass still dominating the area as they provide almost 90% of the total vegetative cover. Without the dominance of the perennial grasses, western ragweed could be more of a problem than it is, for even now it makes up most of the remaining 10% of the vegetative cover.

1990 APPARENT TREND ASSESSMENT

Soil trend is stable with a lack of significant slope and good protective cover from herbaceous species and litter. The browse trend is not applicable here as none were sampled although not considered a deer winter range, there are a few white stemmed rabbitbrush and four-wing saltbush on the slopes. The herbaceous understory is up from what was here before the treatment and seeding.

1997 TREND ASSESSMENT

Soil trend has continued to be stable with percent bare soil at 9% and good protective cover. Browse trend is not applicable here as 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 found). 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 or total vegetative cover.

TREND ASSESSMENT

soil - stable

browse - not applicable, none were sampled

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 15

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover % '97
		'90	'97	'90	'97	
G	Agropyron intermedium	286	239	98	77	21.85
G	Agropyron trachycaulum	-	*67	-	20	6.14
G	Bromus tectorum (a)	-	67	-	24	.39
G	Poa fendleriana	3	5	1	3	.04
G	Poa pratensis	23	10	10	4	.09
Total for Grasses		312	388	109	128	28.51
F	Ambrosia psilostachya	-	*70	-	28	3.25
F	Aster chilensis	25	*2	11	1	.00
F	Cirsium spp.	-	2	-	1	.00
F	Epilobium paniculatum (a)	-	34	-	18	.28
F	Grindelia squarrosa	27	*4	12	4	.22
F	Lactuca serriola	2	*14	1	6	.06
F	Medicago sativa	11	*-	5	-	-
F	Solidago spp.	18	*-	8	-	-
Total for Forbs		83	126	37	58	3.84

* Indicates significant difference at % = 0.10 (annuals excluded)

BASIC COVER --

Herd unit 18 , Study no: 15

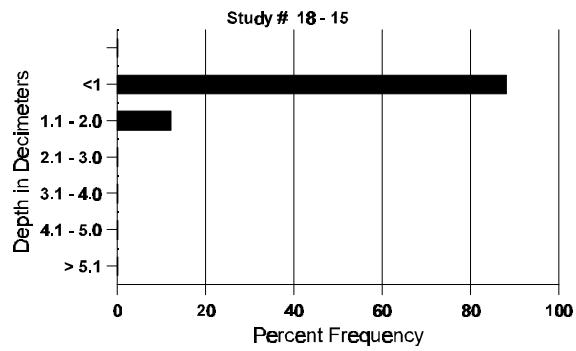
Cover Type	Nested Frequency '97	Average Cover %	
		'90	'97
Vegetation	321	6.75	33.99
Rock	261	33.50	23.40
Pavement	114	7.25	2.83
Litter	377	42.75	44.82
Cryptogams	105	2.25	2.83
Bare Ground	123	7.50	8.89

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 15

Effective rooting depth (inches)	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	.7

Stoniness Index



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

Type	Quadrat Frequency '97
Elk	32

Trend Study 18-19-97

Study site name: Black Rock West .

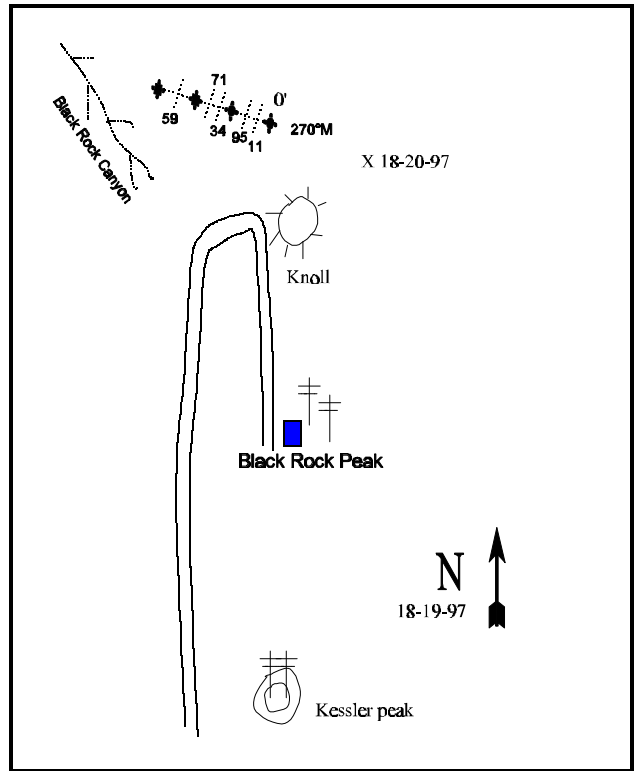
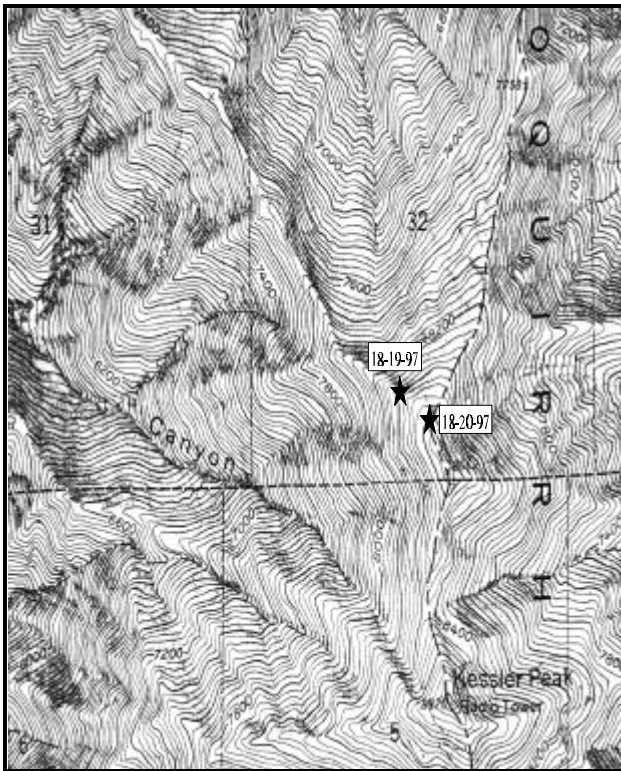
Range type: Perennial grass .

Compass bearing: frequency baseline 270 M degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34 , 71ft), line 3 (59ft).

LOCATION DESCRIPTION

Drive up to Kessler Peak on the Coon Canyon Road and continue north to Black Rock Peak. On the last switchback before reaching the radio towers, stop and then 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

Diagrammatic Sketch

Township 1S Range 3W , Section 32

UTM 4504140.205 N, 398300.459 E

DISCUSSION

Trend Study No. 18-19 (11-19)

The Black Rock West study samples a west-facing slope where shrubs were planted and grasses aerially seeded. The site is at a moderately 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 indicates 84 elk days use/acre. There were no 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.

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 4%. About 28% 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 9 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). Vegetative cover is relatively high, with almost 90% coming from herbaceous species. Soil erosion on the site is minimal.

The browse species tend to be moderately hedged but they only contribute about 11% of the vegetative cover. Low rabbitbrush is common and has the potential to increase, however with the increased sample size, density is down from the initial estimate. Although small, the serviceberry sprouts are vigorous. Conversely, the estimate for serviceberry is down significantly from the original density. Again, this is because the larger sample is giving a much more accurate estimate of its density. Sagebrush grows on similar, but physiologically drier slopes below the study site.

Initially the seeded 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 significantly. Overall, the trend for perennial grasses is down with the sum of nested frequency decreasing noticeably. As before, there is a large diversity of low-growing native forb species. Nineteen perennial species were identified in 1990, with over 30 being identified in 1997. 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 grasshoppers in 1997.

1990 APPARENT TREND ASSESSMENT

The trend for soil is 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 because the site is too high to be considered a winter range for deer. The herbaceous understory is also considered to be stable at this time without any other data.

1997 TREND ASSESSMENT

The trend for soil is slightly improved with percent bare soil decreasing to about 4%. Herbaceous cover continues to be high with improved values for litter cover. With the larger sample size, some of the shrubs have showed decreases or increases in their densities. This has been more reflective of the sampling 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

significantly increased has been spike fescue which is more adapted to the higher elevation, however it has not compensated for the losses to the other three species. Overall, there has been a slight downward change in the sum of nested frequency for the forbs also.

TREND ASSESSMENT

soil - up slightly

browse - stable, but a minor component of the community

herbaceous understory - down slightly for both the grasses and forbs, probably moisture related

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 19

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover % '97
		'90	'97	'90	'97	
G	Agropyron spicatum	185	*111	72	45	2.80
G	Agropyron trachycaulum	-	*25	-	11	.15
G	Bromus carinatus	3	-	1	-	-
G	Leucopoa kingii	159	*229	62	78	16.25
G	Poa fendleriana	170	*19	65	8	.09
G	Poa pratensis	-	4	-	1	.00
G	Poa secunda	246	*99	84	42	.82
G	Stipa lettermani	-	*35	-	15	.55
Total for Grasses		763	522	284	200	20.69
F	Achillea millefolium	83	108	32	41	2.73
F	Agoseris glauca	1	*20	1	9	.14
F	Antennaria rosea	273	*181	93	62	10.57
F	Arabis spp.	11	6	4	4	.02
F	Arenaria fendleri	284	*173	92	56	5.10
F	Astragalus convallarius	-	2	-	1	.03
F	Aster perelegans	9	*29	4	13	.48
F	Castilleja linariaefolia	28	*10	14	5	.07
F	Calochortus nuttallii	22	*56	10	31	.18
F	Chaenactis douglasii	30	23	16	12	.13
F	Cirsium spp.	-	2	-	2	.01
F	Comandra pallida	19	*4	9	3	.01
F	Collinsia parviflora (a)	-	7	-	4	.02
F	Crepis acuminata	141	*26	61	14	.07
F	Delphinium nuttallianum	-	2	-	2	.03
F	Draba spp. (a)	2	-	1	-	-
F	Epilobium paniculatum (a)	-	3	-	1	.00

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover % '97
		'90	'97	'90	'97	
F	Eriogonum umbellatum	10	6	5	2	.15
F	Gayophytum ramosissimum (a)	-	30	-	10	.96
F	Geum spp.	7	*-	4	-	-
F	Lathyrus brachycalyx	35	*19	12	7	1.26
F	Lactuca serriola	-	3	-	1	.00
F	Lupinus argenteus	17	*5	7	3	.03
F	Machaeranthera canescens	-	*7	-	4	.04
F	Penstemon spp.	-	*13	-	7	.11
F	Polygonum douglasii (a)	-	49	-	18	.43
F	Potentilla spp.	8	14	3	7	.16
F	Senecio multilobatus	1	8	1	5	.05
F	Stellaria jamesiana	-	*98	-	34	1.34
F	Taraxacum officinale	-	1	-	1	.00
F	Unknown forb-perennial	1	5	1	3	.06
F	Viguiera multiflora	-	4	-	2	.03
Total for Forbs		982	914	370	364	24.32

* Indicates significant difference at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 18 , Study no: 19

Type	Species	Strip Frequency '97	Average Cover % '97
B	Amelanchier alnifolia	16	.60
B	Chrysothamnus viscidiflorus stenophyllus	57	4.28
B	Prunus virginiana	4	.53
B	Symphoricarpos oreophilus	1	-
Total for Browse		78	5.42

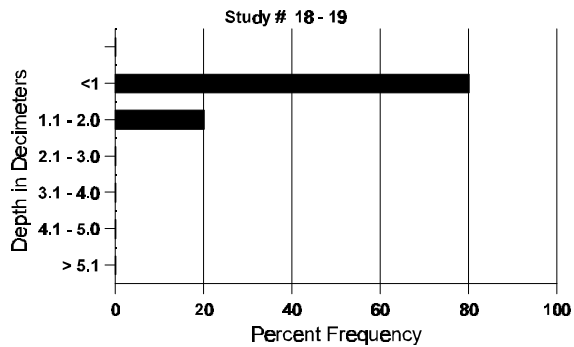
BASIC COVER --
Herd unit 18 , Study no: 19

Cover Type	Nested Frequency '97	Average Cover %	
		'90	'97
Vegetation	359	27.75	53.92
Rock	237	22.75	10.71
Pavement	290	17.50	17.70
Litter	393	19.75	37.43
Cryptogams	21	1.25	.15
Bare Ground	138	11.00	3.77

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 19

Effective rooting depth (inches)	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 '97
Elk	47
Deer	1

BROWSE CHARACTERISTICS --

Herd unit 18 , 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>Amelanchier alnifolia</i>																		
Y	90	44	35	8	-	-	-	-	-	-	86	1	-	-	2900		87	
	97	2	4	-	-	-	-	-	-	-	6	-	-	-	120		6	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	97	-	5	11	-	-	-	-	-	-	16	-	-	-	320	6	7	16
D	90	3	33	10	4	-	-	-	-	-	47	2	-	1	1666		50	
	97	1	-	1	-	-	2	-	-	-	1	1	-	2	80		4	
X	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	40			2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'90		50%			13%			.72%			-89%							
'97		35%			54%			08%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	4566	Dec:	36%			
												'97	520		15%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	97	2	-	-	-	-	-	-	-	-	2	-	-	40			2	
Y	90	50	5	-	1	-	-	-	-	-	56	-	-	1866			56	
	97	28	-	-	-	-	-	-	-	-	28	-	-	560			28	
M	90	119	18	-	2	-	-	-	-	-	139	-	-	4633	7	10	139	
	97	205	-	-	-	-	-	-	-	-	205	-	-	4100	6	12	205	
D	90	6	10	1	-	-	-	-	-	-	16	-	-	566			17	
	97	1	-	-	-	-	-	-	-	-	1	-	-	20			1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'90		16%			.47%			.47%			-34%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	7065	Dec:	8%			
												'97	4680		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				
<i>Prunus virginiana</i>																		
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	2	-	-	-	-	-	-	-	3	-	-	-	60			3
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	4	11	-	-	-	-	-	-	-	15	-	-	-	300	24	13	15
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%			Appeared							
'97		72%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'97	360		-			
<i>Symphoricarpos oreophilus</i>																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	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%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'97	20		-			

Trend Study 18-20-97

Study site name: Black Rock East .

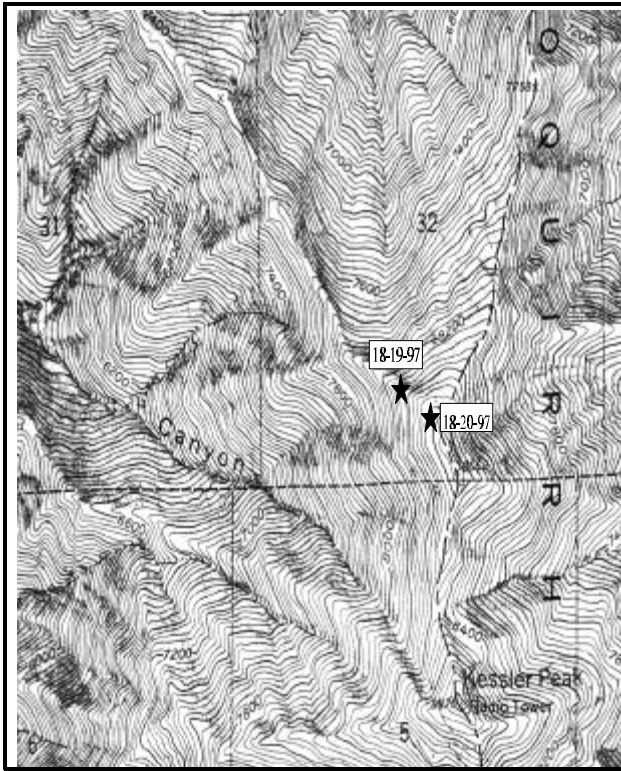
Range type: Perennial grass .

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

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

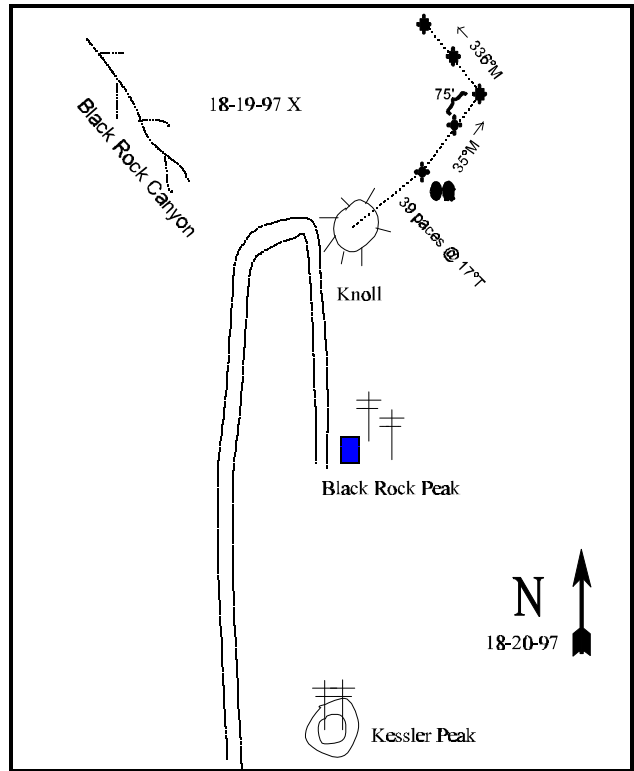
LOCATION DESCRIPTION

Drive up to Kessler Peak (Coon Canyon Road) and continue north to the peak above Black Rock Canyon. On the last switchback before reaching the radio towers, stop and then walk onto the knoll to the east. From the knoll, walk 39 paces north (bearing approximately 17°T) to the 0-foot baseline stake. The study is marked by short fenceposts. The 100-foot end of the baseline is marked by a rebar.



Map Name: Farnsworth Peak

Township 1S, Range 3W, Section 32



Diagrammatic Sketch

UTM 4504127.544 N, 398339.433 E

DISCUSSION

Trend Study No. 18-20 (11-20)

The Black Rock East study is at about the same elevation as the Black Rock West study. This site has a moderate slope of 35% and northeast aspect. In 1997, it was noted that the site had been poorly located for it is 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 pellet-groups indicate that elk prefer the spike fescue, not the drier east aspect. The pellet group transect, read in 1997, indicates 50 elk days use/acre on this site. There were no deer pellet-groups found in the area.

The soils on the site are conspicuously deeper with an effective rooting depth (see methods) of almost 16 inches and a slightly acidic pH (6.4). The soil temperature is cool at 50°F at 17 inches in depth. The soil textural analysis indicates a loam. The site has good protective herbaceous and litter cover, with little erosion taking place.

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 and the dominant browse is also low rabbitbrush. Species diversity is also very similar with more than 30 species of forbs. There are no annual grasses on this site either. Like the other site, grasshoppers were at very high numbers and were heavily utilizing the grasses. The browse on this site makes up about 21% of the total vegetative cover, about double that of the Black Rock West site. The chokecherry is lightly hedged and very vigorous.

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, and it is more of a summer range for elk. However, 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 below 5% but rock cover increased and litter cover declined. Protective cover from the herbaceous species is still high with almost 80% of the total vegetative cover coming from them. The larger sampling design now picks up some browse species that were not sampled before. The numbers are relatively low, but still almost twice that of the Black Rock West site. Browse is still a minor component because this is more of a summer range for elk. Trend is stable for the herbaceous species on this site, which has an effective rooting depth 40% deeper than Black Rock West where the trend was down.

TREND ASSESSMENT

soil - stable

browse - stable, but not a critical component for a high elevation elk summer range

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 20

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover % '97
		'90	'97	'90	'97	
G	Agropyron spicatum	3	*52	1	23	.63
G	Agropyron trachycaulum	157	*66	66	30	.74
G	Bromus carinatus	102	*8	47	4	.22
G	Leucopoa kingii	21	*99	9	40	5.23
G	Melica bulbosa	4	1	1	1	.00
G	Poa bulbosa	-	1	-	1	.00
G	Poa fendleriana	-	*70	-	28	2.40
G	Poa pratensis	2	1	1	1	.00
G	Poa secunda	-	*92	-	33	2.32
G	Stipa columbiana	16	*36	8	18	1.09
G	Stipa lettermani	121	93	52	41	2.67
Total for Grasses		426	519	185	220	15.34
F	Achillea millefolium	97	*56	45	28	1.53
F	Agoseris glauca	26	*2	11	2	.01
F	Antennaria rosea	-	*65	-	26	2.42
F	Arenaria spp.	-	*92	-	35	2.94
F	Arabis glabra	13	18	7	9	.04
F	Aster spp.	-	5	-	3	.01
F	Castilleja linariaefolia	-	4	-	2	.03
F	Calochortus nuttallii	-	*43	-	20	.10
F	Chaenactis douglasii	21	27	10	12	.21
F	Cirsium spp.	-	*20	-	10	.56
F	Comandra pallida	-	*18	-	8	.23
F	Collinsia parviflora (a)	-	39	-	13	.09
F	Crepis acuminata	19	8	8	4	.02
F	Delphinium bicolor	5	-	3	-	-
F	Delphinium nuttallianum	-	1	-	1	.03
F	Epilobium paniculatum (a)	-	7	-	3	.06
F	Eriogonum umbellatum	-	*11	-	6	.22
F	Erysimum spp.	9	*-	4	-	-
F	Gayophytum ramosissimum (a)	-	65	-	23	1.16
F	Helianthus annuus (a)	1	-	1	-	-
F	Helianthella uniflora	16	*-	6	-	-
F	Lathyrus brachycalyx	9	17	5	6	1.24

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover % '97
		'90	'97	'90	'97	
F	Lactuca serriola	4	-	3	-	-
F	Lupinus argenteus	68	51	26	25	3.54
F	Machaeranthera canescens	1	-	1	-	.03
F	Mentha spp.	-	*7	-	3	.04
F	Osmorhiza occidentalis	12	*-	6	-	-
F	Polygonum douglasii (a)	-	176	-	50	5.32
F	Prunus virginiana	-	6	-	3	.04
F	Stellaria jamesiana	-	*23	-	11	.27
F	Taraxacum officinale	-	4	-	1	.15
F	Thalictrum fendleri	8	3	3	1	.15
F	Tragopogon dubius	13	*1	7	1	.00
F	Unknown forb-perennial	-	-	-	-	.03
F	Viguiera multiflora	197	*76	76	31	1.29
F	Viola spp.	-	2	-	1	.03
Total for Forbs		519	847	222	338	21.88

* Indicates significant difference at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 18 , Study no: 20

Type	Species	Strip Frequency '97	Average Cover % '97
B	Amelanchier utahensis	23	.58
B	Artemisia tridentata vaseyana	3	.00
B	Cercocarpus ledifolius	0	.78
B	Chrysothamnus viscidiflorus	39	4.59
B	Prunus virginiana	9	3.49
B	Quercus gambelii	1	-
B	Symphoricarpos oreophilus	1	.15
Total for Browse		76	9.60

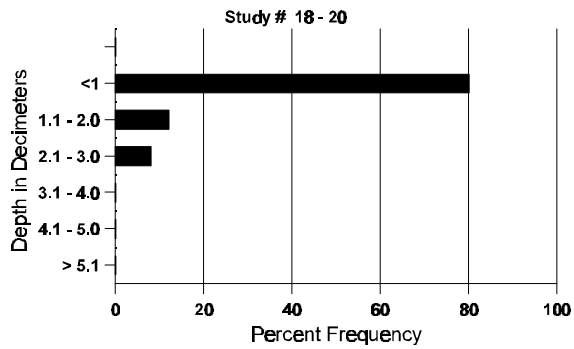
BASIC COVER --
Herd unit 18 , Study no: 20

Cover Type	Nested Frequency '97	Average Cover %	
		'90	'97
Vegetation	363	7.75	49.72
Rock	266	11.75	10.38
Pavement	336	16.00	24.00
Litter	389	51.50	22.59
Cryptogams	8	.25	.01
Bare Ground	202	12.75	4.94

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 20

Effective rooting depth (inches)	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	.4

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 18 , Study no: 20

Type	Quadrat Frequency '97
Rabbit	1
Elk	34
Deer	3

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 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				
Amelanchier utahensis																		
S	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	4	2	-	-	-	-	-	-	-	6	-	-	-	120		6	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	1	41	6	2	1	-	-	-	-	50	-	1	-	1020	6	10	
D	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	8	4	1	-	-	-	-	-	-	-	-	-	13	260		13	
X	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	260		13	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%			Appeared							
'97		69%			10%			20%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	0%			
												'97	1400		19%			
Artemisia tridentata vaseyana																		
S	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	2	1	-	-	-	-	-	-	-	3	-	-	-	60	8	9	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%			Appeared							
'97		33%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'97	60		-			
Cercocarpus ledifolius																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	28	101	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%			None							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'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				
Chrysothamnus viscidiflorus																		
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	15	-	-	-	-	-	-	-	-	15	-	-	-	300		15	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	165	2	-	-	-	-	-	-	-	167	-	-	-	3340	7	12	
D	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	8	-	-	-	-	-	-	-	-	6	-	-	2	160		8	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%			Appeared							
'97		01%			00%			01%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	0%			
												'97	3800		4%			
Prunus virginiana																		
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	46	-	-	-	-	-	-	-	-	46	-	-	-	920		46	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	47	-	-	-	-	-	-	-	-	47	-	-	-	940	35	14	
D	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	1	-	-	-	-	-	-	-	-	-	-	1	20		1	
X	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	140		7	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%			Appeared							
'97		01%			00%			01%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	0%			
												'97	1880		1%			
Quercus gambelii																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100	13	15	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'90		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'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					
Symphoricarpos oreophilus																			
M	'90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	'97	1	-	-	-	-	-	-	-	-	-	-	-	1	20	7	5	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 .

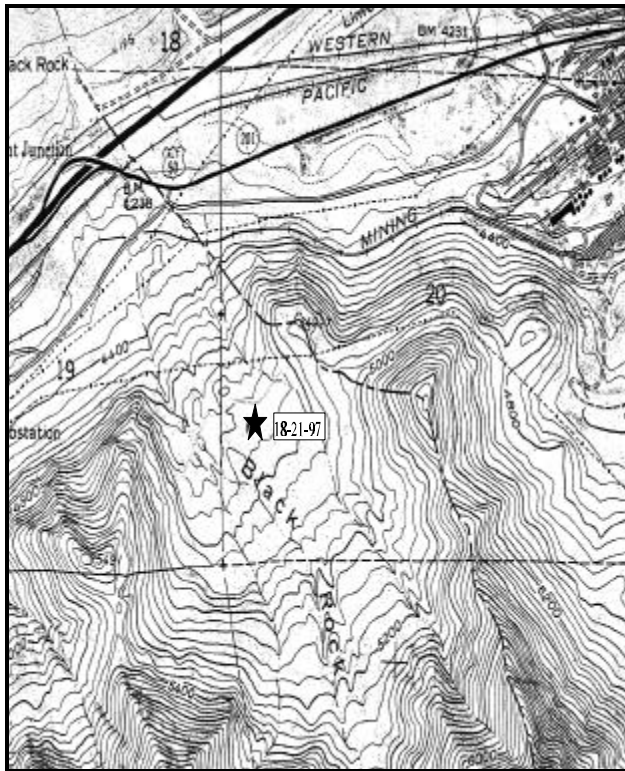
Range type: Seeded .

Compass bearing: frequency baseline 304 M degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), Line 3 (59ft), line 4 (71ft).

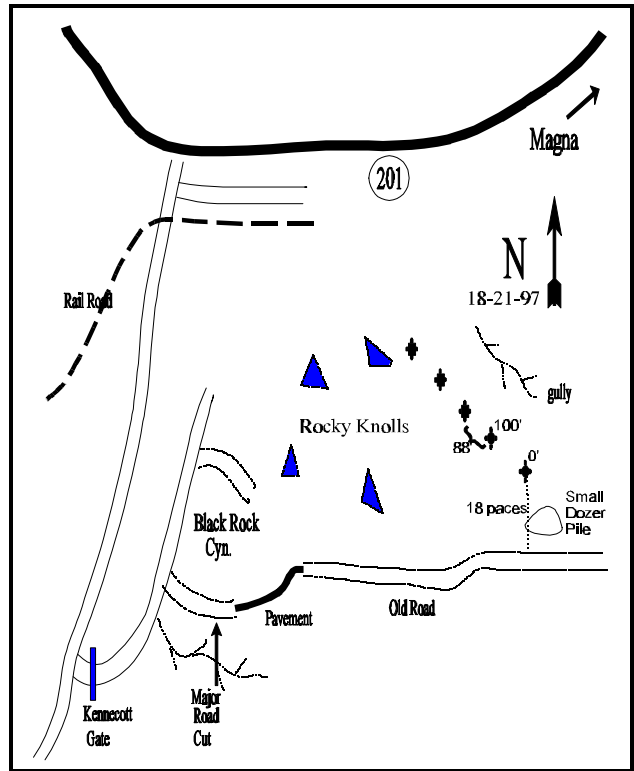
LOCATION DESCRIPTION

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 1/2 mile into the valley. The study site is on the north side of the road, in a reseeded flat. The study is marked by 2 1/2 foot tall fencepost stakes.



Map Name: Farnsworth Peak

Township 1S, Range 3W, Section 20



Diagrammatic Sketch

UTM 4507414.496 N, 397328.869 E

DISCUSSION

Trend Study No. 18-21 (11-21)

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 only 4% of the total vegetative cover. The site is obviously not a deer winter range, however the site is used heavily by elk. A Pellet group transect read in 1997 indicate 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. The high 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 again 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 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 been eliminated, but the seeding effort provides increased desirable forage production.

1990 APPARENT TREND ASSESSMENT

The trend for soil is stable with good protective cover from herbaceous species even though most of it is from weedy species. The trend for browse is stable, but at very, insignificantly low numbers. The trend for the herbaceous understory is improving.

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 species 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

browse - stable, but not an important component because of its very low numbers

herbaceous understory - down, because of the overwhelming proportion of weeds in the composition

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 21

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover % '97
		'90	'97	'90	'97	
G	Agropyron intermedium	3	*28	1	11	.53
G	Aristida longiseta	6	13	3	8	.94
G	Bromus tectorum (a)	-	321	-	94	7.83
G	Leucopoa kingii	-	3	-	1	.03
G	Muhlenbergia asperifolia	167	*72	55	26	4.03
G	Poa pratensis	16	25	6	9	.55
G	Sporobolus cryptandrus	10	*-	6	-	-
Total for Grasses		202	462	71	149	13.94
F	Ambrosia psilostachya	217	*147	81	59	6.53
F	Aster spp.	1	-	1	-	-
F	Cardaria draba	-	*34	-	14	.55
F	Carduus nutans (a)	11	*-	6	-	-
F	Comandra pallida	2	*22	1	8	.14
F	Cruciferae	1	-	1	-	-
F	Epilobium paniculatum (a)	-	39	-	20	.33
F	Grindelia squarrosa	94	*59	43	30	1.63
F	Helianthus annuus (a)	14	*2	6	1	.03
F	Lactuca serriola	23	9	12	5	.22
F	Linaria dalmatica	6	*221	4	82	10.39
F	Melilotus alba	22	*-	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	44	*3	23	1	.01

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover % '97
		'90	'97	'90	'97	
F	Unknown forb-perennial	-	2	-	1	.15
Total for Forbs		443	542	193	223	20.16

* Indicates significant difference at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 18 , Study no: 21

T y p e	Species	Strip Frequency '97	Average Cover % '97
B	Chrysothamnus nauseosus albicaulis	5	1.06
B	Gutierrezia sarothrae	1	.18
Total for Browse		6	1.24

BASIC COVER --

Herd unit 18 , Study no: 21

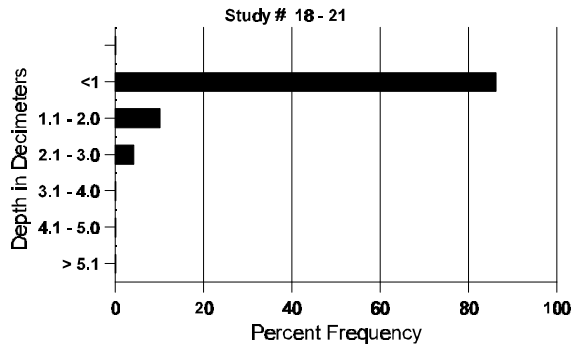
Cover Type	Nested Frequency '97	Average over %	
		'90	'97
Vegetation	282	5.00	32.95
Rock	152	10.00	5.53
Pavement	112	2.50	2.31
Litter	318	77.25	47.41
Cryptogams	22	0	.24
Bare Ground	83	5.25	3.94

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 21

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	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

Stoniness Index



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) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Chrysothamnus nauseosus albicaulis</i>																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	5	1	1	-	-	-	-	-	-	-	-	-	140	26	42	7	
		% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change Appeared</u>					
		'90		00%			00%			00%								
		'97		14%			14%			00%								
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'97	140		-			
<i>Gutierrezia sarothrae</i>																		
Y	90	1	-	-	-	-	-	-	-	-	-	-	-	33			1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
M	90	5	-	-	-	-	-	-	-	-	-	-	-	166	17	11	5	
	97	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 .

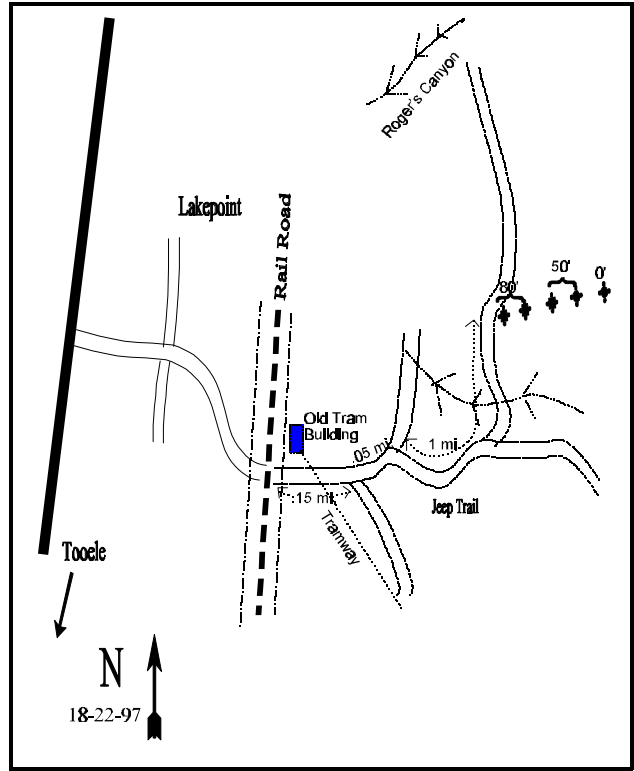
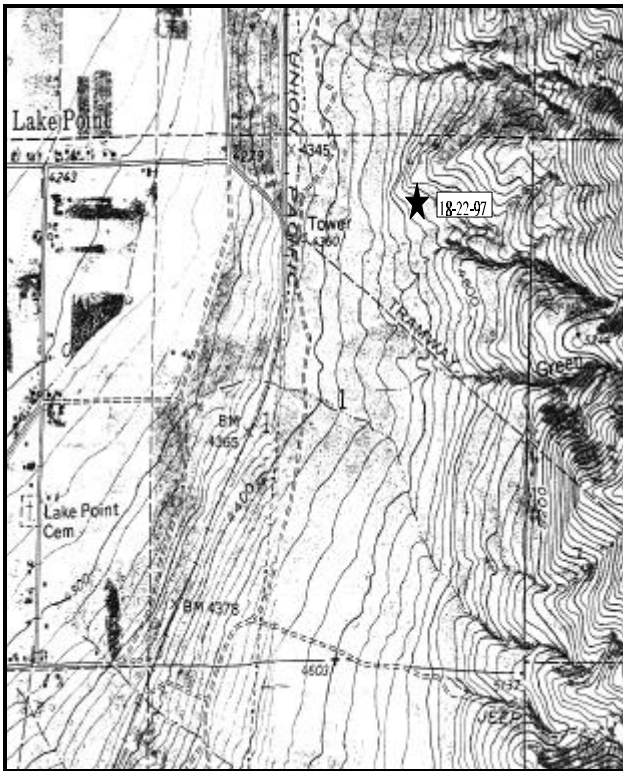
Range type: Perennial grass .

Compass bearing: frequency baseline 240 M degrees.

First frame placement on frequency belts 5 feet. 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

UTM 4504260.524 N, 395504.195 E

DISCUSSION

Trend Study No. 18-22 (11-22)

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 (see methods) 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 10 ppm (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, however 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. 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

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

herbaceous understory - down, mostly composed of weedy species

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 22

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover % '97
		'90	'97	'90	'97	
G	Agropyron spicatum	132	*83	53	33	3.23
G	Aristida purpurea	69	51	31	24	1.21
G	Bromus tectorum (a)	-	254	-	88	2.29
G	Muhlenbergia spp.	-	3	-	1	.03
G	Poa bulbosa	50	*134	19	44	4.30
G	Poa fendleriana	-	3	-	2	.03
G	Poa secunda	13	*70	6	26	1.83
Total for Grasses		264	598	109	218	12.96
F	Alyssum alyssoides (a)	-	52	-	19	.19
F	Ambrosia psilostachya	149	*88	64	41	1.39
F	Astragalus amphioxys	-	4	-	2	.18
F	Asclepias asperula	1	3	1	1	.18
F	Astragalus spp.	27	*-	14	-	-
F	Astragalus utahensis	117	*27	51	11	.81
F	Calochortus nuttallii	8	*23	5	12	.06
F	Cirsium spp.	35	*56	15	31	1.68
F	Cirsium undulatum	139	*-	59	-	-
F	Collinsia parviflora (a)	-	5	-	2	.01
F	Draba spp. (a)	-	1	-	1	.00
F	Epilobium paniculatum (a)	-	13	-	8	.09
F	Erigeron spp.	-	2	-	1	.00
F	Grindelia squarrosa	59	*38	27	20	.92
F	Helianthus annuus (a)	5	2	4	2	.01
F	Lactuca serriola	2	6	1	3	.04
F	Linaria dalmatica	-	1	-	1	.00
F	Lithospermum spp.	29	*3	14	1	.03
F	Oenothera spp.	11	16	9	8	.11
F	Phlox longifolia	5	2	3	1	.00
F	Ranunculus testiculatus (a)	-	3	-	1	.03

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover % '97
		'90	'97	'90	'97	
F	Tragopogon dubius	24	18	12	10	.10
F	Zigadenus paniculatus	3	1	3	1	.00
Total for Forbs		614	364	282	177	5.89

* Indicates significant difference at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 18 , Study no: 22

T y p e	Species	Strip Frequency	Average Cover %
		'97	'97
B	Gutierrezia sarothrae	100	16.20
Total for Browse		100	16.20

BASIC COVER --

Herd unit 18 , Study no: 22

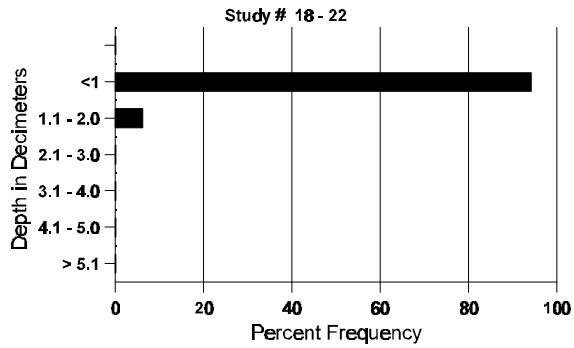
Cover Type	Nested Frequency	Average Cover %	
	'97	'90	'97
Vegetation	333	8.75	32.81
Rock	262	21.25	14.00
Pavement	305	14.75	15.04
Litter	389	33.50	36.31
Cryptogams	47	.25	.58
Bare Ground	225	21.50	11.62

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 22

Effective rooting depth (inches)	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				
<i>Gutierrezia sarothrae</i>																		
S	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	4	-	-	-	-	-	-	-	-	-	-	-	4	80		4	
Y	90	56	-	-	1	-	-	-	-	-	-	-	57	3800		57		
	97	385	-	-	15	-	-	-	-	-	-	13	8000		400			
M	90	32	-	-	-	-	-	-	-	-	-	32	2133	9	12	32		
	97	1473	-	-	6	-	-	-	-	-	-	1479	11	14	1479			
D	90	8	-	1	-	-	-	-	-	-	-	5	600		9			
	97	102	-	-	-	-	-	-	-	-	-	2040		102				
X	90	-	-	-	-	-	-	-	-	-	-	-	0		0			
	97	-	-	-	-	-	-	-	-	-	-	380		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 18-23-97

Study site name: South Palmer Point .

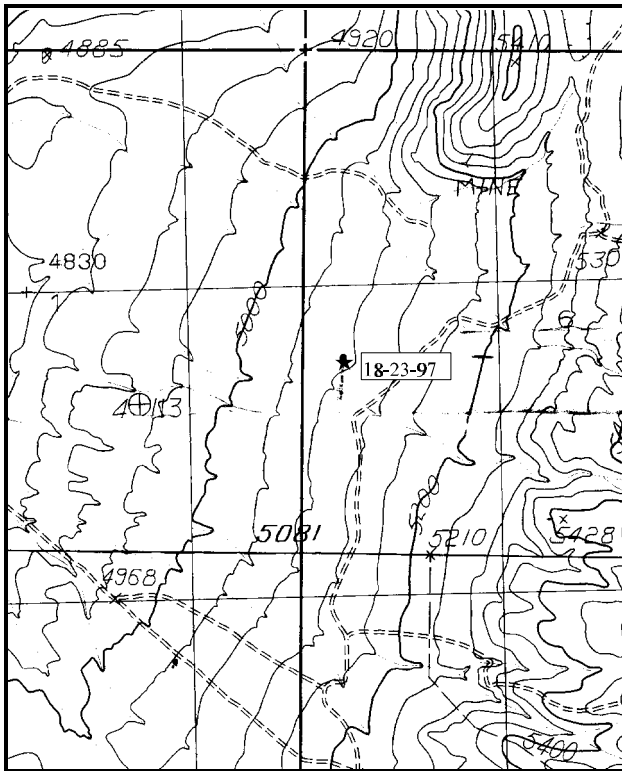
Range type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 14 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

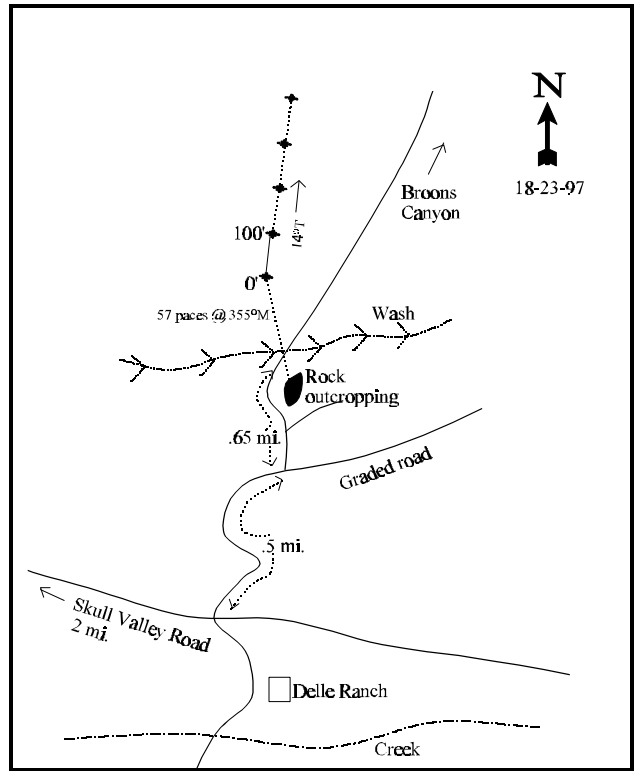
LOCATION DESCRIPTION

From the site where the creek crosses the road at Delle Ranch, proceed north towards Broons Canyon for 1.05 miles until you reach a rock outcropping on the righthand 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 14 degrees true, 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, Utah

Township 3 S , Range 7 W , Section 6



Diagrammatic Sketch

UTM 4493692.225 N , 357587.698 E

DISCUSSION

Trend Study No. 18-23 (12-1)

The South Palmer Point trend study is in a Wyoming big sagebrush grass deer winter range. This study site is located on what in the past has been described as heavily used deer winter range within the sagebrush/grass type. 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. Aside from light to moderate deer use in the winter, cattle use is currently light.

Soils are derived from fine textured alluvial deposits with many large rocks on the soil surface. Soil textural analysis indicates it to be a loam with a moderately alkaline pH (7.9). This pH could be limiting to the establishment of some species. The amount of phosphorus in the soil could also be limiting to the establishment and development of some plant species as it is only 3.4 ppm where 10 ppm is considered the minimal value required. In 1983, approximately 30% of the soil surface was bare with some erosion taking place. By 1989, the percent bare soil was down to 20%, and further decreased down to 10% during the 1997 reading. Vegetative cover consists primarily of cheatgrass brome, Wyoming big sagebrush, broom snakeweed, and scattered Utah junipers. This has not changed much through the years.

Browse cover comes primarily from two species (Wyoming big sagebrush and juniper), in which they provide 98% of the browse cover. The most important of these is Wyoming big sagebrush which has showed signs of rapid decline in the past, most likely caused by heavy utilization in conjunction with extended drought. This has been demonstrated by the increases in percent decadence and percentage of plants classified with heavy use in the past. Since 1983, percentage of plants classified with heavy use has gone from 69% to none, and those with poor vigor have gone from a high of 72% in 1989 to 11% in 1997. Percent decadence has also gone from a high of 83% to only 24% in 1997. Population numbers are slightly improved from the initial density estimates of 1983. Currently, the biotic potential is the highest it has ever been at 37% with 38% of the population classified as young plants. Nearly half of the population were classified as dead in 1997, which indicates what has been happening in the past. Now the population is on the upward trend with an end to the extended drought. The population now has improved vigor, mostly light use, percent decadence is down to 24%, and there is excellent biotic potential (percentage of seedlings) with a relatively high percentage of young plants (38%). Broom snakeweed and Utah juniper are both increasers with heavy grazing. Currently, the juniper appears to be stable and broom snakeweed is slightly down.

Sandberg bluegrass and especially cheatgrass brome are the most common grasses. However neither, provides much forage value. Other grasses are present but only occasionally. Cheatgrass is dense enough in most places to make 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. Forb cover currently totals just under 4% and makes up only 18% of the herbaceous cover. 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 soil trend is basically stable. The dense cheatgrass cover isn't especially effective at preventing runoff, but does provide 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 decreasing in abundance. 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, because percent bare soil is has decreased from 30% to 20%. The herbaceous cover and lack of any significant slope help mitigating 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%, and percent decadence going from 47% up to 83%. The herbaceous understory is slightly up for the perennial component, but there is still too many weedy species in the composition.

TREND ASSESSMENT

soil - stable

browse - downward

herbaceous understory - slightly upward

1997 TREND ASSESSMENT

The trend for soil is slightly improving, with a decrease in percent bare soil (from 20% to 10%), a significant increase in cryptogamic cover, from 4% to 10%, and a decrease in percent rock and pavement cover. The trend for browse (Wyoming big sagebrush) is up with moderate use down from 83% to 13%, those plants classified as having poor vigor going from 72% down to 11%, and percent decadence decreasing from 83% down to 24%. Also of great importance is that the biotic potential has increased to 37% and percentage of young plants in the population has increased to 38%. All measured parameters have improved. The trend for the herbaceous understory is slightly down because grasses make up over 80% of the herbaceous cover and the perennial component of the grasses has decreased while the perennial portion of the forbs show little changes. Most of the grass and forb cover for this site is derived from weedy species.

TREND ASSESSMENT

soil - slightly improved

browse - upward

herbaceous understory - slightly downward, composed of far too many weedy species

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 23

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron spicatum	12	6	11	5	2	5	.61
G	Bromus tectorum (a)	-	-	308	-	-	97	8.61
G	Poa secunda	_a 160	_b 244	_b 224	63	88	79	7.65
G	Sitanion hystrix	_a 9	_b 31	_{ab} 21	3	12	11	.29
Total for Grasses		181	281	564	71	102	192	17.17
F	Antennaria rosea	12	18	5	7	8	3	.06
F	Astragalus cibaricus	_a 9	_a 12	_b 36	8	5	16	1.39
F	Astragalus utahensis	7	13	15	5	6	6	.23
F	Castilleja chromosa	3	-	-	1	-	-	-
F	Calochortus nuttallii	11	19	10	7	9	6	.03

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	Chaenactis douglasii	1	4	8	1	2	5	.02
F	Cirsium undulatum	5	2	10	2	2	7	.13
F	Comandra pallida	-	-	3	-	-	2	.01
F	Collinsia parviflora (a)	-	-	4	-	-	2	.01
F	Cryptantha spp.	-	3	-	-	1	-	-
F	Erodium cicutarium (a)	-	-	1	-	-	1	.03
F	Holosteum umbellatum (a)	-	-	34	-	-	14	.31
F	Lathyrus brachycalyx	_b 10	_c 24	_a -	4	8	-	-
F	Lactuca serriola	_a -	_b 7	_b 8	-	5	4	.04
F	Lygodesmia spp.	-	-	3	-	-	2	.01
F	Microsteris gracilis (a)	-	-	1	-	-	1	.00
F	Phlox longifolia	_a 10	_b 32	_{ab} 24	4	17	10	.25
F	Ranunculus testiculatus (a)	-	-	154	-	-	56	1.09
F	Tragopogon dubius	-	-	7	-	-	3	.04
F	Zigadenus paniculatus	-	-	1	-	-	1	.03
Total for Forbs		68	134	324	39	63	139	3.73

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 18 , Study no: 23

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata wyomingensis	66	11.78
B	Chrysothamnus nauseosus albicaulis	1	.03
B	Chrysothamnus viscidiflorus viscidiflorus	1	.00
B	Gutierrezia sarothrae	38	.34
B	Juniperus osteosperma	6	7.68
Total for Browse		112	19.85

CANOPY COVER --

Herd unit 18 , Study no: 23

Species	Percent Cover '97
Juniperus osteosperma	5

BASIC COVER --

Herd unit 18 , Study no: 23

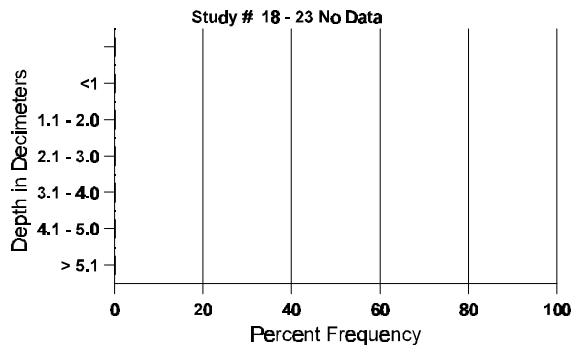
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	354	1.50	6.00	39.91
Rock	89	3.25	6.25	2.59
Pavement	256	1.25	10.00	5.13
Litter	385	63.50	53.75	43.77
Cryptogams	228	.25	3.75	10.16
Bare Ground	218	30.25	20.25	10.21

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 23

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
n/a	n/a	7.9	42.0	33.1	24.9	2.1	3.4	259.2	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 18 , Study no: 23

Type	Quadrat Frequency '97
Rabbit	18
Deer	16
Cattle	2

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 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>Artemisia tridentata wyomingensis</i>													
S	83	2	-	-	-	-	-	-	2	66		2	
	89	-	-	-	-	-	-	-	-	0		0	
	97	45	-	-	-	-	-	-	45	940		47	
Y	83	1	-	-	-	-	-	-	1	33		1	
	89	2	-	-	-	-	-	-	1	66		2	
	97	46	2	-	-	-	-	-	48	960		48	
M	83	-	10	27	-	-	-	-	37	1233	19 26	37	
	89	1	2	-	-	-	-	-	2	100	39 29	3	
	97	40	9	-	-	-	-	-	47	980	28 45	49	
D	83	-	11	23	-	-	-	-	-	1133		34	
	89	2	22	-	-	-	-	-	5	800		24	
	97	16	6	-	2	-	-	-	12	600		30	
X	83	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	2080		104	
% 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%							
Total Plants/Acre (excluding Dead & Seedlings)										'83	2399	Dec:	47%
										'89	966		83%
										'97	2540		24%
<i>Chrysothamnus nauseosus albicaulis</i>													
M	83	-	-	-	-	-	-	-	-	0	- -	0	
	89	-	-	-	-	-	-	-	-	0	- -	0	
	97	1	-	-	-	-	-	-	1	20	15 18	1	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'83		00%		00%		00%		None					
'89		00%		00%		00%		Appeared					
'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				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	5	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	20		-			
<i>Gutierrezia sarothrae</i>																		
S	83	59	-	-	-	-	-	-	-	-	59	-	-	-	1966		59	
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	83	38	-	-	-	-	-	-	-	-	38	-	-	-	1266		38	
	89	23	-	-	-	-	-	-	-	-	22	-	1	-	766		23	
	97	34	4	-	-	-	-	-	-	-	38	-	-	-	760		38	
M	83	58	-	-	-	-	-	-	-	-	58	-	-	-	1933	9	11	58
	89	88	-	-	-	-	-	-	-	-	87	-	1	-	2933	13	14	88
	97	88	-	-	-	-	-	-	-	-	88	-	-	-	1760	7	6	88
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	1	-	-	-	-	-	-	-	-	-	-	1	-	33		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	3199	Dec:	0%			
												'89	3732		1%			
												'97	2520		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				
Juniperus osteosperma																		
S	'83	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	'89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	'83	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	'89	6	-	-	-	-	-	-	-	-	6	-	-	-	200		6	
	'97	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
M	'83	2	-	-	2	-	-	-	-	-	4	-	-	-	133	62 44	4	
	'89	-	-	-	2	-	-	-	-	-	2	-	-	-	66	335 118	2	
	'97	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%			+38%							
'89		00%			00%			00%			-55%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	166	Dec:	-				
											'89	266		-				
											'97	120		-				

Trend Study 18-24-97

Study site name: Salt Mountain Stock Pond.

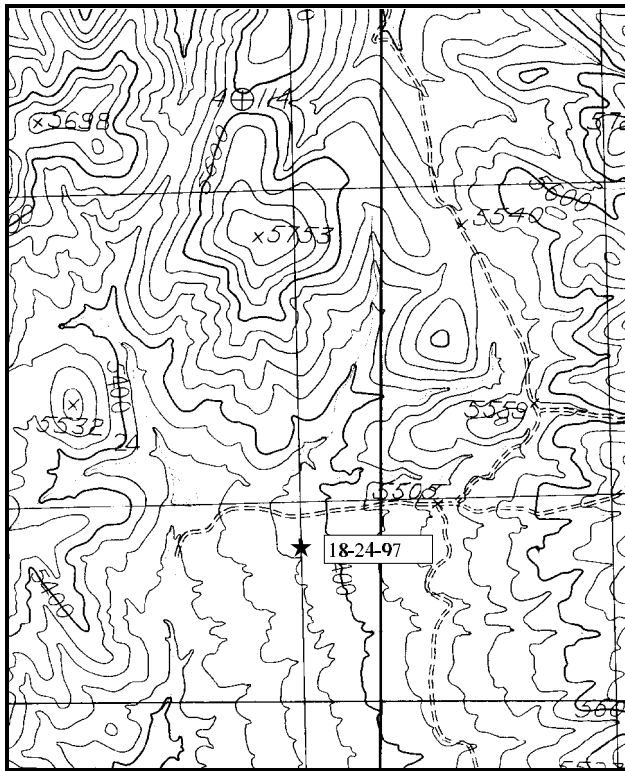
Range type: Chained, Seeded Pinyon Juniper.

Compass bearing: frequency baseline 183 degrees magnetic.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

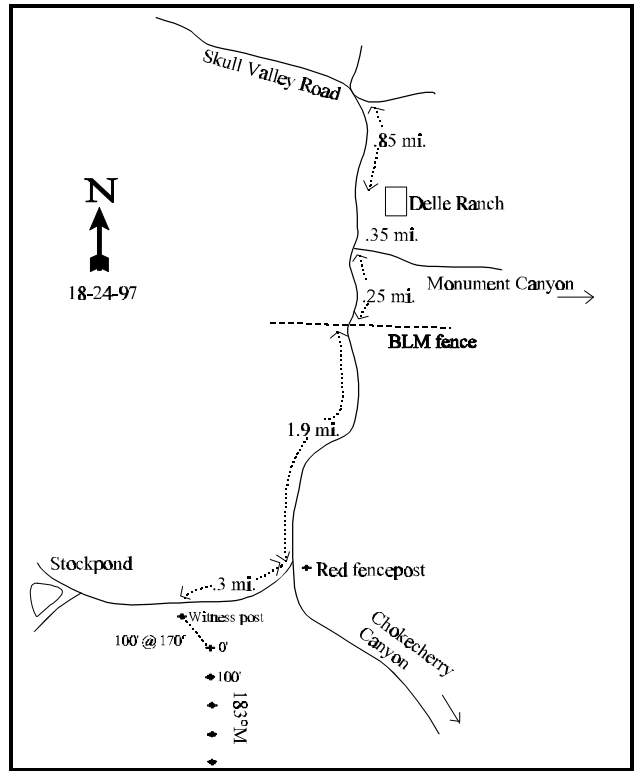
LOCATION DESCRIPTION

1.4 miles south of Horseshoe Springs turn east on Delle Ranch Road. From Delle Ranch, proceed south towards Salt Mountain to an intersection to the right (i.e., west) heading onto Salt Mountain. There will be a red post on the east side of the intersection. Turn right and proceed 0.30 miles to a rock pile on the left side of the road. From the rock pile, the 0-foot baseline stake is 21 paces away at an azimuth of 170 degrees true. 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 attached, number 5926.



Map Name: Salt Mountain, Utah

Township 3 S, Range 8 W, Section 24



Diagrammatic Sketch

UTM 4488910.234 N, 356978.476 E

DISCUSSION

Trend Study No. 18-24 (12-2)

The Salt Mountain Stock Pond study is located on 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 and the elevation is approximately 5,400 feet.

Soil is alluvially deposited and is medium to fine textured. The soil textural analysis indicates it to be a sandy clay loam with a moderately alkaline pH (7.6). Effective rooting depth was almost 13 inches, however the soil temperature was relatively high at 70°F. This high of a summer soil temperature could be limiting to the germination and establishment of perennial species. The amount of phosphorus could be a limiting factor for the establishment of plant species because it only occurs at 4.8 ppm where 10 ppm are thought to be the minimum. Relatively few large rocks are present on the soil surface. The area initially showed evidence of moderate sheet erosion. This was the result largely from trampling by cattle and a general lack of good protective ground cover. Initially, the percentage (34%) of bare soil was quite high where it now only accounts for 16%.

Vegetative composition is dominated by a relatively sparse stand of Wyoming big sagebrush interspersed with somewhat numerous Utah juniper trees. Antelope bitterbrush occurs infrequently and is always heavily hedged. Wyoming big sagebrush is also heavily browsed, which was somewhat surprising in 1983 in view of the fact that relatively few deer pellet groups were present. Sagebrush vigor was generally poor with 86% of the plants classified as having moderate to heavy use. 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 the sagebrush age structure included a large number of decadent plants (40%), probably resulting from the combination of poor vigor and heavy use. In spite of those conditions, the area should have a good site potential for sagebrush. It is difficult to conclude that big sagebrush is declining, even though the data suggests that trend.

After the initial reading, the sagebrush showed a definite decline in the readings of 1989 with percent decadence increasing, and it's estimated population decreasing by 35%. In 1997, percent decadence decreased to only 33%. This is relatively high, but shows good improvement. Those classified as having poor vigor is moderately high at 20%. About 1 in 9 plants are now classified as dead. The proportion of decadent plants that are classified as dying or have poor vigor has steadily increased from 19% in 1983, to 30% in 1989, and to 58% in 1997. This could be pointing to further losses in the future, but with the end of the extended drought, it could be stable at this time. This illustrated by the good biotic potential (17%), the percentage of young plants in the population (18%), and the proportion of plants classified with moderate to heavy use declining since the highs of 1983. Therefore it appears that the population is stable at this time.

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. Selective grazing pressure from livestock over the years has no doubt contributed to its decline. Cheatgrass brome at the time was considered the most abundant grass on the site. Conditions at the time appeared favorable for continued increase of this species. Now crested wheatgrass is the most abundant grass species. It has continually through the years shown a gradual increase in its sum of nested frequency and quadrat frequency. Crested wheatgrass now contributes 74% of the total grass cover, while cheatgrass only makes up 8% of the grass cover.

Forb composition is composed entirely of native species, most of which are poor value forbs typical of heavily grazed sites. They offer little forage value to wintering deer. This has not changed much through time as the

forbs still only make up 12% of the herbaceous understory cover. They are still a minor component of the herbaceous community.

1983 APPARENT TREND ASSESSMENT

In spite of nearly level terrain, this site was 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 grass 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 with the removal of most of the young trees. The trend for soil was thought to be slightly improved with more vegetative cover and less bare soil. The key shrub for the site, Wyoming big sagebrush, shows slightly downward trends with 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 effects of the 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

browse - downward

herbaceous understory - slightly upward

1997 TREND ASSESSMENT

Percent bare soil has been decreasing since 1983 when it was at its highest (34%). Presently percent bare soil is at its lowest (16%), while rock and pavement cover have remained about the same. With an increase in percent herbaceous cover, trend for soil is slightly improved over 1989. Trend for the key browse species, Wyoming big sagebrush, is considered stable at this time. However, this would be dependant on what happens to the decadent portion of the population in which 58% of them were classified as dying and if the percentage of the population with moderate use also increases. If this occurs, there would be a slightly downward trend. The noxious increaser, broom snakeweed, has shown an alarming increase in its density, from 200 to 4,540 plants/acre. This much higher density could be mostly reflective of the larger sample size giving a greatly increased accuracy for estimating browse populations, but the population also has the characteristics of an increasing population with a relatively high biotic potential (7%) and high proportion of young plants in the population (29%). The perennial component of the herbaceous understory 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

browse - stable, but cautionary with the high percentage of decadent plants that are classified as dying

herbaceous understory - slightly improved

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 24

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	<i>Agropyron cristatum</i>	a102	b145	c267	42	58	87	16.01
G	<i>Agropyron spicatum</i>	b10	ab3	a-	5	1	-	-
G	<i>Bromus japonicus</i> (a)	-	-	25	-	-	8	.11
G	<i>Bromus tectorum</i> (a)	-	-	134	-	-	44	1.77
G	<i>Poa secunda</i>	239	221	205	89	80	79	3.64
G	<i>Sitanion hystrix</i>	a1	b18	a-	1	6	-	-
Total for Grasses		352	387	631	137	145	218	21.54
F	<i>Agoseris glauca</i>	10	12	8	7	8	4	.02
F	<i>Alyssum alyssoides</i> (a)	-	-	5	-	-	2	.01
F	<i>Antennaria rosea</i>	b25	b24	a6	11	15	2	.03
F	<i>Astragalus cibarius</i>	b36	a-	b29	17	-	13	.35
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	-	-	5	.02
F	<i>Calochortus nuttallii</i>	b17	a-	b17	12	-	7	.04
F	<i>Castilleja</i> spp.	-	-	3	-	-	1	.00
F	<i>Chaenactis douglasii</i>	ab5	a1	b18	3	1	8	.06
F	<i>Cirsium neomexicanum</i>	6	5	5	2	3	3	.06
F	<i>Collinsia parviflora</i> (a)	-	-	3	-	-	1	.00
F	<i>Crepis acuminata</i>	-	-	2	-	-	1	.00
F	<i>Cryptantha</i> spp.	-	2	-	-	1	-	-
F	<i>Draba</i> spp. (a)	-	-	5	-	-	2	.01
F	<i>Epilobium paniculatum</i> (a)	-	-	9	-	-	4	.07
F	<i>Eriogonum</i> spp.	2	-	-	1	-	-	-
F	<i>Helianthus annuus</i> (a)	-	9	-	-	4	-	-
F	<i>Holosteum umbellatum</i> (a)	-	-	5	-	-	2	.01
F	<i>Lactuca serriola</i>	-	-	1	-	-	1	.00
F	<i>Machaeranthera canescens</i>	a4	a3	b20	2	1	8	.06
F	<i>Microsteris gracilis</i> (a)	-	-	4	-	-	1	.00
F	<i>Oenothera albicaulis</i> (a)	2	-	-	1	-	-	-
F	<i>Penstemon</i> spp.	a-	ab2	b10	-	2	6	.08
F	<i>Phlox longifolia</i>	-	-	8	-	-	3	.01
F	<i>Ranunculus testiculatus</i> (a)	-	-	167	-	-	53	1.67

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	Senecio multilobatus	6	-	-	2	-	-	-
F	Tragopogon dubius	_{ab} 4	_a -	_b 7	2	-	5	.07
F	Trifolium spp.	-	-	1	-	-	1	.00
F	Zigadenus paniculatus	-	-	2	-	-	1	.00
Total for Forbs		120	60	352	62	36	138	2.74

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 18 , Study no: 24

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata wyomingensis	73	9.63
B	Chrysothamnus nauseosus	1	.00
B	Chrysothamnus viscidiflorus viscidiflorus	1	-
B	Gutierrezia sarothrae	63	1.08
B	Juniperus osteosperma	5	-
B	Opuntia spp.	2	-
Total for Browse		145	10.71

BASIC COVER --

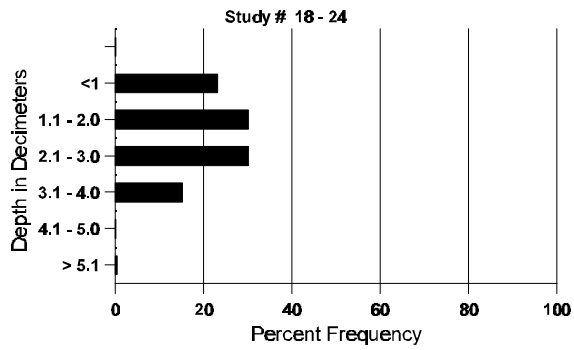
Herd unit 18 , Study no: 24

Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	361	2.25	15.00	36.75
Rock	80	.25	.50	.83
Pavement	268	10.00	7.25	7.19
Litter	391	52.00	49.50	45.63
Cryptogams	160	2.00	.50	3.69
Bare Ground	270	33.50	27.25	16.01

SOIL ANALYSIS DATA --
 Herd Unit 18, Study no: 24

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.73	69.5 (12.77)	7.6	52.0	20.4	27.6	2.1	4.8	224.0	.5

Stoniness Index



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

Type	Quadrat Frequency '97
Sheep	2
Rabbit	12
Deer	18
Cattle	2

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 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		1	2								
<i>Artemisia tridentata wyomingensis</i>																
S	83	-	-	-	-	-	-	-	0	0						
	89	43	-	-	-	-	11	-	54	54						
	97	26	-	-	-	-	-	-	26	26						
Y	83	2	-	-	-	-	-	-	66	2						
	89	-	-	-	-	-	-	-	0	0						
	97	26	2	-	-	-	-	-	25	28						
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
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
X	83	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	360			18
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)										'83	4732	Dec:	40%			
										'89	3066		43%			
										'97	3060		33%			
<i>Chrysothamnus nauseosus</i>																
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%		None								
'89		00%		00%		00%		Appeared								
'97		00%		00%		00%										
Total Plants/Acre (excluding Dead & Seedlings)										'83	0	Dec:	-			
										'89	0		-			
										'97	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				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	9	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	20		-			
<i>Gutierrezia sarothrae</i>																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	15	-	-	1	-	-	-	-	-	16	-	-	-	320			16
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	65	1	-	-	-	-	-	-	-	66	-	-	-	1320			66
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	6	-	-	-	-	-	-	-	-	6	-	-	-	200	10	11	6
	97	157	-	-	-	-	-	-	-	-	157	-	-	-	3140	11	19	157
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	4	-	-	-	-	-	-	-	-	2	-	-	2	80			4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'83		00%			00%			00%			Appeared							
'89		00%			00%			00%			+96%							
'97		.44%			00%			.88%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	0%			
												'89	200		0%			
												'97	4540		2%			

AGE	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.		
Juniperus osteosperma																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
Y	83	3	-	-	-	-	-	-	-	-	3	-	-	-	100			3
	89	3	-	-	-	-	-	-	-	-	3	-	-	-	100			3
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	83	6	-	-	-	-	-	-	-	-	4	-	2	-	200	56	56	6
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	140			7
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	300	Dec:	-				
											'89	100		-				
											'97	100		-				
Opuntia spp.																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	4	9	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	-				
											'89	0		-				
											'97	40		-				
Purshia tridentata																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8	28	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			None							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	-				
											'89	0		-				
											'97	0		-				

Trend Study 18-25-97

Study site name: Below Chokecherry Spring .

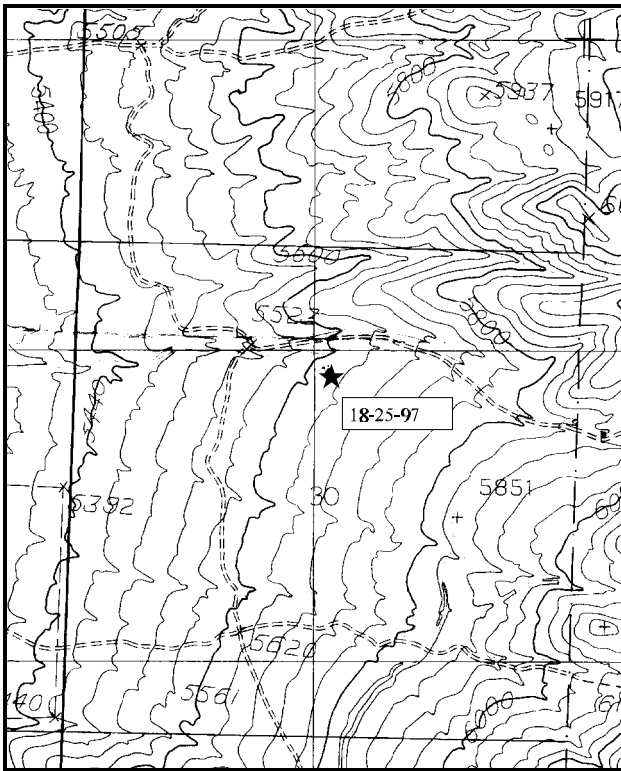
Range Type: Big sagebrush-grass

Compass bearing: frequency baseline 143 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95), line 2 (34ft), line 3 (59ft), line 4 (71ft).

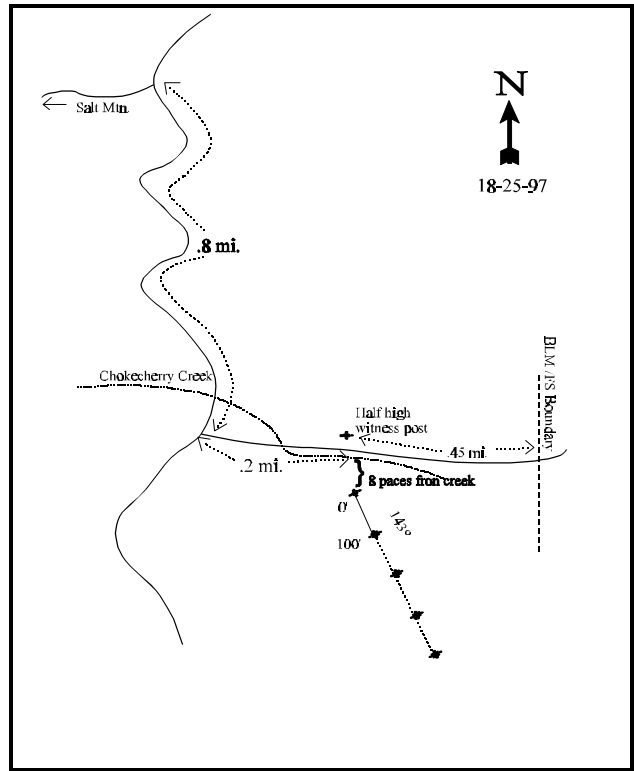
LOCATION DESCRIPTION

From the Salt Mountain Road approximately 3.5 miles south of Delle Ranch, turn east towards Chokecherry Spring. 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. A browse tag (number 3924) is attached to the 0-foot marker of the baseline.



Map Name: Salt Mountain, Utah

Township 3S, Range 7W, Section 30



Diagrammatic Sketch

UTM No Data Available

DISCUSSION

Trend Study No. 18-25 (12-3)

The "Below Chokecherry Spring" 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. 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 winter in this area. Currently this is not the case with mostly light wildlife use noted on the key browse species (sagebrush) and 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 has cured. Now it appears that grazing is not as intense as it has been in the past. The pinyon-juniper woodland was apparently chained and seeded in the past. However, the site in 1983 was thought to more nearly resemble a pure mountain big sagebrush stand underlain by a dense carpet of cheatgrass brome. Currently this appears to have been slowly turned around with significant increases in crested wheatgrass. At the present time, crested wheatgrass is more dominant than cheatgrass as it contributes 44% of the grass cover and cheatgrass makes up only 32% of the grass cover. With low grazing impacts, this trend would be expected to continue.

Soil is alluvially deposited and gravelly in texture. Textural analysis indicates it to be a loam with a neutral to mildly alkaline pH (7.3). Effective rooting depth (see methods) is almost 13 inches deep with a soil temperature of 61°F. A possible limiting factor to plant establishment and development is the amount of phosphorus in the soil (6.3 ppm where 10ppm is considered minimal). The herbaceous understory makes up 65% of the total vegetative cover. Litter cover is moderately high, but is composed largely of dead cheatgrass. Erosion is not a great problem because of gentle slope and protective herbaceous cover.

In 1983, browse composition was described as consisting of "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, in 1997 it was lengthened and increased in size. The mountain big sagebrush population is currently estimated at 10,840 plants/acre. Quite a change in what was originally estimated on the site. The structure of the population is that of a rapidly growing one. It has a biotic potential of 22%, the young age class makes up 68% of the population, only 20% of the population is moderately browsed, and percent decadence is only 3%. Initially, evidence was thought compelling of an impending and rapidly increasing population of broom snakeweed. It originally had a biotic potential that went from 11% to 0%, young age class went from making up 87% of the population to only 10%, and the mature age class went from 13% up to 87%. These figures all point to a sharp decline which occurred, for the population went from a high of 15,566 to only 2,900 plants/acre in 1997. Other browse that occur occasionally or rarely are white 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. Currently, livestock use is not heavy which, along with the end of the prolonged drought, has helped in significant increases in crested wheatgrass. The most abundant grass on the site was originally cheatgrass brome. Now crested wheatgrass contributes the most cover. Forbs, especially perennials, occur only occasionally and now only makes up 17% of the herbaceous cover. Forage production from this source is almost negligible. Peavine alone makes up 58% of the forb cover.

1983 APPARENT TREND ASSESSMENT

Soil trend is stable, principally because of gentle terrain. Vegetative trend indicators include 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 vegetative cover, increase in cryptogamic cover, and decrease in percent bare soil down to 10% (from 26%), all point to an improving soil trend. Sagebrush does have good vigor and fair production and cover averages 16%. Mountain big sagebrush 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 near their crowns. 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 indicates it to be going down in the future. Trend for browse is believed to be stable at this time. The trend for the herbaceous understory is stable to 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 - upward

browse - stable

herbaceous understory - stable to slightly upward

1997 TREND ASSESSMENT

The trend for soil is continuing to show improvement with increases in cryptogamic cover (doubled), another decrease in percent bare soil (down to 3%), and the percentage of herbaceous cover now makes up 65% of the total vegetative cover. The trend for mountain big sagebrush (key species) which makes up 83% of the browse cover is up (as discussed in introductory text). The trend for the herbaceous species is slightly up, mostly because of the increase in crested wheatgrass and decrease in cheatgrass. There has been a significant increase in sum of nested frequency for crested wheatgrass where it now produces more cover than cheatgrass. The perennial component for forbs has remained stable.

TREND ASSESSMENT

soil - upward

browse - upward

herbaceous understory - stable to slightly upward

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 25

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	<i>Agropyron cristatum</i>	a57	a96	b169	26	36	58	12.91
G	<i>Agropyron spicatum</i>	7	4	14	3	1	6	.27
G	<i>Bromus japonicus</i> (a)	-	-	3	-	-	1	.00
G	<i>Bromus tectorum</i> (a)	-	-	261	-	-	80	9.35
G	<i>Poa fendleriana</i>	a-	b37	a2	-	14	1	.03
G	<i>Poa secunda</i>	a184	b281	a214	68	95	77	6.39
G	<i>Sitanion hystrix</i>	7	6	2	3	5	1	.03
G	<i>Sporobolus cryptandrus</i>	-	2	1	-	1	1	.03
Total for Grasses		255	426	666	100	152	225	29.05
F	<i>Agoseris glauca</i>	-	4	-	-	2	-	.00
F	<i>Allium</i> spp.	a8	b81	b73	5	30	36	.61
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	-	-	37	.18
F	<i>Crepis acuminata</i>	-	2	-	-	2	-	-
F	<i>Descurainia</i> spp. (a)	-	-	11	-	-	4	.02
F	<i>Draba</i> spp. (a)	-	-	22	-	-	10	.05
F	<i>Epilobium paniculatum</i> (a)	-	-	5	-	-	3	.01
F	<i>Erodium cicutarium</i> (a)	-	-	5	-	-	2	.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	-	-	22	.13
F	<i>Lathyrus brachycalyx</i>	b207	a149	a139	86	65	56	3.36
F	<i>Lactuca serriola</i>	a-	b26	a-	-	11	-	-
F	<i>Lomatium</i> spp.	-	-	-	-	-	-	.00
F	<i>Lygodesmia</i> spp.	-	-	2	-	-	1	.00
F	<i>Microsteris gracilis</i> (a)	-	-	2	-	-	1	.00
F	<i>Phlox longifolia</i>	a13	b55	b54	5	26	22	.40
F	<i>Polygonum douglasii</i> (a)	-	-	3	-	-	2	.01
F	<i>Ranunculus testiculatus</i> (a)	-	-	19	-	-	7	.03

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	Taraxacum officinale	3	4	14	1	3	5	.05
F	Tragopogon dubius	_a 3	_b 23	_b 33	2	13	18	.17
F	Veronica biloba (a)	-	-	19	-	-	6	.05
Total for Forbs		251	362	574	107	162	247	5.77

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 18 , Study no: 25

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata vaseyana	85	15.28
B	Chrysothamnus nauseosus albicaulis	10	.40
B	Chrysothamnus viscidiflorus viscidiflorus	26	1.98
B	Gutierrezia sarothrae	50	.79
B	Juniperus osteosperma	2	-
Total for Browse		173	18.47

CANOPY COVER --

Herd unit 18 , Study no: 25

Species	Percent Cover '97
Juniperus osteosperma	8

BASIC COVER --

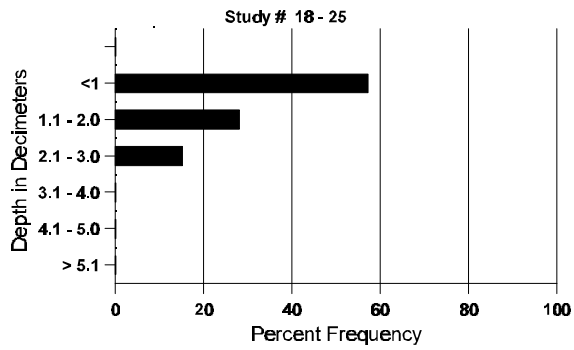
Herd unit 18 , Study no: 25

Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	371	.25	10.25	53.84
Rock	86	1.75	3.00	2.17
Pavement	168	1.75	1.50	1.57
Litter	396	70.00	71.75	54.59
Cryptogams	190	0	3.25	6.73
Bare Ground	118	26.25	10.25	2.66

SOIL ANALYSIS DATA --
Herd Unit 18, Study no: 25

Effective rooting depth (inches)	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	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 18 , Study no: 25

Type	Quadrat Frequency '97
Rabbit	44
Elk	1
Deer	11
Cattle	11

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 25

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																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	119	-	-	-	-	-	-	-	-	119	-	-	-	2420			121
Y	83	10	-	-	-	-	-	-	-	-	10	-	-	-	333			10
	89	4	-	-	-	-	-	-	-	-	2	2	-	-	133			4
	97	344	23	-	-	-	-	-	-	-	367	-	-	-	7340			367
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
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	2	5	-	-	-	-	-	-	-	4	3	-	-	233			7
	97	8	5	-	-	-	1	-	-	-	10	-	-	4	280			14
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	140			7
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	966	Dec:	0%				
											'89	1332		17%				
											'97	10840		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				
Chrysothamnus nauseosus albicaulis												
S	83	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	20		1	
Y	83	1	-	-	-	-	-	-	33		1	
	89	1	-	-	-	-	-	-	33		1	
	97	13	-	-	-	-	-	-	260		13	
M	83	1	-	-	-	-	-	-	33	39	77	1
	89	3	-	-	-	-	-	-	100	41	63	3
	97	9	-	-	-	-	-	-	180	21	23	9
D	83	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	0			0
	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%		+50%				
'89		00%		00%		00%		+71%				
'97		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'83	66	Dec:	0%			
						'89	133		0%			
						'97	460		4%			
Chrysothamnus viscidiflorus viscidiflorus												
Y	83	-	-	-	-	-	-	-	0		0	
	89	3	-	-	-	-	-	-	100		3	
	97	8	-	-	-	-	-	-	160		8	
M	83	2	-	-	-	-	-	-	66	16	14	2
	89	2	-	-	-	-	-	-	66	15	23	2
	97	56	1	-	-	-	-	-	1140	16	25	57
D	83	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	0			0
	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%		+60%				
'89		00%		00%		00%		+87%				
'97		02%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'83	66	Dec:	0%			
						'89	166		0%			
						'97	1320		2%			

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	52	-	-	-	-	-	-	-	-	52	-	-	-	1733			52
	89	24	-	-	-	-	-	-	-	-	24	-	-	-	800			24
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	83	405	-	-	-	-	-	-	-	-	405	-	-	-	13500			405
	89	70	-	-	-	-	-	-	-	-	67	-	3	-	2333			70
	97	15	-	-	-	-	-	-	-	-	15	-	-	-	300			15
M	83	62	-	-	-	-	-	-	-	-	61	1	-	-	2066	13	13	62
	89	232	-	-	-	-	-	-	-	-	216	16	-	-	7733	13	11	232
	97	126	-	-	-	-	-	-	-	-	124	-	-	-	2520	10	10	126
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	88	-	-	-	-	-	-	-	-	46	3	-	39	2933			88
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
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%			-16%							
'89		00%			00%			11%			-78%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	15566	Dec:	0%				
											'89	12999		23%				
											'97	2900		3%				
<i>Juniperus osteosperma</i>																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	-	-	-	1	20	-	-	1
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		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			50%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	-				
											'89	0		-				
											'97	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	-	-	2	-	-	-	-	-	-	1	-	1	-	66	14	24	2
	'89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	15	55	0
D	'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%			100%			50%			-50%							
'89		00%			100%			100%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	66	Dec:	0%			
												'89	33		100%			
												'97	0		0%			

DISCUSSION

Trend Study No. 18-26 (12-4)

This site was not reread in 1997; text is a summary from the 1983 and 1989 reports.

The Salt Mountain study, located on the east side of Salt Mountain, samples critical deer winter range within the Stansbury cliffrose range type. Also within the immediate vicinity of the study, there is a browse transect and the beginning of the Salt Mountain pellet group transect. Utilization of the principal browse species was initially moderate to heavy with large numbers of pellet groups present. The study site lies immediately below a small ridge top on a moderately steep (55%) southeast slope. Elevation is approximately 5,600 feet. This area shows some evidence of wildfire about 15 to 20 years ago.

Soil is weathered in place from sedimentary or metamorphic rock. Soil depth is moderately shallow and very rocky on the surface. Rock, bare ground, and erosion pavement occupy approximately 55% of the ground surface. Litter and vegetative cover is poor and comes principally from cheatgrass. The rate of soil erosion appears rapid.

Browse composition consists of sparse stands of Stansbury cliffrose, Wyoming big sagebrush, and occasional individuals of spiny horsebrush and Utah juniper. A small but increasing population of broom snakeweed is also included. Stansbury cliffrose plants vary in height from about 6 inches high to individuals well above the reach of deer. However, tall plants are the exception and most cliffrose foliage is available. Cliffrose density is relatively low (600/acre) but age structure is indicative of a stable population. Vigor is good even though the level of utilization is moderate to heavy. Wyoming big sagebrush are even fewer in number and without exception, closely hedged. These shrubs have poor vigor and a high level of decadence. Maintenance of big sagebrush in the composition is doubtful.

Grasses comprise the bulk of herbaceous plants on the site. Forage value, however, is poor because cheatgrass density far surpasses that of perennial grasses. As a result, the fire hazard on the site is high. Perennial grasses occur as scattered bunches within the uniform carpet of cheatgrass. They include two subspecies of bluebunch wheatgrass, Sandberg bluegrass, and Indian ricegrass. Grasses show no evidence of use. Forbs, except for a heavy infestation of annual mustards, 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. Vegetative and litter cover comes primarily from cheatgrass, which has only minimal soil holding capabilities. Trend continues to be down. Vegetative trend is 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, and

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 downward soil trend. Due to the lack of reproduction and decadence of the key browse species after the die-off, and browsing pressure on the limited remaining forage, the vegetative trend on this winter range is downward.

TREND ASSESSMENT

soil - downward

browse - slightly downward

herbaceous understory - slightly upward

Trend Study 18-27-97

Study site name: South of Broons Canyon .

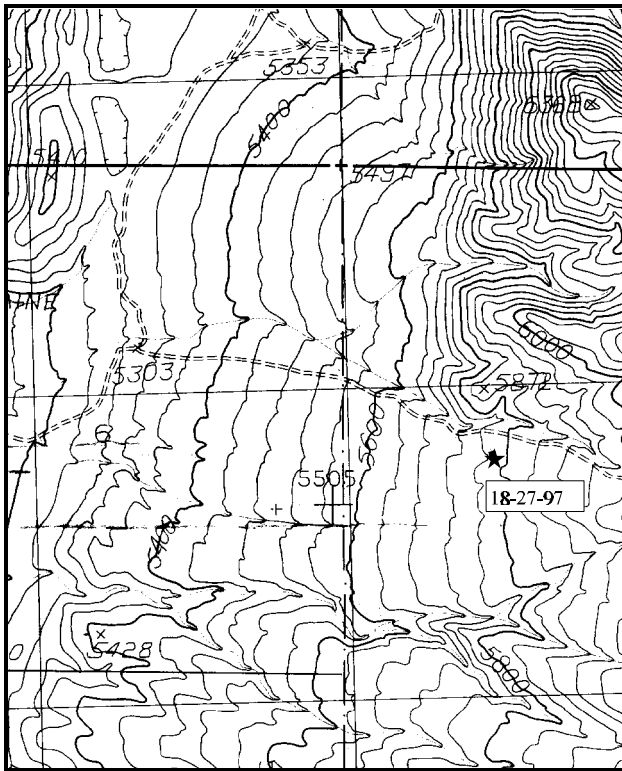
Range Type: Antelope bitterbrush

Compass bearing: frequency baseline 178 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

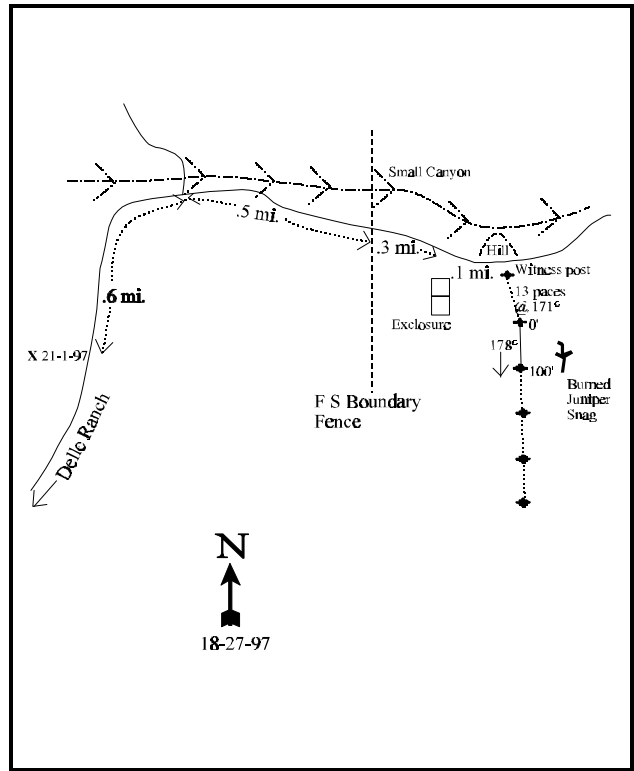
LOCATION DESCRIPTION

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, Utah

Township 3S, Range 7W, Section 5



Diagrammatic Sketch

UTM 4496830.411 N, 359423.100 E

DISCUSSION

Trend Study No. 18-27 (12-5)

The "South of Broons Canyon" 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 5,600 feet, which reportedly is near the upper limit of the 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, 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.

Soil is derived from igneous alluvium and is gravelly to sandy in texture. Soil textural analysis indicated a sand clay loam with a neutral pH (6.7). Effective rooting depth (see methods) was 12 inches with a soil temperature of 68°F. This high of a soil temperature could be very detrimental to the 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 (42% of the total cover), but most of the vegetative cover comes from shrub crowns and is not as protective as the herbaceous cover. Some sheet erosion is occurring but it is not excessive. Cheatgrass remains the principle understory component.

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. Initially, antelope bitterbrush was considered stable or even increasing in density. 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 has steadily declined from a high in 1983 of 83% to 70% in 1989, and now in 1997 it is down to 15%. Bitterbrush now contributes 62% of the browse cover. Mountain big sagebrush is present in moderate numbers and is of secondary importance. It now makes up 35% of the browse cover and appears to be increasing in density. Utilization is light and vigor is generally high. It too has shown that the percentage of the population with moderate use has decreased from a high of 38% to where it is down to 18% in 1997. A few other less desirable shrubs comprise the remainder of browse composition. With the exception of a moderately sparse but slowly decreasing population of broom snakeweed, all appear relatively stable populations of low density.

Herbaceous composition consists chiefly of grasses, especially cheatgrass brome which now makes up 57% of the grass cover and has a quadrat frequency of 99%. Sandberg bluegrass and bluebunch wheatgrass make up the majority of the remaining grass cover (41%). Forbs occur only occasionally as they only make up 29% of the herbaceous cover. 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. The principle perennial grasses have an irregular distribution, but provide moderate amounts of livestock forage. The most important species are bluebunch wheatgrass, Sandberg bluegrass, and oniongrass, all of which are lightly grazed. The potential fire hazard depends primarily on abundance and growth of cheatgrass. Current fire potential is moderately high.

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 thought to be stable with percent bare ground cover staying the same. 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 stable.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable

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 improved

browse - slightly improved

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

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

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron spicatum	138	109	124	52	40	40	3.69
G	Bromus tectorum (a)	-	-	338	-	-	99	10.86
G	Melica bulbosa	a-	a-	b20	-	-	7	.30
G	Poa fendleriana	-	5	4	-	3	1	.00
G	Poa secunda	138	159	141	62	60	54	4.19
Total for Grasses		276	273	627	114	103	201	19.07

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	<i>Agoseris glauca</i>	a-	b18	a3	-	9	1	.00
F	<i>Alyssum alyssoides</i> (a)	-	-	41	-	-	14	.16
F	<i>Allium</i> spp.	a3	a24	b63	2	10	26	.53
F	<i>Antennaria rosea</i>	2	-	-	1	-	-	-
F	<i>Astragalus</i> spp.	a2	b17	a1	1	12	1	.00
F	<i>Balsamorhiza sagittata</i>	-	1	2	-	1	2	.21
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>	6	12	5	3	5	4	.20
F	<i>Comandra pallida</i>	-	-	-	-	-	-	.00
F	<i>Collinsia parviflora</i> (a)	-	-	31	-	-	13	.11
F	<i>Crepis acuminata</i>	5	7	4	2	3	3	.09
F	<i>Descurainia</i> spp. (a)	-	-	3	-	-	1	.00
F	<i>Epilobium paniculatum</i> (a)	-	-	15	-	-	7	.06
F	<i>Erodium cicutarium</i> (a)	-	-	32	-	-	14	.31
F	<i>Eriogonum racemosum</i>	-	1	2	-	1	2	.03
F	<i>Galium boreale</i>	a-	c33	b17	-	13	7	.37
F	<i>Hackelia patens</i>	a39	a28	b88	18	16	38	3.30
F	<i>Holosteum umbellatum</i> (a)	-	-	99	-	-	38	.66
F	<i>Lactuca serriola</i>	a-	a-	b11	-	-	7	.06
F	<i>Lithospermum ruderale</i>	3	2	3	3	1	3	.56
F	<i>Lomatium grayi</i>	17	22	19	9	12	11	.38
F	<i>Lygodesmia</i> spp.	-	-	13	-	-	7	.06
F	<i>Machaeranthera canescens</i>	a-	a-	b14	-	-	8	.04
F	<i>Microsteris gracilis</i> (a)	-	-	11	-	-	7	.18
F	<i>Phlox longifolia</i>	a23	ab56	b56	13	24	25	.25
F	<i>Polygonum douglasii</i> (a)	-	-	2	-	-	1	.00
F	<i>Ranunculus testiculatus</i> (a)	-	-	5	-	-	2	.03
F	<i>Tragopogon dubius</i>	b48	a4	a11	22	2	6	.08
F	<i>Zigadenus paniculatus</i>	-	4	-	-	2	-	-
Total for Forbs		151	232	565	75	112	255	7.79

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 18 , Study no: 27

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata vaseyana	50	13.35
B	Chrysothamnus viscidiflorus viscidiflorus	5	.06
B	Gutierrezia sarothrae	18	.70
B	Juniperus osteosperma	0	.03
B	Purshia tridentata	29	23.27
Total for Browse		102	37.41

CANOPY COVER --

Herd unit 18 , Study no: 27

Species	Percent Cover '97
Juniperus osteosperma	3

BASIC COVER --

Herd unit 18 , Study no: 27

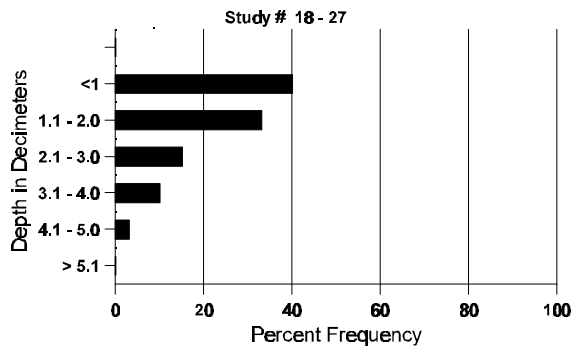
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	376	2.75	16.00	56.69
Rock	172	5.00	8.75	7.96
Pavement	123	.50	2.00	1.64
Litter	393	84.25	65.50	62.09
Cryptogams	77	1.00	.75	1.17
Bare Ground	122	6.50	7.00	3.67

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 27

Effective rooting depth (inches)	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	.4

Stoniness Index



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

Type	Quadrat Frequency '97
Rabbit	35
Elk	1
Deer	27
Cattle	1

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 27

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	6	-	-	1	-	-	-	140		7
Y	83	12	-	-	-	-	-	-	400		12
	89	-	-	-	1	-	-	-	33		1
	97	7	-	-	-	-	-	-	140		7
M	83	1	8	-	-	-	-	-	300	30 40	9
	89	6	4	1	-	-	-	-	366	21 24	11
	97	52	11	-	3	-	-	-	1320	27 37	66
D	83	-	-	1	-	-	-	-	33		1
	89	2	1	-	-	1	-	-	133		4
	97	8	4	-	-	-	-	-	240		12
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		36%	05%	05%	-27%						
'89		38%	06%	00%	+69%						
'97		18%	00%	05%							
Total Plants/Acre (excluding Dead & Seedlings)					'83	733	Dec:	5%			
					'89	532		25%			
					'97	1700		14%			
<i>Chrysothamnus viscidiflorus</i>											
S	83	-	-	-	-	-	-	-	0		0
	89	3	-	-	-	-	-	-	100		3
	97	-	-	-	-	-	-	-	0		0
Y	83	-	-	-	-	-	-	-	0		0
	89	2	-	-	-	-	-	-	66		2
	97	-	-	-	-	-	-	-	0		0
M	83	-	-	-	-	-	-	-	0	- -	0
	89	1	1	-	-	-	-	-	66	12 12	2
	97	-	-	-	-	-	-	-	0	- -	0
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>% Change</u>						
'83		00%	00%	00%	Appeared						
'89		25%	00%	00%	Died out						
'97		00%	00%	00%							
Total Plants/Acre (excluding Dead & Seedlings)					'83	0	Dec:	-			
					'89	132		-			
					'97	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				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
M	83	-	1	-	-	-	-	-	-	-	1	-	-	-	33	20	31	1
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	3	-	-	1	-	-	-	-	-	4	-	-	-	80	16	29	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'83		50%			00%			00%			Died out							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	66	Dec:	-			
												'89	0		-			
												'97	100		-			
<i>Gutierrezia sarothrae</i>																		
S	83	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	83	48	-	-	-	-	-	-	-	-	48	-	-	-	1600		48	
	89	11	-	-	-	-	-	-	-	-	11	-	-	-	366		11	
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	83	48	-	-	-	-	-	-	-	-	48	-	-	-	1600	13	14	48
	89	27	-	-	-	-	-	1	-	-	28	-	-	-	933	8	10	28
	97	28	-	-	9	-	-	-	-	-	37	-	-	-	740	12	12	37
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	18	1	-	-	-	-	-	-	-	9	-	4	6	633		19	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	3200	Dec:	0%			
												'89	1932		33%			
												'97	840		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																		
M	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33	67	51	1
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33	89	94	1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	89	-	-	-	-	1	-	-	-	-	1	-	-	-	33			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		00%			00%			00%			+ 0%							
'89		50%			00%			00%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	66	Dec:	50%				
											'89	66		50%				
											'97	0		0%				
Purshia tridentata																		
S	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
Y	83	2	2	-	-	-	-	-	-	-	4	-	-	-	133			4
	89	-	-	1	-	-	-	-	-	-	1	-	-	-	33			1
	97	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
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	2	1	-	-	-	-	-	-	3	-	-	-	100			3
	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		83%			10%			00%			-31%							
'89		70%			15%			00%			+ 2%							
'97		15%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	966	Dec:	0%				
											'89	666		15%				
											'97	680		0%				

Trend Study 18-28-97

Study site name: Condie Meadows .

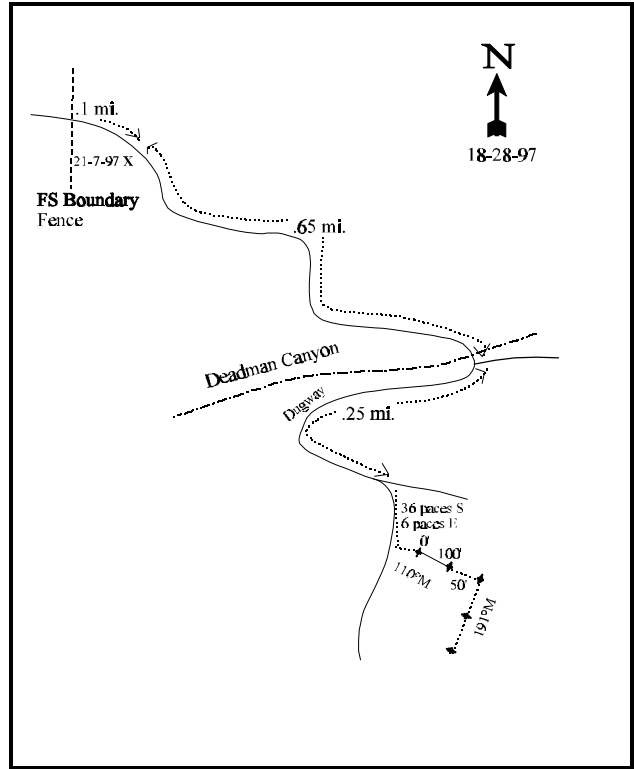
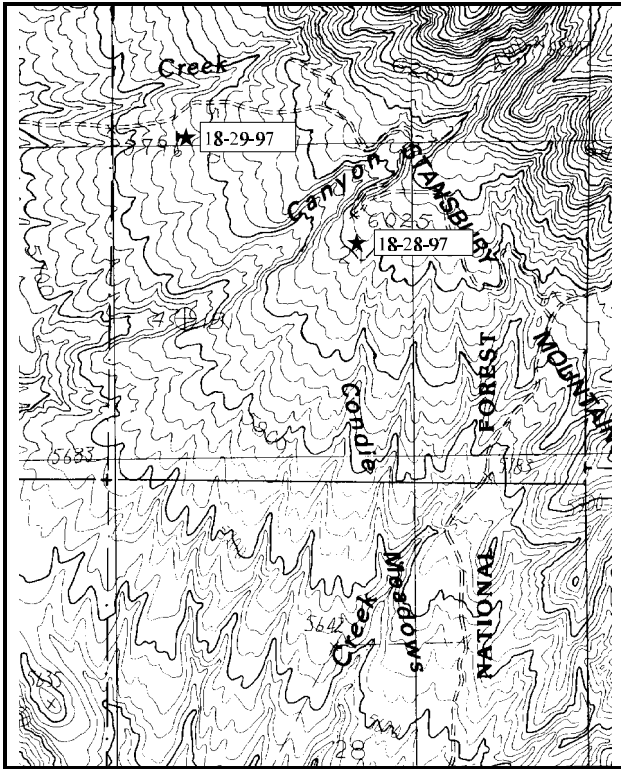
Range Type: Perennial grass

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

First frame placement on frequency belts 5 feet. 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, #12-7. 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 5 S, Range 7W, Section 21

UTM 4469705.786 N, 360816.092 E

DISCUSSION

Trend Study No. 18-28 (12-6)

The Condie Meadows 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 larger 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. This is not a problem however, 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 shrub and tree species. Isolated individuals of cliffrose, mountain big sagebrush, white 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. However, 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. 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 is 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 is also 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 number one 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, a 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, however continued moderate to heavy cattle 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

browse - stable

herbaceous understory - stable

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

browse - slightly improved

herbaceous understory - down, mostly for the perennial grasses, but they make up 92% of the total vegetative cover

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 28

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'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 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 Forbs		25	1	355	15	1	123	2.15

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 18 , Study no: 28

Type	Species	Strip Frequency '97	Average Cover % '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

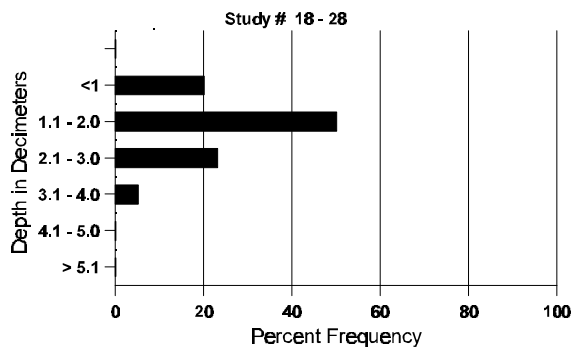
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	372	1.25	6.00	32.70
Rock	139	1.00	6.00	1.74
Pavement	216	1.75	5.75	3.73
Litter	391	55.50	54.25	53.20
Cryptogams	13	0	0	.05
Bare Ground	233	40.50	28.00	13.29

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 28

Effective rooting depth (inches)	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 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>Chrysothamnus nauseosus albicaulis</i>																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	3	-	-	-	-	-	-	-	-	1	2	-	-	60			3
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	5	1	1	-	-	-	-	-	-	7	-	-	-	140			7
M	83	2	-	-	-	-	-	-	-	-	2	-	-	-	66	19	30	2
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33	28	32	1
	97	19	-	-	-	-	-	-	-	-	19	-	-	-	380	25	37	19
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%			-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%			None							
'89		00%			00%			00%			None							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	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				
<i>Cowania mexicana stansburiana</i>																		
M	83	-	-	2	-	-	-	-	-	-	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%			Died out							
'89		00%			00%			00%			None							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	66	Dec:	-			
												'89	0		-			
												'97	0		-			
<i>Gutierrezia sarothrae</i>																		
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	3	500	8	11	15
	97	117	6	1	8	-	-	-	-	-	132	-	-	-	2700	9	14	135
D	83	1	-	-	-	-	-	-	-	-	-	-	-	1	33			1
	89	13	-	-	-	-	-	-	-	-	4	1	3	5	433			13
	97	30	1	-	-	-	-	-	-	-	11	-	-	20	620			31
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	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 18-29-97

Study site name: Deadman Canyon .

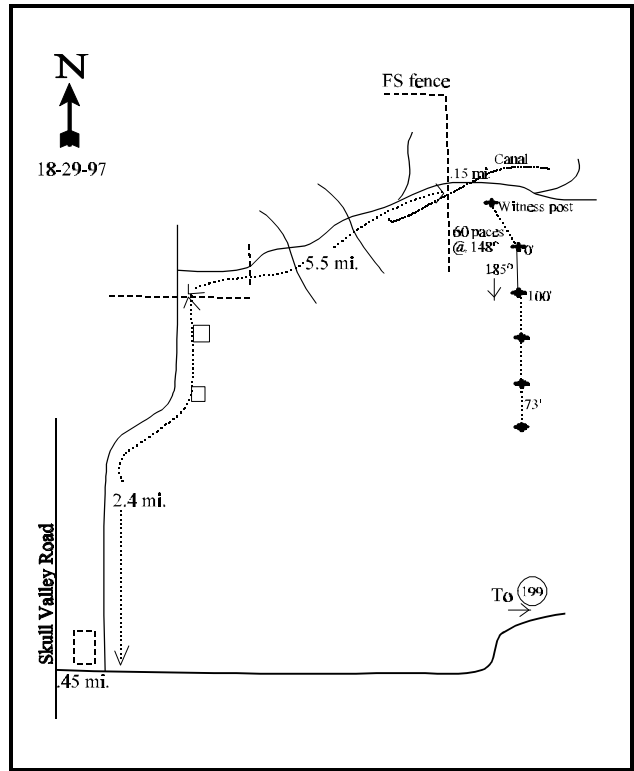
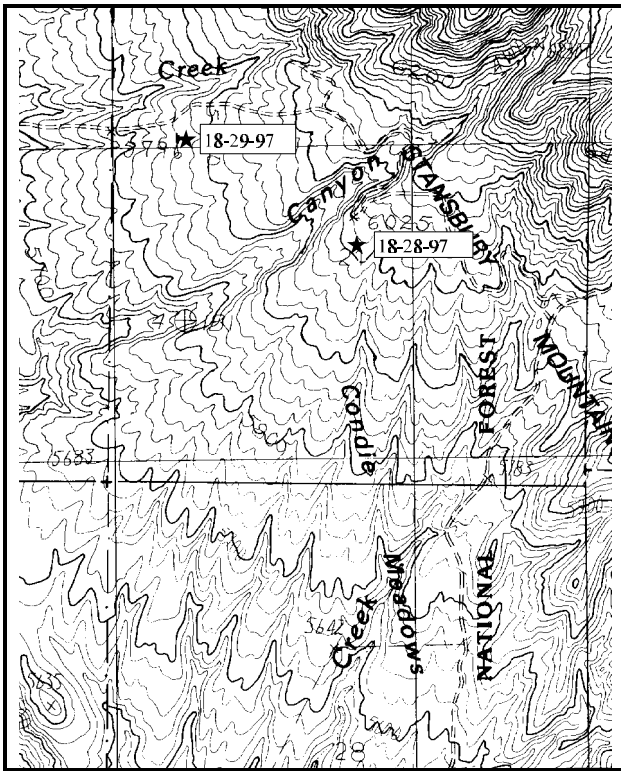
Range Type: Chained, Seeded Pinyon-Juniper

Compass bearing: frequency baseline 185 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Probably the easiest route to this study site begins on the Old Lincoln Road, the cutoff between U-199 at the base of Johnson Pass and the Skull Valley Road. From U-199, go 5.6 miles west on this graded road. Turn north and go 2 miles to the Williams Ranch. Continue 0.5 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

UTM 4470006.039 N, 360260.268 E

DISCUSSION

Trend Study No. 18-29 (12-7)

The Deadman Canyon study, although located only a short distance from study 18-28 (12-6), samples a markedly different community. The study is at an elevation of 5,880 feet, which is slightly lower than the previous site, but slope (10%) and aspect (west) are alike. 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 currently would be considered light to moderate with quadrat frequency at 29%. Here again, cattle utilize the area at an intensity similar to that described for the previous site, but currently it shows only light use.

Soil character is similar to that described on the previous site, but perhaps is somewhat rockier. Effective rooting depth (see methods) is a little over 10 inches with a soil temperature of 60°F at about 12 inches. The soil reaction is neutral to mildly alkaline with a pH of 7.3. The amount of phosphorus in the soil could be a limiting factor for plant establishment and development (6.8 ppm) where 10 ppm is thought to be the minimum needed for proper plant development. Ground cover characteristics were initially better than the previous site, but less uniform because of greater accumulations of old litter. Originally, seeded grasses appeared to have established well, but they have not performed as well as they have on the Condie Meadows site. Moderate erosion was thought to be occurring originally, but not at a serious rate. Currently erosion is negligible.

Browse composition consists of a mixed stand of Stansbury cliffrose, Wyoming big sagebrush, and Utah juniper. Except for a small but increasing population of broom snakeweed, other shrub species occur infrequently. Both key browse species are currently in relatively low numbers, but vigorous and on the increase. Utah juniper, originally appeared to be thickening but is not an immediate threat at an estimated density of 60 trees/acre. When the study was setup, browse utilization was mostly light use for sagebrush and heavy use for cliffrose. Now, use for the sagebrush has gone from mostly moderate (84%) in 1989 to only 8% moderate use in 1997. Cliffrose use has also gone from mostly moderate (80%) use to now only light use. Percent decadence for both species is very low (0-3%) with good vigor. Forty-eight percent of the sagebrush population is classified as young with a good biotic potential (5%). The cliffrose is stable with a characteristically mostly mature age structure (89%), but it is not as critical for this very long-lived species.

Perennial grasses comprise the bulk of herbaceous cover (71%). Seeded species such as intermediate and crested wheatgrass appear most frequently in 1983, but they are also the most favored by livestock. Crested wheatgrass has shown a significant decrease in abundance since 1989, while intermediate wheatgrass has increased significantly. However, both only contribute 14% of the grass cover. To put it in better perspective, bluebunch wheatgrass by itself contributes 48% of the grass cover. Native grasses are less aggressive and are not nearly the obstacle to shrub reproduction that seeded grasses are on the Condie Meadows study. Annuals such as cheatgrass occur frequently, but are not as common as on the previous site.

Forb composition and density is only marginally better than on the burned area (Condie Meadow). Forage production from this component is still low and few desirable species can be found. All together forbs only make up 13% of the herbaceous cover.

1983 APPARENT TREND ASSESSMENT

Soil trend is 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 and improving slightly. Unless Utah juniper thickens 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. Native grass species, namely bluebunch wheatgrass and Sandberg bluegrass, are the most prevalent.

Although still sparse, big sagebrush (identified as Wyoming big sage in 1989) 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

browse - slightly upward

herbaceous understory - stable

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 this 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 improved

browse - stable

herbaceous understory - slightly up

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

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron cristatum	_a 50	_b 133	_a 31	16	46	10	1.17
G	Agropyron intermedium	_c 98	_a 6	_b 50	34	3	18	2.03
G	Agropyron spicatum	159	165	211	54	63	71	10.55
G	Bromus tectorum (a)	-	-	228	-	-	74	6.31
G	Oryzopsis hymenoides	-	-	2	-	-	1	.03
G	Poa bulbosa	13	-	-	5	-	-	-
G	Poa secunda	_b 122	_a 51	_{ab} 91	54	22	36	1.72
G	Sitanion hystrix	_b 17	_a 1	_{ab} 8	9	1	4	.07
Total for Grasses		459	356	621	172	135	214	21.90
F	Agoseris glauca	4	-	-	2	-	-	-
F	Alyssum alyssoides (a)	-	-	241	-	-	74	1.79
F	Allium spp.	-	-	1	-	-	1	.03
F	Antennaria rosea	3	-	-	2	-	-	-
F	Arabis spp.	_a -	_b 14	_b 13	-	7	6	.08
F	Calochortus nuttallii	_b 19	_a 4	_a 3	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	Lathyrus brachycalyx	_b 83	_c 133	_a 48	32	47	19	.58
F	Lactuca serriola	-	-	1	-	-	1	.00
F	Petradoria pumila	17	12	5	9	6	2	.02
F	Phlox longifolia	8	3	8	4	1	3	.21
F	Ranunculus testiculatus (a)	-	-	107	-	-	39	.39
F	Sisymbrium altissimum (a)	-	-	2	-	-	2	.03
Total for Forbs		148	167	429	68	64	149	3.21

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 18 , Study no: 29

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata wyomingensis	27	3.38
B	Cowania mexicana stansburiana	9	4.37
B	Gutierrezia sarothrae	36	.77
B	Juniperus osteosperma	3	3.97
Total for Browse		75	12.50

CANOPY COVER --

Herd unit 18 , Study no: 29

Species	Percent Cover '97
Cowania mexicana stansburiana	3
Juniperus osteosperma	6

BASIC COVER --

Herd unit 18 , Study no: 29

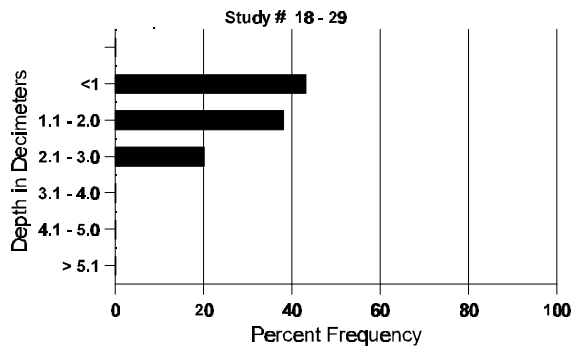
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	365	3.25	6.00	34.40
Rock	137	1.50	3.75	1.70
Pavement	246	3.25	17.00	7.44
Litter	392	73.50	57.25	51.37
Cryptogams	150	1.50	1.50	1.52
Bare Ground	208	17.00	14.50	7.66

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 29

Effective rooting depth (inches)	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	.6

Stoniness Index



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

Type	Quadrat Frequency '97
Rabbit	47
Deer	29

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 29

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 wyomingensis																		
S	83	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	83	7	-	-	-	-	-	-	-	-	7	-	-	-	233		7	
	89	3	11	-	-	-	-	-	-	-	14	-	-	-	466		14	
	97	18	1	-	-	-	-	-	-	-	19	-	-	-	380		19	
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	
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	140		7	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	499	Dec:	0%				
											'89	832		4%				
											'97	800		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				
Cowania mexicana stansburiana																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	2	-	-	-	-	-	3	-	-	-	60		3	
Y	83	-	-	1	-	-	-	-	-	-	1	-	-	-	33		1	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	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	
D	83	-	-	1	-	-	-	-	-	-	-	-	1	-	33		1	
	89	-	2	1	-	-	-	-	-	-	2	-	-	1	100		3	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
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		17%			83%			17%			-17%							
'89		80%			20%			20%			+ 8%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	199	Dec:	17%			
												'89	166		60%			
												'97	180		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>Gutierrezia sarothrae</i>									
S	83	2	-	-	-	66			2
	89	-	-	-	-	0			0
	97	-	-	-	-	0			0
Y	83	12	-	-	-	400			12
	89	-	-	-	-	0			0
	97	18	-	-	1	380			19
M	83	7	-	-	-	233	10	13	7
	89	1	-	-	-	33	11	9	1
	97	56	-	-	-	1120	9	10	56
D	83	-	-	-	-	0			0
	89	-	-	-	-	0			0
	97	10	-	-	-	200			10
X	83	-	-	-	-	0			0
	89	-	-	-	-	0			0
	97	1	-	-	-	240			12
% 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%					
Total Plants/Acre (excluding Dead & Seedlings)					'83	633	Dec:	0%	
					'89	33		0%	
					'97	1700		12%	
<i>Juniperus osteosperma</i>									
Y	83	-	-	-	-	0			0
	89	-	-	-	-	0			0
	97	1	-	-	-	20			1
M	83	-	-	-	-	0	-	-	0
	89	1	-	-	-	33	124	63	1
	97	-	-	-	2	40	-	-	2
X	83	-	-	-	-	0			0
	89	-	-	-	-	0			0
	97	-	-	-	-	60			3
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>% Change</u>				
'83		00%	00%	00%	Appeared				
'89		00%	00%	00%	+45%				
'97		00%	00%	00%					
Total Plants/Acre (excluding Dead & Seedlings)					'83	0	Dec:	-	
					'89	33		-	
					'97	60		-	

Trend Study 18-30-97

Study site name: Hatch Ranch.

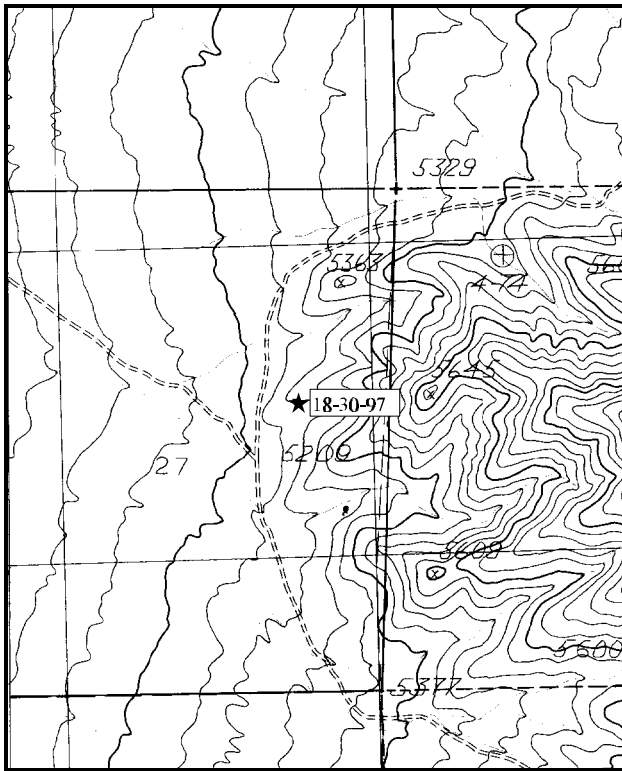
Range Type: Stansbury cliffrose

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

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

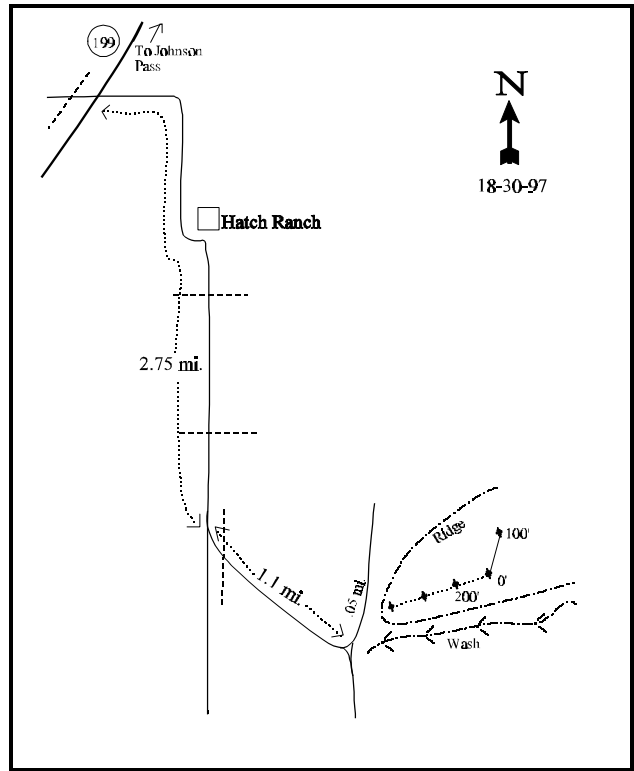
LOCATION DESCRIPTION

Across from the Old Lincoln Road, turn east off of U-199. Go east and south one 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 ridgetop. It is a short green fencepost marked with browse tab #9081.



Map Name: Johnson Pass

Township 6S, Range 7W, Section 27



Diagrammatic Sketch

UTM 4458557.469 N, 362931.298 E

DISCUSSION

Trend Study No. 18-30 (12-8)

The Hatch Ranch study is on severe winter range located at the base of the Onaqui Mountains, approximately three miles south-southeast of Hatch Ranch. This 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 low elevation flats are occupied by extensive areas of Wyoming big sagebrush and shadscale saltbush. The entire area is rather depleted of understory herbs, especially forbs. Cheatgrass is widespread and often very dense with a quadrat frequency of 91% in 1997. Deer use appears to be moderate through all years it was sampled. Pellet group frequency was 40% in 1997. The area is administered by the BLM and permitted for cattle grazing, which was underway at the time of study establishment. Currently, livestock use appears to be light. Elevation of the study is 5,600 feet with a moderately steep slope (17%) and a southwest aspect.

Soil condition is poor with 1/3 of the ground covered with rock or pavement. Effective rooting depth (see methods) is one of the most shallow (6 inches) of any site within this unit and soil temperature is conversely one of the most high (74°F at 8 inches) that was measured. Soil texture is a clay loam with a neutral pH (7.1). Here, as on most sites of this unit, phosphorus could be a limiting factor (9.5 ppm) where 10 ppm is considered minimal for proper plant development. Only minimal vegetation (herbaceous cover) or litter cover is available to protect a 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, but most occur on rock surfaces. Although the rate of soil erosion has been severe in the past, it currently would be considered negligible or quite small with only 6% bare soil.

The key browse species are Stansbury cliffrose and Wyoming big sagebrush, which make up 38% and 13% of the browse cover respectively. These occur at moderately low densities which were thought initially to be either stable or slightly increasing in density and have satisfactory vigor. In 1983, utilization was mostly moderate on cliffrose and heavy on Wyoming big sagebrush. Currently, utilization on cliffrose and sagebrush is mostly light. Age class distribution for cliffrose is improved with a good biotic potential (ratio of seedlings to total population), a favorable sized young age class, and percent decadence has gone down in recent years to 13%. All these changes point to an improving trend for cliffrose. Wyoming big sagebrush is showing signs of downward trends even though utilization is now mostly classified as light. These signs include: those plants classified with poor vigor have increased to 33%, 88% of the decadent plants are classified as dying, the ratio of dead to live plants is 1:2.5, the proportion of the population classified as mature has increased to almost 75%, and the percentage of young plants in the population has decreased to only 10%. All of these changes indicate a downward trend for Wyoming big sagebrush. Several other shrub species can also be found. However, most occur infrequently and generally low in palatability except for birchleaf mountain mahogany. The most numerous is broom snakeweed, an aggressive increaser, which is now up to 12,920 plants/acre and contributing to 30% of the browse cover.

Understory grasses, and especially forbs, are sparse and generally of low forage value. Barren areas and patches of nearly pure cheatgrass brome occupy more surface area than any other class of vegetation. The most palatable and abundant 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.

1983 APPARENT TREND ASSESSMENT

Soil trend is down. 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 is 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 and density, 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. There was 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

browse - stable

herbaceous understory - slightly upward

1997 TREND ASSESSMENT

The trend for soil is improved, but still in poor condition. Percent bare soil has decreased further down 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, good age class structure (mature and young age classes) for a long-lived species, reduced decadence, mostly light use at this time, and an increase in the population. For Wyoming big sagebrush, we have another scenario. We have a population that is more decadent and 88% of these are classified as dying, 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 (1:2.5). 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 is relatively high at 33%. This one encouraging characteristic could compensate for its decrease in numbers, but it will not be readily distinguishable until the next reading in 2002. Broom snakeweed is also relatively abundant. It is not utilized, however 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 go down. Large swings in its population (either up or down) would not be unexpected. Trend for key browse would be 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

browse - stable for key browse species

herbaceous understory - slightly down, still too many weedy species

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 30

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron spicatum	_a 17	_b 39	_a 24	8	18	9	.93
G	Bromus tectorum (a)	-	-	285	-	-	91	8.10
G	Oryzopsis hymenoides	-	3	6	-	1	3	.07
G	Poa secunda	_a 192	_b 270	_b 252	69	88	87	5.09
Total for Grasses		209	312	567	77	107	190	14.19
F	Agoseris glauca	-	-	3	-	-	1	.03
F	Alyssum alyssoides (a)	-	-	10	-	-	4	.02
F	Allium spp.	10	6	12	5	3	7	.06
F	Antennaria rosea	-	-	4	-	-	2	.01
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	1	10	6	1	7	2	.03
F	Euphorbia spp.	-	-	5	-	-	3	.01
F	Haplopappus acaulis	-	6	-	-	2	-	-
F	Lactuca serriola	_a -	_b 27	_a 2	-	16	1	.03
F	Lomatium spp.	-	6	-	-	3	-	-
F	Microsteris gracilis (a)	-	-	2	-	-	1	.00
F	Oenothera caespitosa	-	2	-	-	1	-	-
F	Phlox hoodii	_a -	_a -	_b 9	-	-	4	.21
F	Phlox longifolia	2	8	1	2	4	1	.00
F	Ranunculus testiculatus (a)	-	-	149	-	-	53	.74
F	Townsendia incana	_a -	_b 37	_a 4	-	16	2	.06
Total for Forbs		16	112	214	9	57	85	1.25

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 18 , Study no: 30

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata wyomingensis	34	3.10
B	Chrysothamnus viscidiflorus stenophyllus	13	.09
B	Cowania mexicana stansburiana	32	9.34
B	Gutierrezia sarothrae	87	7.50
B	Juniperus osteosperma	5	4.09
B	Leptodactylon pungens	2	-
B	Sclerocactus	1	-
B	Tetradymia canescens	2	.15
B	Tetradymia nuttallii	18	.38
Total for Browse		194	24.66

CANOPY COVER --

Herd unit 18 , Study no: 30

Species	Percent Cover '97
Juniperus osteosperma	3

BASIC COVER --

Herd unit 18 , Study no: 30

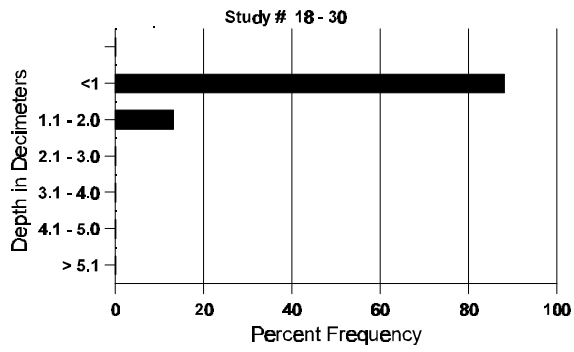
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	354	2.00	3.25	34.68
Rock	291	22.75	23.00	16.75
Pavement	280	12.00	21.25	16.10
Litter	376	33.75	27.25	28.58
Cryptogams	283	15.50	16.00	17.79
Bare Ground	180	14.00	9.25	6.42

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 30

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
6.1	74.3 (8.44)	7.1	35.1	32.7	32.2	2.5	9.5	233.6	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 18 , Study no: 30

Type	Quadrat Frequency '97
Rabbit	45
Deer	40
Cattle	1

BROWSE CHARACTERISTICS --

Herd unit 18 , Study no: 30

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 wyomingensis</i>											
S	83	2	-	-	-	-	-	-	2	2	
	89	5	-	-	-	-	1	-	6	6	
	97	16	-	-	-	-	-	-	16	16	
Y	83	10	-	-	-	-	-	-	10	10	
	89	13	1	-	-	-	1	-	13	15	
	97	4	-	-	1	-	-	-	5	5	
M	83	4	5	10	-	-	-	-	16	21	19
	89	11	5	2	-	-	-	-	18	20	18
	97	33	1	-	1	-	-	-	26	19	28
D	83	-	-	3	-	-	-	-	1	-	3
	89	4	-	-	-	-	-	-	2	-	4
	97	6	1	-	-	-	-	-	1	-	8
X	83	-	-	-	-	-	-	-	-	-	0
	89	-	-	-	-	-	-	-	-	-	0
	97	-	-	-	-	-	-	-	-	-	380
% 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%					
Total Plants/Acre (excluding Dead & Seedlings)						'83	1066	Dec:	9%		
						'89	1233		11%		
						'97	960		17%		
<i>Cercocarpus montanus</i>											
S	83	-	-	-	-	-	-	-	0	0	
	89	-	-	-	-	-	-	-	0	0	
	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%		None			
'89		00%		00%		00%		None			
'97		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)						'83	0	Dec:	-		
						'89	0		-		
						'97	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>Chrysothamnus viscidiflorus stenophyllus</i>														
Y	83	1	-	-	-	-	-	-	1	-	-	33		1
	89	1	-	-	1	-	-	-	2	-	-	66		2
	97	1	-	-	-	-	-	-	1	-	-	20		1
M	83	56	-	-	-	-	-	-	56	-	-	1866	12 17	56
	89	10	16	2	-	-	-	-	28	-	-	933	7 7	28
	97	12	-	1	2	-	-	-	14	-	-	300	9 13	15
D	83	3	-	-	-	-	-	-	1	-	2	100		3
	89	11	13	-	-	1	-	-	23	1	1	833		25
	97	3	-	-	-	-	-	-	1	-	-	60		3
X	83	-	-	-	-	-	-	-	-	-	-	0		0
	89	-	-	-	-	-	-	-	-	-	-	0		0
	97	-	-	-	-	-	-	-	-	-	-	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%								
Total Plants/Acre (excluding Dead & Seedlings)										'83	1999	Dec:	5%	
										'89	1832		45%	
										'97	380		16%	
<i>Cowania mexicana stansburiana</i>														
S	83	-	-	-	-	-	-	-	-	-	-	0		0
	89	1	-	-	-	-	-	1	2	-	-	66		2
	97	3	-	-	-	-	-	-	3	-	-	60		3
Y	83	-	1	1	-	-	-	-	2	-	-	66		2
	89	2	-	-	-	-	-	-	2	-	-	66		2
	97	8	-	-	-	-	-	-	8	-	-	160		8
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
D	83	-	1	-	-	-	-	-	1	-	-	33		1
	89	-	2	2	1	-	1	-	6	-	-	200		6
	97	5	-	-	-	-	-	-	4	-	-	100		5
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		78%		22%		11%		-11%						
'89		25%		44%		00%		+32%						
'97		05%		03%		03%								
Total Plants/Acre (excluding Dead & Seedlings)										'83	599	Dec:	6%	
										'89	532		38%	
										'97	780		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>Gutierrezia sarothrae</i>																		
S	83	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	89	5	-	-	-	-	-	2	-	-	7	-	-	-	233		7	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	83	15	-	-	-	-	-	-	-	-	15	-	-	-	500		15	
	89	25	-	-	-	-	-	-	-	-	23	-	2	-	833		25	
	97	92	-	-	1	-	-	-	-	-	93	-	-	-	1860		93	
M	83	71	-	-	-	-	-	-	-	-	71	-	-	-	2366	11 9	71	
	89	97	-	-	-	-	1	-	-	-	92	-	6	-	3266	8 8	98	
	97	515	-	-	18	-	-	-	-	-	533	-	-	-	10660	9 10	533	
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	16	2	-	-	-	-	1	-	-	15	-	-	4	633		19	
	97	20	-	-	-	-	-	-	-	-	13	-	-	7	400		20	
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	440		22	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	2866	Dec:	0%				
											'89	4732		13%				
											'97	12920		3%				
<i>Juniperus osteosperma</i>																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	3	-	-	1	-	-	-	-	-	4	-	-	-	133		4	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	83	1	-	-	1	-	-	-	-	-	2	-	-	-	66	56 42	2	
	89	2	-	-	-	-	-	1	-	-	3	-	-	-	100	79 45	3	
	97	1	-	-	1	-	-	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%			+34%							
'89		00%			00%			00%			+ 0%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	66	Dec:	-				
											'89	100		-				
											'97	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	
Y	83	8	-	-	-	-	-	-	-	-	7	-	1	-	266		8	
	89	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	83	56	-	-	-	-	-	-	-	-	56	-	-	-	1866	5	5	56
	89	78	-	-	-	-	-	4	-	-	82	-	-	-	2733	5	6	82
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	10	26	2
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	2132	Dec:	0%				
											'89	2965		2%				
											'97	60		0%				
Sclerocactus																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	5	10	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'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				
Tetradymia canescens																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	1	-	-	-	-	-	1	-	-	2	-	-	-	66		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	83	12	-	-	-	-	-	-	-	-	6	-	6	-	400	18 19	12	
	89	2	1	-	-	-	-	-	-	-	3	-	-	-	100	20 19	3	
	97	3	-	-	-	-	-	-	-	-	-	-	3	-	60	20 25	3	
D	83	14	-	-	-	-	-	-	-	-	14	-	-	-	466		14	
	89	7	4	-	-	-	-	1	-	1	10	1	1	1	433		13	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
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%			23%			-31%							
'89		28%			06%			11%			-90%							
'97		00%			00%			100%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	866	Dec:	54%				
											'89	599		72%				
											'97	60		0%				
Tetradymia nuttallii																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33	9 10	1	
	97	2	-	-	-	-	1	-	-	-	3	-	-	-	60	18 23	3	
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	20	-	-	2	-	-	-	-	-	14	1	-	9	480		24	
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		00%			00%			00%			Appeared							
'89		50%			00%			00%			+89%							
'97		00%			00%			31%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	0%				
											'89	66		0%				
											'97	580		83%				

Trend Study 18-31-97

Study site name: Carr Fork .

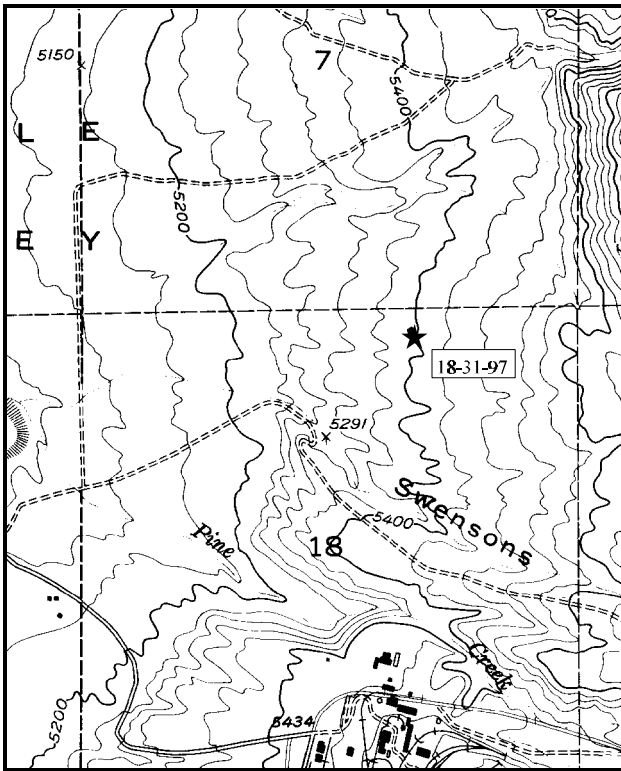
Range Type: Annual grass/forb

Compass bearing: frequency baseline 308 M degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

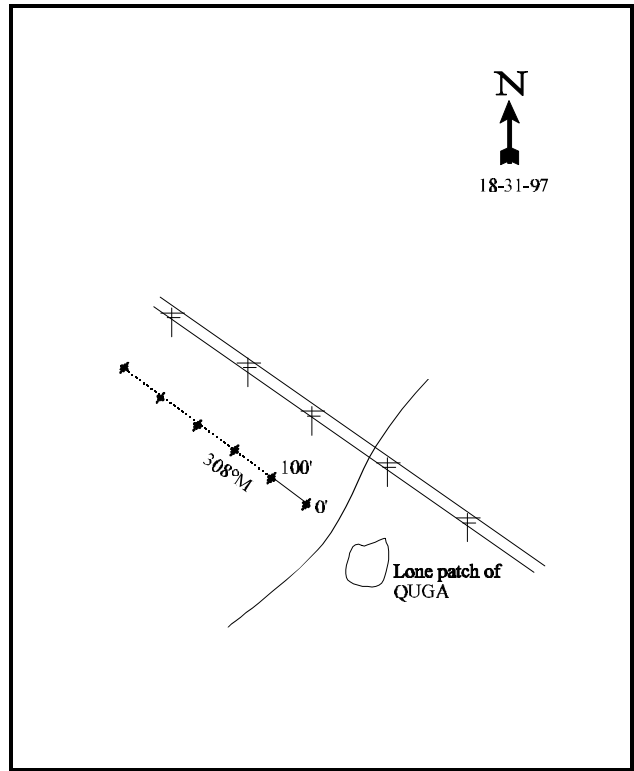
LOCATION DESCRIPTION

Go east on 4th north (Smelter Road) in Tooele for 1.5 miles to Ericson Road. Go 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 gumweed to a left fork. Take the left fork for .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 powerlines. The study is marked by green, steel fenceposts 12-18 inches in height.



Map name: Bingham Canyon .

Township 3 S, Range 3 W, Section 7



Diagrammatic Sketch

UTM 4491053.527 N, 396564.628 E

DISCUSSION

Trend Study No. 18-31

The Carr Fork study is a new site which was initiated by the habitat manager of the central region. This is some property that originally belonged to Kennecott Copper and was then transferred to the Division of Wildlife Resources. Because it was an old tailings area for a copper mine, it is mostly composed of weeds. Because of this problem, it was disked deeply a couple of times and seeded (drilled) 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 is light with pellet group frequency at only 2%. The much larger pellet group transect showed mostly fall and spring use (transitional range) with 36 deer days use/acre. The nearby drainages provide good cover, provided mainly by Gambel oak.

The soil is graded tailings. Effective rooting depth is 12 inches with a strongly acidic pH (5.5). The soil had 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 was 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 was only 58°F at about 13 inches in depth. Percent bare soil is relatively high at 40%. The ratio of protective plant cover and litter to bare soil is marginal (1:2.2) and high intensity summer storms could cause severe erosion problems.

The browse component for the site is lacking with no browse species sampled at this site. There was a small oak clone nearby, but it was not within the sampling grid.

The herbaceous species planted did not come in very well on this site. Of all the seeded species, only small burnet was sampled and only one plant was located. The remaining species sampled were weeds. Cheatgrass, bulbous bluegrass, ragweed, bindweed, gumweed, and toadflax make up almost 75% of the herbaceous cover.

1997 APPARENT TREND ASSESSMENT

The trend for soil is down 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 trend for herbaceous species is down. 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.

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 31

Type	Species	Nested Frequency '97	Quadrat Frequency '97	Average Cover % '97
G	Bromus tectorum (a)	245	75	3.02
G	Poa bulbosa	178	52	5.99
Total for Grasses		423	127	9.02
F	Ambrosia psilostachya	33	15	1.09
F	Asclepias spp.	50	18	2.62
F	Aster spp.	4	1	.15
F	Astragalus spp.	2	2	.01
F	Cardaria draba	63	28	.93
F	Camelina microcarpa (a)	1	1	.00
F	Convolvulus arvensis	287	81	11.16
F	Comandra pallida	3	1	.00
F	Collinsia parviflora (a)	1	1	.00
F	Draba spp. (a)	4	2	.01
F	Epilobium paniculatum (a)	93	36	1.74
F	Grindelia squarrosa	104	39	1.48
F	Helianthus annuus (a)	211	81	5.36
F	Lactuca serriola	115	47	1.89
F	Linaria dalmatica	52	18	2.96
F	Linum lewisii	26	10	.15
F	Polygonum douglasii (a)	26	9	.17
F	Sanguisorba minor	1	1	.00
F	Veronica biloba (a)	15	5	.07
F	Verbascum blattaria	20	9	.50
Total for Forbs		1111	405	30.36

BASIC COVER --

Herd unit 18 , Study no: 31

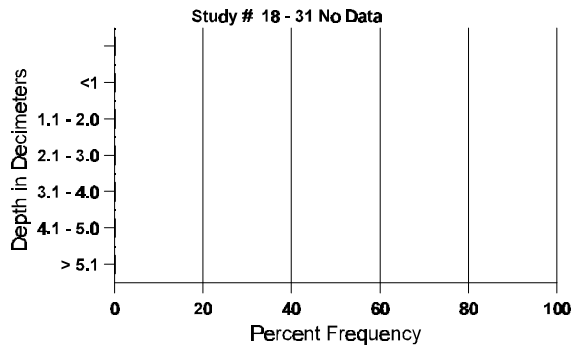
Cover Type	Nested Frequency '97	Average Cover % '97
Vegetation	450	44.43
Rock	146	.78
Pavement	301	1.79
Litter	478	18.82
Cryptogams	24	.16
Bare Ground	442	40.18

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 31

Effective rooting depth (inches)	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	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 18 , Study no: 31

Type	Quadrat Frequency '97
Deer	2

Trend Study 18-32-97

Study site name: East Hickman Canyon .

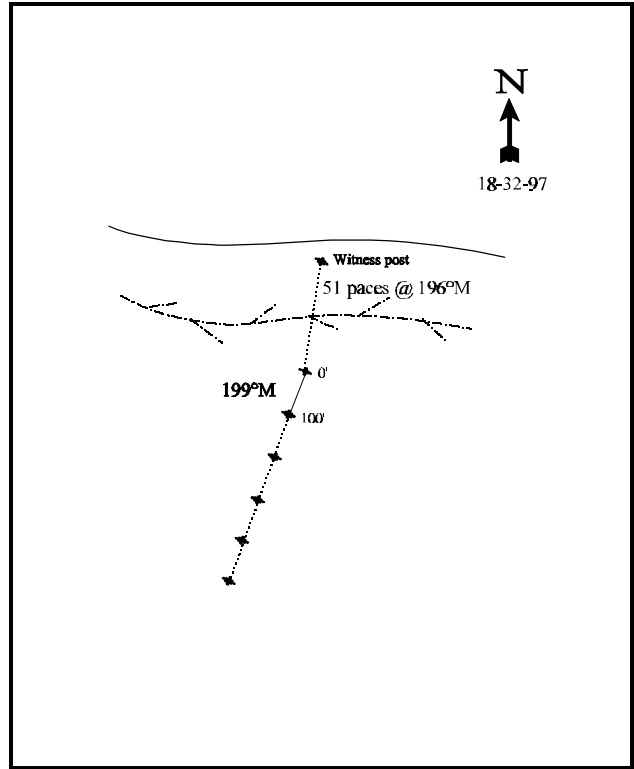
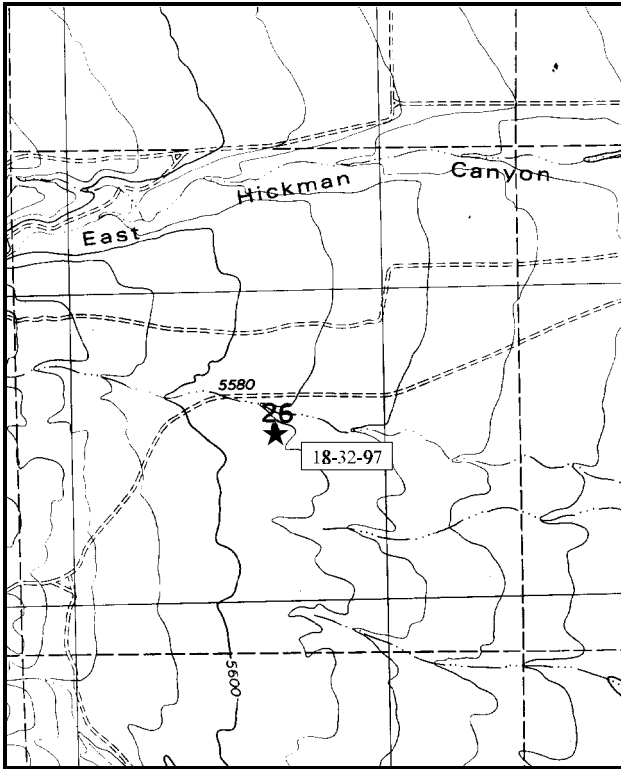
Range type: Pinyon-Juniper

Compass bearing: frequency baseline 199 M degrees.

Footmark (first frame placement) 5 feet. 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 an azimuth of 196 ° M to the 0-foot stake. The study is marked by green, steel fenceposts 12-18 inches in height.



Map name: South Mountain .

Diagrammatic Sketch

Township 4 S, Range 6 W, Section 26

UTM 4477582.125 N, 393606.199 E

DISCUSSION

Trend Study No. 18-32

The East Hickman Canyon site is a new study located within a gently sloping (3-5%) juniper-pinyon woodland with a north aspect and elevation of 5,500 feet. This study was initiated by the Central Region's habitat manager. This study was established to get some pretreatment inventory data for an area that is to be burned and seeded in the near future. The data will help determine what effect and changes the treatment will have on species composition and community structure. Deer use currently would be considered very light with a pellet group frequency of 13%, while rabbit is much higher at 41%.

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 (see methods) is 15 inches with a soil temperature of 57°F at 15 inches. Soil textural analysis indicates a clay loam with a neutral to mildly alkaline pH (7.3). The amount of phosphorus in the soil could be a limiting factor to the establishment and development of plant species with a reading of 6.5 ppm, where 10 ppm is considered minimal for normal plant development. There is a very high percentage of bare ground on this site (35%) with severely pedestaled grasses and dead sagebrush plants throughout the site. There are very few rocks on the surface or in the soil profile.

The site is dominated by juniper trees. Average canopy cover for juniper is 31% with a density of 295 trees/acre (determined by the point-quarter method). The average diameter (at 6 inches off the ground) is almost 5 inches. The effect that the juniper has had on the understory of mountain big sagebrush is devastating. The population estimate for live plants on the site is only 80 plants/acre and these were all classified as decadent and dying. There are 1,220 dead plants/acre on the site. Essentially all the browse plants (sagebrush) are dead or dying. This would be one of the most obvious reasons for the proposed treatment of the area, also along with the fact that there is very little herbaceous forage on the site.

The herbaceous component of the community is not doing much better. Total vegetative cover for the grasses and forbs is less than 9%, with the total cover for forbs coming to less than 1%. Sandberg bluegrass and muttongrass make up 80% of the herbaceous cover indicating just how poor the site is for producing forage. The only thing that will improve the forage production of this site is to remove the majority of the competing overstory of juniper trees.

1997 APPARENT TREND ASSESSMENT

The trend for soil is down and in very poor condition because of the pedestaling of shrubs and 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 down 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 trend for the herbaceous understory is also down with most species in very low numbers and they are species that produce little forage. Any treatment should make sure that there is good establishment of a variety of competitive perennial grasses for cheatgrass is 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.

HERBACEOUS TRENDS --

Herd unit 18 , Study no: 32

Type	Species	Nested Frequency '97	Quadrat Frequency '97	Average Cover % '97
G	Agropyron spicatum	50	22	.43
G	Bromus tectorum (a)	15	6	.19
G	Poa fendleriana	48	14	1.43
G	Poa secunda	277	74	5.67
G	Sitanion hystrix	17	9	.16
Total for Grasses		407	125	7.92
F	Alyssum alyssoides (a)	1	1	.00
F	Allium spp.	4	2	.01
F	Antennaria rosea	2	1	.00
F	Arabis spp.	1	1	.00
F	Astragalus convallarius	16	10	.28
F	Collinsia parviflora (a)	33	10	.15
F	Crepis acuminata	1	1	.03
F	Draba spp. (a)	3	1	.00
F	Holosteum umbellatum (a)	1	1	.03
F	Lathyrus brachycalyx	5	2	.01
F	Lactuca serriola	2	1	.00
F	Phlox hoodii	18	7	.28
F	Phlox longifolia	2	1	.00
F	Ranunculus testiculatus (a)	50	21	.13
Total for Forbs		139	60	0.95

BROWSE TRENDS --

Herd unit 18 , Study no: 32

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata vaseyana	3	.18
B	Gutierrezia sarothrae	1	-
B	Juniperus osteosperma	24	16.54
Total for Browse		28	16.73

CANOPY COVER --

Herd unit 18 , Study no: 32

Species	Percent Cover '97
Juniperus osteosperma	31

BASIC COVER --

Herd unit 18 , Study no: 32

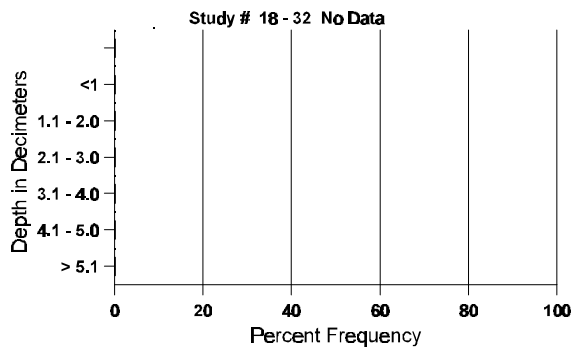
Cover Type	Nested Frequency '97	Average Cover % '97
Vegetation	356	26.19
Rock	57	1.12
Pavement	211	4.89
Litter	458	30.51
Cryptogams	324	13.01
Bare Ground	353	34.45

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 32

Effective rooting depth (inches)	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	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 18 , Study no: 32

Type	Quadrat Frequency '97
Rabbit	41
Deer	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				
<i>Artemisia tridentata vaseyana</i>																		
D	97	1	-	3	-	-	-	-	-	-	-	-	-	-	4	80		4
X	97	-	-	-	-	-	-	-	-	-	-	-	-	2	-	1220		61
% Plants Showing '97		<u>Moderate Use</u> 00%					<u>Heavy Use</u> 75%					<u>Poor Vigor</u> 100%				<u>%Change</u>		
Total Plants/Acre (excluding Dead & Seedlings)														'97	80	Dec:	100%	
<i>Gutierrezia sarothrae</i>																		
M	97	1	-	-	-	-	-	-	-	-	-	-	-	1	-	20	-	1
% 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>Juniperus osteosperma</i>																		
S	97	3	-	-	-	-	-	-	-	-	-	-	-	3	-	60		3
Y	97	2	-	-	1	-	-	-	-	-	-	-	-	3	-	60		3
M	97	14	-	-	-	-	-	10	-	-	-	-	-	24	-	480	-	24
% 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	540	Dec:	-	

Trend Study 18-33-97

Study site name: Clover Creek.

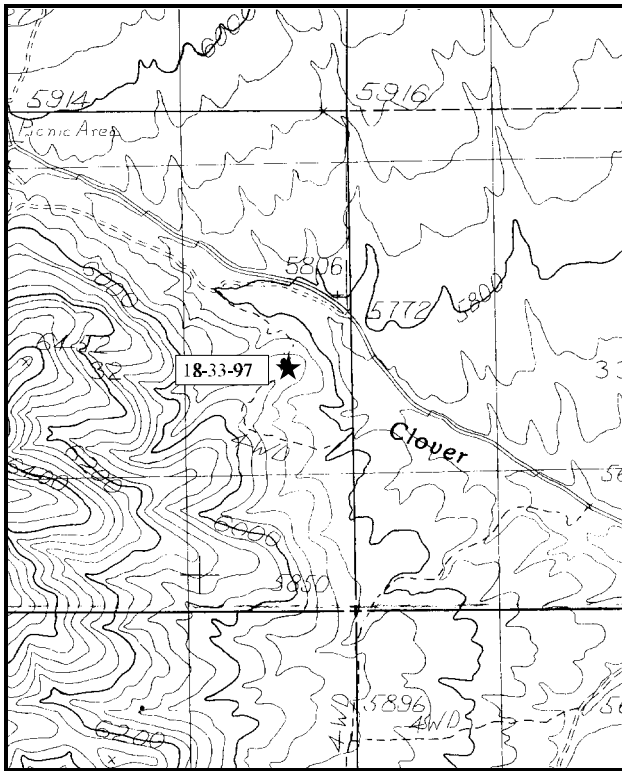
Range type: Chained Pinyon - Juniper

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

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

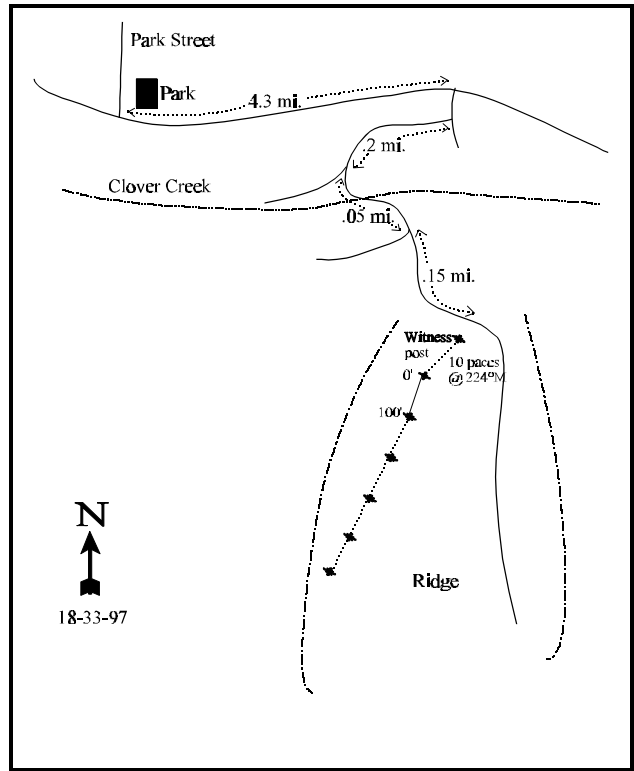
LOCATION DESCRIPTION

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

Township 6 W, Range 5 S, Section 32



Diagrammatic Sketch

UTM 4466359.598 N, 369320.978 E

DISCUSSION

Trend Study No. 18-33

The Clover 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 treated 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 (see methods) 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 trend for soil is stable to slightly down because of the relatively high cover value for bare soil and low value for litter cover. Trend for browse would be down slightly because of the high density of young juniper trees which will become much larger in a relatively short time. Competition with the juniper are already causing some losses to the understory browse species. The herbaceous understory is in more of a stable trend 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

Type	Species	Nested Frequency '97	Quadrat Frequency '97	Average Cover % '97
G	<i>Agropyron spicatum</i>	284	75	12.40
G	<i>Bromus tectorum</i> (a)	17	6	.03
G	<i>Oryzopsis hymenoides</i>	55	23	1.24
G	<i>Poa fendleriana</i>	27	9	.14
G	<i>Poa pratensis</i>	67	21	2.04
G	<i>Poa secunda</i>	56	29	.54
G	<i>Sitanion hystrix</i>	20	9	.12
Total for Grasses		526	172	16.53
F	<i>Agoseris glauca</i>	1	1	.00
F	<i>Alyssum alyssoides</i> (a)	34	15	.07
F	<i>Allium</i> spp.	8	3	.04
F	<i>Antennaria rosea</i>	2	1	.00
F	<i>Arabis</i> spp.	8	4	.02
F	<i>Astragalus beckwithii</i>	15	5	.07
F	<i>Astragalus convallarius</i>	5	2	.03
F	<i>Astragalus humistratus</i>	6	3	.01
F	<i>Cirsium</i> spp.	5	2	.18
F	<i>Comandra pallida</i>	31	12	.26
F	<i>Collinsia parviflora</i> (a)	26	11	.05
F	<i>Crepis acuminata</i>	15	7	.30
F	<i>Erigeron</i> spp.	6	4	.07
F	<i>Eriogonum racemosum</i>	2	1	.03
F	<i>Hackelia patens</i>	5	2	.01
F	<i>Hedysarum boreale</i>	1	1	.03
F	<i>Holosteum umbellatum</i> (a)	3	1	.00
F	<i>Lathyrus brachycalyx</i>	7	3	.21
F	<i>Lappula occidentalis</i> (a)	-	-	.00
F	<i>Lesquerella</i> spp.	11	4	.04
F	<i>Machaeranthera canescens</i>	29	10	.15
F	<i>Penstemon</i> spp.	5	3	.06
F	<i>Petradoria pumila</i>	12	4	.13
F	<i>Phlox hoodii</i>	2	1	.00
F	<i>Phlox longifolia</i>	19	7	.06
F	<i>Senecio multilobatus</i>	9	7	.11

Type	Species	Nested Frequency '97	Quadrat Frequency '97	Average Cover % '97
F	Veronica biloba (a)	16	8	.04
F	Zigadenus paniculatus	-	-	.00
Total for Forbs		283	122	2.06

BROWSE TRENDS --

Herd unit 18 , Study no: 33

Type	Species	Strip Frequency '97	Average Cover % '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
Total for Browse		130	4.73

BASIC COVER --

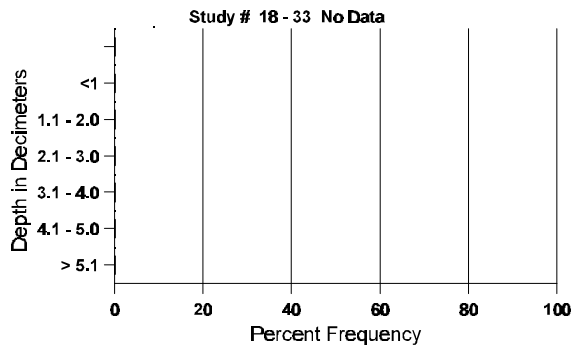
Herd unit 18 , Study no: 33

Cover Type	Nested Frequency '97	Average Cover % '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

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	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 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	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%		

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 montanus																		
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:	-	
Chrysothamnus nauseosus albicaulis																		
Y	97	4	-	-	1	-	-	-	-	-	-	-	-	5	-	-	-	5
M	97	14	-	-	-	-	-	-	-	-	-	-	-	14	-	-	-	14
D	97	2	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	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%	
Chrysothamnus viscidiflorus viscidiflorus																		
Y	97	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
M	97	16	-	-	-	-	-	-	-	-	-	-	-	16	-	-	-	16
D	97	4	-	-	1	-	-	-	-	-	-	-	-	1	-	-	4	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%	
Eriogonum microthecum																		
M	97	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	1
% 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:	-	
Gutierrezia sarothrae																		
S	97	5	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	5
Y	97	27	-	-	-	-	-	-	-	-	-	-	-	27	-	-	-	27
M	97	142	-	-	-	-	-	-	-	-	-	-	-	142	-	-	-	142
D	97	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	2
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	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%	

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>Juniperus osteosperma</i>																		
Y	97	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
M	97	15	-	-	-	-	-	1	-	-	14	2	-	-	320	-	16	
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:	-	
<i>Opuntia spp.</i>																		
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:	-	
<i>Purshia tridentata</i>																		
M	97	-	1	1	-	-	-	-	-	-	2	-	-	-	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:	-	
<i>Symphoricarpos oreophilus</i>																		
Y	97	2	-	-	1	-	-	-	-	-	3	-	-	-	60		3	
M	97	23	6	2	6	-	-	-	-	-	32	-	5	-	740	16	28	37
D	97	2	-	-	-	-	-	-	-	-	-	-	-	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%	
<i>Tetradymia canescens</i>																		
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 - HEASTON

Site	1989			1997		
	Soil	Browse	Grasses & Forbs	Soil	Browse	Grasses & forbs
18-1 Barney Canyon	NR	NR	NR	NR	NR	NR
18-2 City Canyon	NR	NR	NR	NR	NR	NR
18-3 Manning Canyon	+	-	0	+	+	+
18-4 Silverado Canyon	+	-	-	0	0	0
18-5 Big Dip Gulch	0	0	+	0	0	-
18-6 South of Soldier Canyon	+	0	+	0	0	-
18-7 Calumet Mine	0	-	+	+	+	+
18-8 Silcox Canyon	+	+	+	NR	NR	NR
18-9 Left Fork Settlement Canyon	0	0	+	0	0	+
18-10 Bates Canyon	+	-	+	0	+	+
18-11 Rose Canyon	NR	NR	NR	NR	NR	NR

(+) = upward trend, (-) = downward trend, (0) = stable trend, (NR) = not read

Site	1997		
	Soil	Browse	Grasses & forbs
18-13 Kessler Peak	NR	NR	NR
18-14 Little Valley	+	none	-
18-15 Upper Kessler	0	none	0
18-16 Smelter	NR	NR	NR
18-17 Deadman	NR	NR	NR
18-19 Black Rock West	+	0	-
18-20 Black Rock East	0	0	0
18-21 Black Rock Canyon	0	0	-

Site	1997		
	Soil	Browse	Grasses & forbs
18-22 Rodgers Canyon	+	-	-
18-31 Carr Fork	Established in 1997		

(+) = upward trend, (-) = downward trend, (0) = stable trend, (NR) = not read

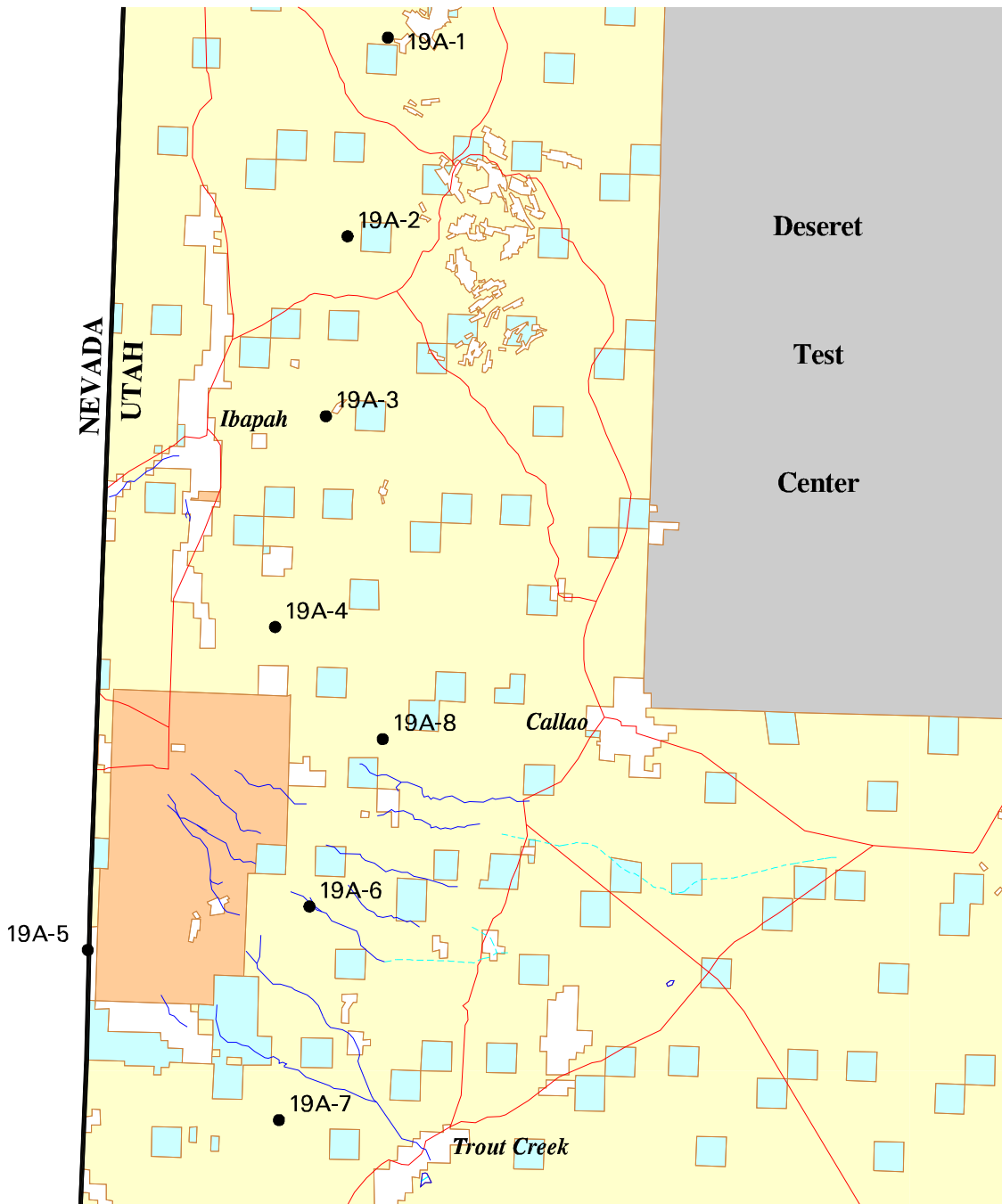
WILDLIFE MANAGEMENT UNIT - 19 - WEST DESERT

Boundary Description

Tooele, Utah, Juab and Millard counties - Boundary begins at the junction of the Utah-Nevada state line and Interstate 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 Highway SR-36; north on SR-36 to Highway SR-73; east on SR-73 to Interstate 15; south on I-15 to Highway SR-132 at Nephi; west on SR-132 to Highway US-6; southwest on US-6 to its junction with Highway US-50 near Delta; west on US-50 & US-6 to the Utah-Nevada state line; north along this state line to I-80 at Wendover and beginning point.











For simplicity in reporting the range trend study findings, unit 19 was divided into two sub-units. Unit 19A (West Desert, Desert Mountain Ranges) encompasses the Deep Creek Mountain range and the surrounding salt desert shrublands. This unit was known as deer herd unit 62A prior to 1993 and deer herd unit 22 from 1993 through 1996. Unit 19B (West Desert, Vernon) is comprised of the Vernon and Tintic Mountain ranges. This unit was originally separated into deer herd units 13 and 14 prior to 1993, then as deer herd units 23 and 24 from 1993 through 1996.

Management Unit 19A



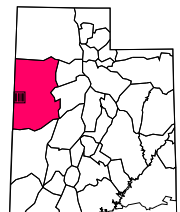
Map Scale 1:365,000 (1" = 5.8 miles)

Legend

- | | |
|---|--|
|  BLM |  Water Body |
|  State of Utah |  Transect Location |
|  Goshute Indian Res. |  Road |
|  Private Land |  Perennial Stream |
|  Military Res. |  Ditch, Canal, Aqueduct |



Unit Location



WILDLIFE MANAGEMENT UNIT - 19 - WEST DESERT

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

Boundary Description

Tooele, Utah, Juab, and Millard counties - Boundary begins at the Utah-Nevada state line and Interstate 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 junction 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.

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 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.

The original 6 key areas identified and sampled with trend studies in 1983 are still priority areas. Two more were added in 1989. Now, seven of the studies are located on BLM land, while the remaining study is located on the Goshute Indian Reservation. These range trend studies were established on key winter ranges in Trail Gulch, Ochre Mountain, Sevy and Durse Canyons in mid-July 1983. In mid-September of that year, two summer range studies were added at Chokecherry Springs and Granite Creek. Two more studies were added in June 1989. The Wood Canyon study on the southeast side of the range was established primarily to monitor bighorn sheep habitat in the desert shrub type. The other new study in The Basin samples summer range in a big sagebrush/grass community. These studies were again reread in mid-July 1997. The studies range in elevation from 5,860 feet at Trail Gulch (19A-1) to 8,740 feet at Chokecherry Springs (19A-5).

The overall deer population remains well below the modeled winter population of 2,000 deer. It is felt that the Deep Creek range is experiencing the same problems related to fawn production and survival as other west desert mountain ranges. Although harvest success improved in 1996, it is lower than what the management objectives call for.

Trend Study 19A-1-97

Study site name: Trail Gulch.

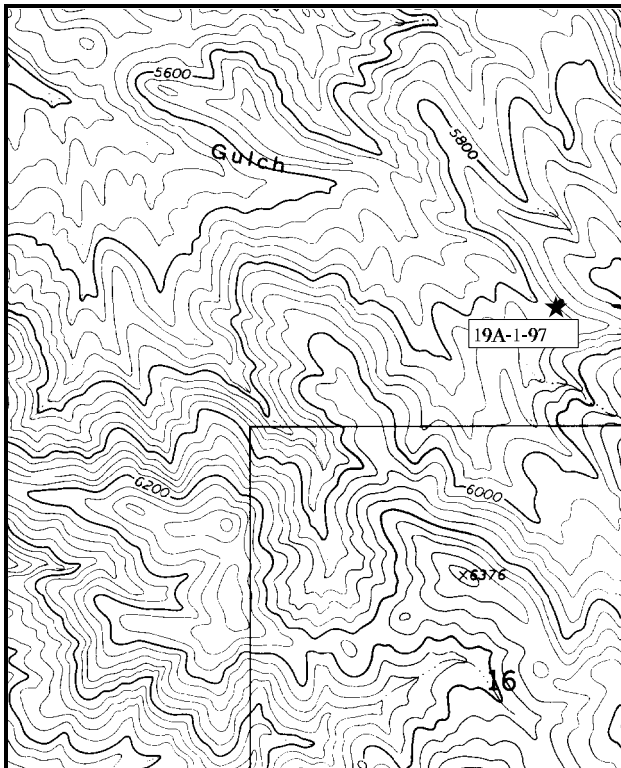
Range type: Stansbury Cliffrose

Compass bearing: frequency baseline 180 degrees.

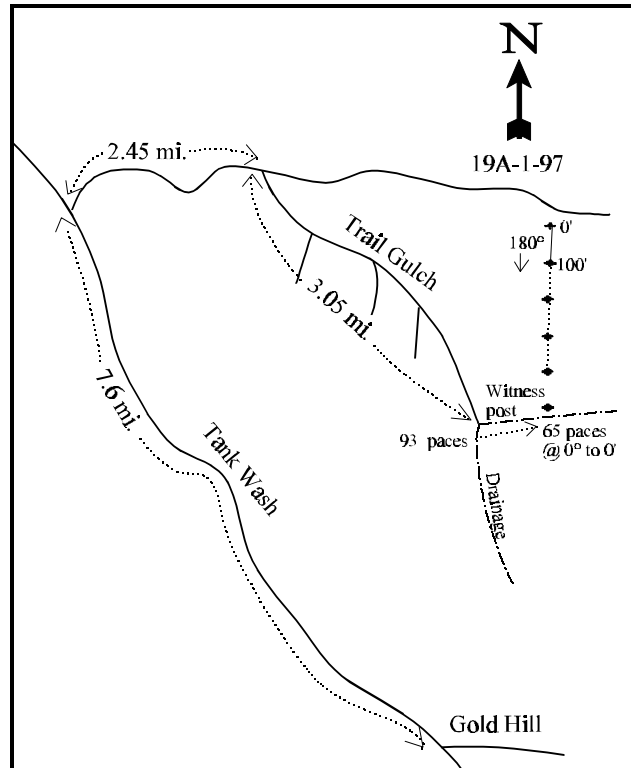
First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

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 (i.e., straight) at all intersections. Stop where the road ends and two drainages come together. From the intersection of the streambeds, walk 93 paces easterly, along the left drainage to a green steel "T" fencepost on the north side of the streambed. From the fencepost, walk 65 paces at an azimuth of 0 degrees true 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, Utah



Diagrammatic Sketch

Township 7 S, Range 18 W, Section Unsurveyed (9)

UTM 4456886.589 N, 255288.546 E

DISCUSSION

Trend Study No. 19A-1 (62A/22-1)

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 low density stand of Stansbury cliffrose in association with scattered Utah juniper. Elevation is approximately 5,700 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 or wildlife was noted as infrequent. Wildlife observed in 1983 in the area included several broods of chukars.

The soil is very rocky and highly eroded. Rocks are angular shaped and uniformly dark grey in color. Textural analysis indicates a clay soil with a neutral pH of 7.1. The effective rooting depth (see methods) is 15 inches with an average temperature of 61°F measured at 17 inches. Phosphorous levels measured in the soil were 7.7 ppm and potassium levels were 76.8 ppm. It is generally thought that phosphorous levels less than 10 ppm and potassium levels less than 70 ppm are limiting to plant growth.

The key browse species are Stansbury cliffrose, black sagebrush, and Nevada ephedra. In 1997, Stansbury cliffrose density was estimated at 340 plants/acre. This is similar to the 1989 estimate of 332 plants/acre and slightly higher than the 1983 estimate of 199 plants/acre. The Stansbury cliffrose age structure is indicative of a stable population. Currently, Stansbury cliffrose display good to excellent seed production and vigor, with very little use noted on last years growth. Nevada ephedra showed heavy hedging in 1983 with all plants encountered classified with poor vigor. Mostly moderate utilization was reported in 1989 with an increase in density from 300 plants/acre in 1983 to 532 plants/acre in 1989. In 1997, both plants classified with moderate use and being decadent decreased to 34% and 7% respectively. Current estimated density for Nevada ephedra is 820 plants/acre. There was some confusion in the past with the identification of the sagebrush. In 1983, the sagebrush was identified as black sagebrush (*Artemisia nova*). In 1989, the sagebrush was identified as low sagebrush (*Artemisia arbuscula*). In 1997, characteristics were more distinguishable between the species and they were identified morphologically as *A. arbuscula* or *A. nova*. Consequently, the sagebrush density for 1983 and 1989 is identified as black sagebrush in the data tables and the 1997 sagebrush were separated between the two species. Black sagebrush density is currently estimated to be 760 plants/acre. This is a mostly mature population with a dead to live ratio of 1:6. Utilization was reported moderate to heavy in 1983, but dropped to light use in 1989 and 1997.

Broom snakeweed was the most abundant shrub on the site in 1989 with an estimated density of 2,699 plants/acre. Evidence of a declining population was apparent in 1989 when about 1/3 of the population were classified as decadent. The 1997 density shows the results of high decadency in 1989 with a drop to 640 plants/acre. Littleleaf horsebrush density has increased slightly to 340 plants/acre in 1997. This increase is more likely due to the greatly increased sample size now used. Singleleaf pinyon and Utah juniper are scattered throughout the site. Point-center quarter data estimates 14 pinyon/acre and 53 juniper/acre. Other infrequent browse species include: fourwing saltbush, California brickellbush, narrowleaf low rabbitbrush, and pricklypear cactus.

The dominant grass on the site is cheatgrass. Cheatgrass provides the majority of grass cover at this time, but is not thick enough to constitute a fire hazard. Perennial grass is dominated by bluebunch wheatgrass. The sum of nested frequency for bluebunch wheatgrass has significantly increased since 1989. Conversely, galleta grass sum of nested frequency has significantly declined since 1989. Sand dropseed was encountered only in 1989. Sum of nested frequency for perennial grasses has increased slightly over all years. Other grasses include: bottlebrush squirreltail, Indian ricegrass, and Sandberg bluegrass.

Forbs are infrequently encountered and provide almost no cover. Longleaf phlox was the dominate forb in 1997, but was encountered in only 4 quadrats. Sum of nested frequency for forbs has declined since 1989, but is still nearly double of that reported in 1983.

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 is basically down. Vegetative condition is fair to poor, but trend is 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

Soil erosion is ongoing and unavoidable, though not severe due to the limited precipitation. Overall, the soil trend is stable. The browse trend is stable with a slight increase in density and a slight decrease in utilization. The data indicates a stable herbaceous understory trend. Grass and forb sum of nested frequency shows a slight increase since 1983.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable

1997 TREND ASSESSMENT

Erosion is present but not accelerated. Percent bare ground has declined over all years. Rock and pavement cover are high and although this may protect the soil in some areas, rock and pavement will accelerate runoff in other areas. Soil trend is stable, yet in poor condition. 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 long-term drought conditions. Browse trend is stable for 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, but poor condition

browse - stable

herbaceous understory - stable, but over 60% of the cover contributed by cheatgrass

HERBACEOUS TRENDS --

Herd unit 19A, Study no: 1

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	<i>Agropyron spicatum</i>	_a 43	_a 47	_b 97	20	24	36	3.09
G	<i>Bromus tectorum</i> (a)	-	-	248	-	-	80	7.17
G	<i>Hilaria jamesii</i>	_b 37	_{ab} 33	_a 13	17	13	6	.36
G	<i>Oryzopsis hymenoides</i>	5	6	6	3	3	3	.21
G	<i>Poa secunda</i>	3	14	15	3	7	7	.40
G	<i>Sitanion hystrix</i>	-	-	6	-	-	2	.03
G	<i>Sporobolus cryptandrus</i>	_a -	_b 20	_a -	-	8	-	-
Total for Grasses		88	120	385	43	55	134	11.29
F	<i>Astragalus utahensis</i>	-	-	3	-	-	1	.00
F	<i>Cirsium neomexicanum</i>	_a 6	_b 19	_a 1	3	11	1	.00
F	<i>Lomatium</i> spp.	-	-	1	-	-	1	.00
F	<i>Lygodesmia grandiflora</i>	3	-	-	1	-	-	-
F	<i>Machaeranthera</i> spp	1	-	-	1	-	-	-
F	<i>Phlox longifolia</i>	_a -	_{ab} 3	_b 10	-	2	4	.04
F	<i>Sphaeralcea coccinea</i>	_{ab} 2	_b 10	_a -	2	4	-	-
F	Unknown forb-perennial	-	-	8	-	-	3	.06
Total for Forbs		12	32	23	7	17	10	0.12

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 19A, Study no: 1

Type	Species	Strip Frequency '97	Average Cover % '97
B	<i>Artemisia arbuscula</i>	2	.78
B	<i>Artemisia nova</i>	19	4.61
B	<i>Atriplex confertifolia</i>	5	.53
B	<i>Brickellia californica</i>	5	.03
B	<i>Chrysothamnus viscidiflorus stenophyllus</i>	10	.15
B	<i>Cowania mexicana stansburiana</i>	15	2.54
B	<i>Ephedra nevadensis</i>	12	1.78
B	<i>Gutierrezia sarothrae</i>	19	.60
B	<i>Juniperus osteosperma</i>	8	11.46

Type	Species	Strip Frequency '97	Average Cover % '97
B	Opuntia spp.	2	-
B	Pinus monophylla	1	-
B	Tetradymia glabrata	12	1.09
Total for Browse		110	23.60

OVERHEAD CANOPY COVER --

Herd unit 19A, Study no: 1

Species	Percent Cover '97
Juniperus osteosperma	15

BASIC COVER --

Herd unit 19A, Study no: 1

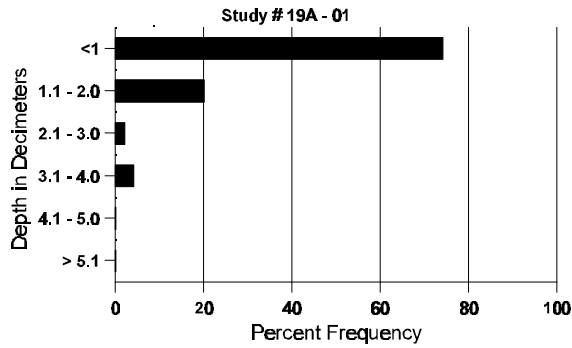
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	295	.25	4.00	35.30
Rock	324	27.00	30.00	27.53
Pavement	285	20.25	21.50	16.47
Litter	361	39.50	33.50	30.37
Cryptogams	111	.25	1.50	1.66
Bare Ground	140	12.75	9.50	3.34

SOIL ANALYSIS DATA --

Herd Unit 19A, Study no: 01

Effective rooting depth (inches)	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	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19A, Study no: 1

Type	Quadrat Frequency '97
Rabbit	8

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)		Total			
		1	2	3	4		Ht. Cr.					
<i>Artemisia arbuscula</i>												
M	83	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	0	-	-	0
	97	1	3	-	-	-	-	-	80	12	26	4
X	83	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	0			0
	97	-	1	-	-	-	-	-	60			3
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'83		00%		00%		00%		None				
'89		00%		00%		00%		Appeared				
'97		75%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'83	0	Dec:	-			
						'89	0		-			
						'97	80		-			

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 nova</i>																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	83	-	6	2	-	-	-	-	-	-	8	-	-	-	266	13 25	8	
	89	3	2	-	2	-	-	-	-	-	7	-	-	-	233	12 29	7	
	97	24	5	-	-	-	-	-	-	-	29	-	-	-	580	13 31	29	
D	83	-	-	1	-	-	-	-	-	-	-	-	1	-	33		1	
	89	-	6	-	2	-	-	-	-	-	8	-	-	-	266		8	
	97	8	-	-	-	-	-	-	-	-	5	-	-	3	160		8	
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		67%			33%			11%			+40%							
'89		53%			00%			00%			+34%							
'97		13%			00%			08%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	299	Dec:	11%			
												'89	499		53%			
												'97	760		21%			
<i>Artemisia tridentata vaseyana</i>																		
Y	83	1	-	-	-	-	-	-	-	-	-	-	1	-	33		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%			100%			Died out							
'89		00%			00%			00%			None							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	33	Dec:	-			
												'89	0		-			
												'97	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				
<i>Atriplex confertifolia</i>																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80	8	11	
D	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%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	0%				
											'89	0		0%				
											'97	120		33%				
<i>Brickellia californica</i>																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	7	-	-	-	-	-	-	-	-	7	-	-	-	140	12	14	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	-				
											'89	0		-				
											'97	160		-				

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>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
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	3	-	-	-	-	-	-	-	-	3	-	-	-	100			3
	97	1	-	-	1	-	-	-	-	-	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%			+20%							
'89		00%			00%			00%			+25%							
'97		00%			00%			09%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	133	Dec:	0%			
												'89	166		60%			
												'97	220		18%			
<i>Cowania mexicana stansburiana</i>																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	89	5	-	-	-	-	-	-	-	-	5	-	-	-	166			5
	97	1	2	-	-	-	-	-	-	-	3	-	-	-	60			3
M	83	2	2	1	-	-	-	-	-	-	5	-	-	-	166	44	67	5
	89	-	-	-	1	-	-	-	-	-	1	-	-	-	33	55	71	1
	97	11	-	-	-	-	-	-	-	-	11	-	-	-	220	38	60	11
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	2	1	-	1	-	-	-	-	-	4	-	-	-	133			4
	97	3	-	-	-	-	-	-	-	-	2	-	-	1	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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	199	Dec:	0%			
												'89	332		40%			
												'97	340		18%			

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				
Echinocactus spp.																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33	3	5	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%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	33	Dec:	-			
												'89	33		-			
												'97	0		-			
Ephedra nevadensis																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	97	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
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
D	83	-	-	3	-	-	-	-	-	-	-	-	3	-	100		3	
	89	1	4	-	1	1	-	-	-	-	7	-	-	-	233		7	
	97	2	1	-	-	-	-	-	-	-	3	-	-	-	60		3	
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%			100%			100%			+44%							
'89		56%			00%			00%			+35%							
'97		34%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	300	Dec:	33%			
												'89	532		44%			
												'97	820		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	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	5	-	-	-	-	-	-	-	5	-	-	-	166		5
	97	1	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	83	6	-	-	-	-	-	-	-	6	-	-	-	200		6
	89	9	-	-	-	-	-	-	-	9	-	-	-	300		9
	97	2	-	-	-	-	-	-	-	2	-	-	-	40		2
M	83	70	-	-	-	-	-	-	-	70	-	-	-	2333	8 8	70
	89	45	-	-	2	-	-	-	-	47	-	-	-	1566	5 7	47
	97	30	-	-	-	-	-	-	-	30	-	-	-	600	7 12	30
D	83	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	25	-	-	-	-	-	-	-	25	-	-	-	833		25
	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%					+ 6%							
'89		00%	00%	00%					-76%							
'97		00%	00%	00%												
Total Plants/Acre (excluding Dead & Seedlings)									'83	2533	Dec:	0%				
									'89	2699		31%				
									'97	640		0%				
<i>Juniperus osteosperma</i>																
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	2	-	-	-	-	-	-	-	2	-	-	-	66		2
	97	2	-	-	-	-	-	-	-	2	-	-	-	40		2
M	83	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	89	1	-	-	-	-	-	-	-	1	-	-	-	33	118 197	1
	97	3	-	-	2	-	-	-	-	5	-	-	-	100	- -	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%					Appeared							
'89		00%	00%	00%					+38%							
'97		00%	00%	00%												
Total Plants/Acre (excluding Dead & Seedlings)									'83	0	Dec:	0%				
									'89	99		0%				
									'97	160		13%				

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	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	83	1	-	-	-	-	-	-	-	-	-	-	1	-	33	4	18	1
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	7	13	2
D	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%			100%			+50%							
'89		00%			00%			50%			-39%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	33	Dec:	0%			
												'89	66		50%			
												'97	40		0%			
Pinus monophylla																		
Y	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	89	1	-	-	1	-	-	-	-	-	2	-	-	-	66		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
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%			+50%							
'89		00%			00%			00%			-70%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	33	Dec:	-			
												'89	66		-			
												'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				
Tetradymia glabrata																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	83	2	-	-	-	-	-	-	-	-	2	-	-	-	66	26	38	2
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	8	-	-	1	-	-	-	-	-	9	-	-	-	180	23	21	9
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	3	-	-	1	-	-	-	-	-	2	-	2	-	133		4	
	97	7	-	-	-	-	-	-	-	-	5	-	-	2	140		7	
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		00%			00%			00%			+67%							
'89		00%			00%			33%			+41%							
'97		00%			00%			12%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	66	Dec:	0%			
												'89	199		67%			
												'97	340		41%			

Trend Study 19A-2-97

Study site name: Ochre Mountain .

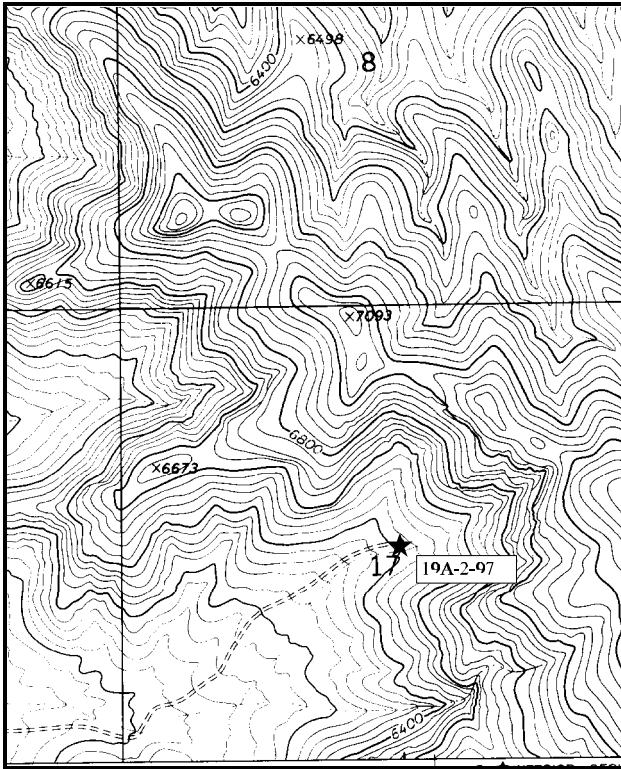
Range type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 249 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

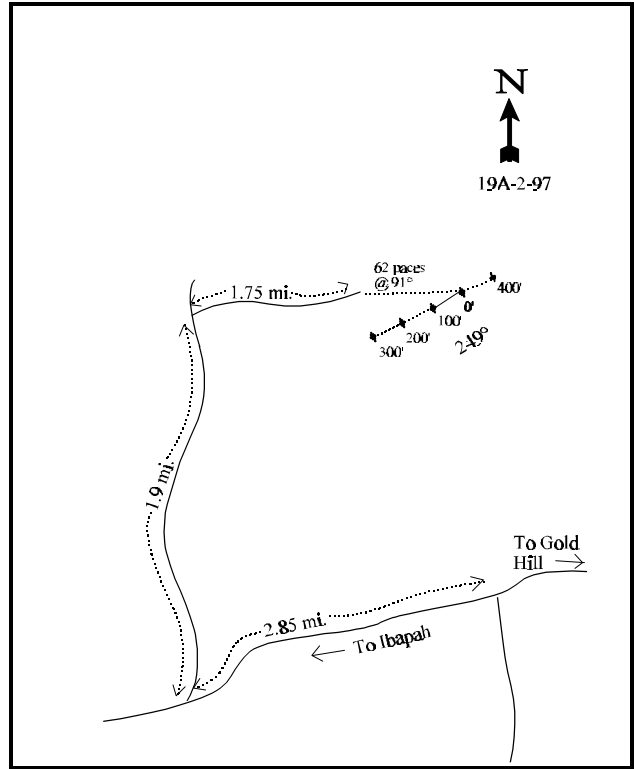
LOCATION DESCRIPTION

From Gold Hill, proceed northwest toward Gold Hill Pass for 3.85 miles to a road to the southwest. Proceed southwest for 0.73 miles to a fork. Take the left fork for 1.5 miles to another fork. Take the right fork for 3.90 miles to a faint road to the left (i.e., east). Take the left fork for 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 of the baseline. The study is marked by green steel "T" fenceposts approximately 12 to 18 inches in height.



Map Name: Ochre Mountain, Utah .

Township 8 S , Range 18 W , Section 17



Diagrammatic Sketch

UTM 444616.576 N , 253104.697 E

DISCUSSION

Trend Study No. 19A-2 (62A/22-2)

The Ochre Mountain study samples deer winter range on the west side of Ochre Mountain. Study site elevation is approximately 6,200 feet on a 15-20% west facing alluvial swale. The range type is basin big sagebrush-grass, characterized by sagebrush underlain by a thick carpet of cheatgrass. 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 in winter and spring. In 1983, deer use appeared light, however there was considerable evidence of 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 is little evidence of animal use, with only a few fresh deer pellet groups noted on the site.

Soil is alluvial with an effective rooting depth (see methods) of 15 inches. The soil type is Shontz Rexmont, a very gravelly soil highly susceptible to water erosion. Soil textural analysis indicates it to be a loam with a neutral pH of 7.1. Average soil temperature is 61°F at 17 inches. Phosphorous levels in the soil profile measure 7.6 ppm, which may be limiting to vegetative growth where 10 ppm is considered minimal for normal plant growth. Past soil erosion is evident by the exposed rock, erosion pavement, and presence of pedestalled plants. Although most of the herbaceous understory cover is contributed by cheatgrass, erosion is minimal due to the vegetative and litter cover.

Browse composition consists almost entirely of basin big sagebrush. These plants are quite large with an average height of 34 inches and an average crown measurement of 47 inches. Currently, density is estimated to be 2,720 plants/acre. This density estimate is twice as large as that estimated in 1983 and 1989. This increase can be attributed to the increased sample size used in 1997 which more accurately represents the area. This is a mature stand with 61% of the plants classified as mature and 33% of the plants classified as decadent. The dead to live ratio is 1:2.5. Age structure indicates that this population is slightly thinning, possibly due to extended drought. Utilization is light with improved vigor relative to 1989. Other shrubs scattered throughout the site include: stickyleaf low rabbitbrush, 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 currently constitutes a definite fire hazard. It was noted in 1989 that there was a noticeable lack of cheatgrass relative to 1983 when comparing photographs. Bluebunch wheatgrass is tall and vigorous with a significant increase in nested frequency since 1989. Sandberg bluegrass sum of nested frequency shows a slight decrease over all years. Muttongrass sum of nested frequency declined in 1989 and was not sampled in 1997.

With one exception, forbs occur infrequently. Peavine (*Lathyrus brachycalyx*) is moderately abundant with a similar nested frequency as that reported in 1989. Other forbs encountered include: longleaf phlox, low fleabane, rockcress, desert Indian paintbrush, and tumble mustard.

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 is stable. No signs of imminent vegetative change are apparent. Soil trend is stable to slightly declining. Soil is poorly developed and has little organic content and is subject to moderate to light sheet and gully erosion.

1989 TREND ASSESSMENT

The soil trend appears to be stable though soils are poorly developed and rocky. The browse trend is slightly downward for basin big sagebrush with an increase in the percent of plants with poor vigor and an increase in percent decadency. The herbaceous understory trend is stable with only a slight increase in perennial herbaceous understory sum of nested frequency.

TREND ASSESSMENT

soil - stable

browse - slightly downward

herbaceous understory - slightly upward

1997 TREND ASSESSMENT

Although past erosion is evident, it is currently minimal due to abundant vegetation and litter cover. However, most of the vegetative 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 mostly 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. The browse trend is slightly down, for it is at a point where many plants could be lost. 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 browse populations. Forbs, with the exception of peavine, are rare.

TREND ASSESSMENT

soil - stable

browse - slightly down, mature/decadent stand of basin big sagebrush

herbaceous understory - slightly upward

HERBACEOUS TRENDS --

Herd unit 19A, Study no: 2

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron cristatum	-	-	4	-	-	2	.18
G	Agropyron spicatum	_a 119	_a 117	_b 189	51	45	69	7.63
G	Bromus tectorum (a)	-	-	329	-	-	96	10.92
G	Poa fendleriana	_c 37	_b 14	_a -	14	6	-	-
G	Poa secunda	153	138	121	56	54	43	1.63
Total for Grasses		309	269	643	121	105	210	20.36
F	Arabis spp.	-	6	5	-	2	2	.01
F	Castilleja chromosa	-	2	1	-	1	1	.03
F	Cirsium spp.	-	-	-	-	-	-	.03

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	<i>Crepis acuminata</i>	-	-	3	-	-	1	.03
F	<i>Descurainia</i> spp. (a)	-	-	7	-	-	4	.02
F	<i>Erigeron pumilus</i>	a-	b8	ab3	-	4	1	.00
F	<i>Hackelia patens</i>	-	-	2	-	-	1	.00
F	<i>Lathyrus brachycalyx</i>	a145	b193	ab182	56	66	70	5.74
F	<i>Machaeranthera canescens</i>	-	1	1	-	1	1	.03
F	<i>Oenothera</i> spp.	-	8	-	-	4	-	-
F	<i>Phlox longifolia</i>	a4	b25	ab13	2	12	8	.06
F	<i>Sisymbrium altissimum</i> (a)	-	-	12	-	-	7	.08
F	Unknown forb-perennial	3	-	-	1	-	-	-
Total for Forbs		152	243	229	59	90	96	6.06

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 19A, Study no: 2

Type	Species	Strip Frequency '97	Average Cover % '97
B	<i>Artemisia nova</i>	5	.33
B	<i>Artemisia tridentata</i> tridentata	64	16.40
B	<i>Chrysothamnus viscidiflorus</i> stenophyllus	18	.30
Total for Browse		87	17.04

BASIC COVER --

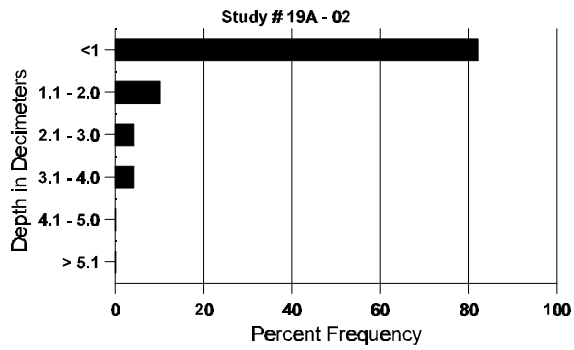
Herd unit 19A, Study no: 2

Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	376	2.00	12.00	39.64
Rock	179	6.75	11.50	5.11
Pavement	226	14.50	11.00	8.30
Litter	394	69.75	62.00	53.55
Cryptogams	75	1.75	1.25	1.38
Bare Ground	115	5.25	2.25	2.58

SOIL ANALYSIS DATA --
Herd Unit 19A, Study no: 02

Effective rooting depth (inches)	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 '97
Rabbit	1
Horse	1
Deer	5
Cattle	5

BROWSE CHARACTERISTICS --

Herd unit 19A, 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		1	2									
Artemisia nova																	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	9	-	-	-	-	-	-	-	9	-	-	-	180	9	17	9
D	83	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	2	-	-	-	-	-	-	-	-	-	-	2	40			2
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%		None									
'89		00%		00%		00%		Appeared									
'97		00%		00%		18%											
Total Plants/Acre (excluding Dead & Seedlings)										'83	0	Dec:	0%				
										'89	0		0%				
										'97	220		18%				
Artemisia tridentata tridentata																	
S	83	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	2	-	-	-	-	-	-	-	-	1	1	-	133			2
	97	3	-	-	5	-	-	-	-	8	-	-	-	160			8
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
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
X	83	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	1060			53
% 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%											
Total Plants/Acre (excluding Dead & Seedlings)										'83	1333	Dec:	30%				
										'89	1332		70%				
										'97	2720		33%				

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 stenophyllus																		
M	'83	6	-	-	-	-	-	-	-	-	6	-	-	-	400	19	20	6
	'89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	16	-	-	5	-	-	-	-	-	21	-	-	-	420	18	24	21
D	'83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'89	2	-	-	-	-	-	-	-	-	1	-	1	-	133			2
	'97	2	-	-	-	-	-	-	-	-	-	-	-	2	40			2
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%			-67%							
'89		00%			00%			50%			+71%							
'97		00%			00%			09%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	400	Dec:	0%				
											'89	133		100%				
											'97	460		9%				

Trend Study 19A-3-97

Study site name: Sevy Canyon .

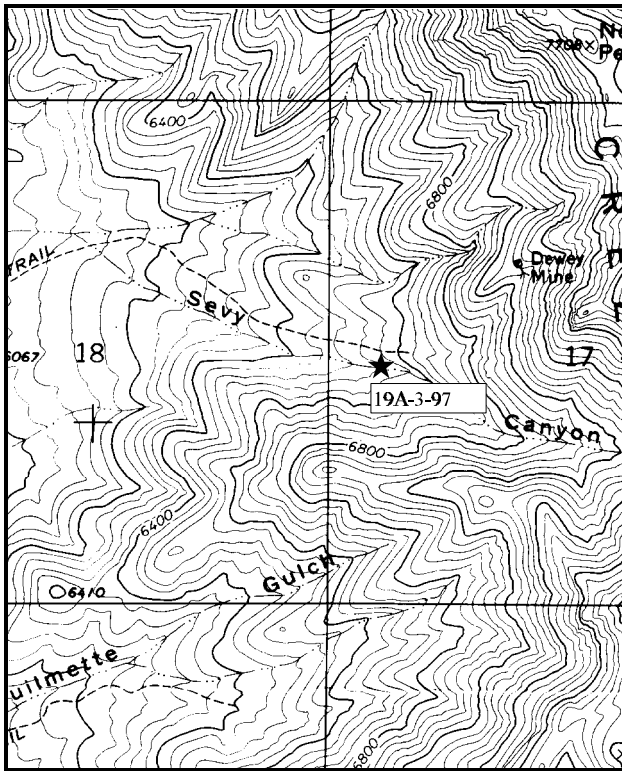
Range type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 276 degrees. (Line 3-4 354°M)

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

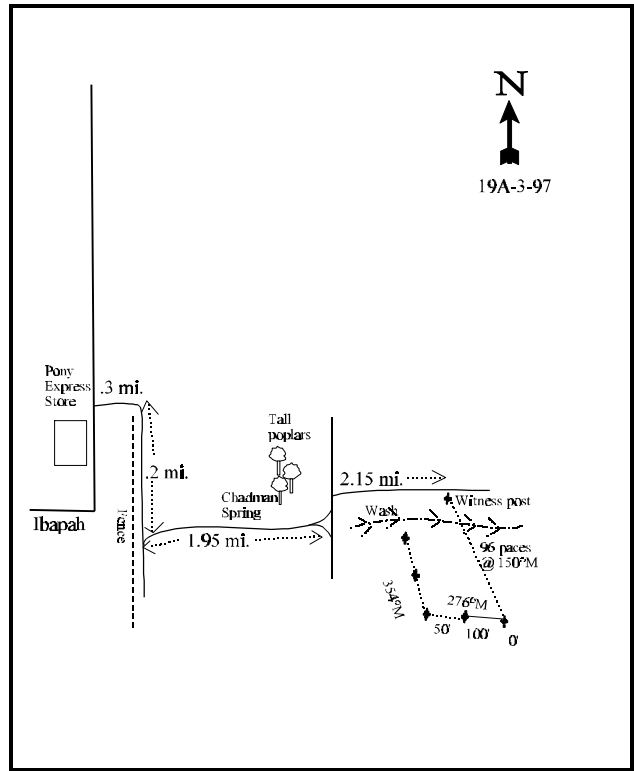
LOCATION DESCRIPTION

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 rockpile, 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, Utah .

Township 9 S , Range 18 W , Section 17



Diagrammatic Sketch

UTM 4436370.606 N, 253104.697 E

DISCUSSION

Trend Study No. 19A-3 (62A/22-3)

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 increased sample size utilized in 1997 extended the study into part of the surrounding pinyon-juniper woodland. Chadman 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. Soil textural analysis indicates it to be a loam with a neutral pH (7.3). Effective rooting depth (see methods) is estimated to be 15 inches. Average soil temperature is 53.6°F at a depth of just over 15 inches. Phosphorous levels in the soil profile measure 5.6 ppm, which may be limiting to vegetative growth where 10 ppm is thought to be the minimum 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 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 percent of plants classified with poor vigor. With the increased sample size used in 1997, the density estimate declined to 4,320 plants/acre. Utilization is currently light, but again, a larger percent of the population are classified in poor vigor. The percent of young plants encountered declined while the percent of decadent plants increased to account for 50% of the entire black sagebrush population with 44% of these plants classified as dying. There is a consistent trend in the percent of the population that is classified as decadent. Percent decadency has increased from 15% in 1983, 29% in 1989, and it is now estimated to be 50%. The dead to live ratio is estimated to be 1:4 in 1997. Wyoming sagebrush has 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. Percentage of the population with moderate utilization has declined from 100% in 1983 to only 11% moderately hedged and 89% slightly hedged in 1997. The dead to live ratio in 1997 is 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 singleleaf pinyon trees/acre. The Utah juniper trees have an average diameter of 4.5 inches and the singleleaf pinyon trees have an average diameter of 3 inches. The Utah juniper and singleleaf 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 sum of nested frequency, but they are not significant. Sum of 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 perennial sum of nested frequency since 1989. The current sum of nested frequency is similar to that of 1983. Forb utilization is light. The most abundant species; peavine, Hoods phlox, and longleaf phlox provide only minute amounts of forage. Hooker balsamroot, although sampled in 1983 and 1989, was not encountered in 1997.

1983 APPARENT TREND ASSESSMENT

Soil trend is 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. Vegetative trend is stable for the short term but will probably decline over the long term. The principal problem is encroachment by Utah juniper and singleleaf 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 Wyoming big sagebrush population has increased since 1983, mostly due to an increase in the number of young plants encountered. Although percent decadency and the percent of plants in poor vigor have increased, the browse trend is stable. The site has a healthy grass and forb understory with a slightly upward herbaceous understory trend.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - slightly upward

1997 TREND ASSESSMENT

Vegetation and litter provide adequate soil protection to limit erosion. Some erosion is apparent under the Utah juniper and singleleaf pinyon trees, but in the sagebrush-grass dominated area, erosion is still 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 percent decadency since the initial survey of 1983. Wyoming sagebrush also has a relatively high percent decadency and live to dead 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

browse - downward

herbaceous understory - slightly downward

HERBACEOUS TRENDS --
Herd unit 19A, Study no: 3

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	<i>Agropyron cristatum</i>	-	-	3	-	-	1	.03
G	<i>Agropyron spicatum</i>	119	153	141	48	66	49	6.04
G	<i>Bromus tectorum</i> (a)	-	-	57	-	-	19	.75
G	<i>Oryzopsis hymenoides</i>	4	-	6	2	-	2	.01
G	<i>Poa fendleriana</i>	-	-	8	-	-	3	.04
G	<i>Poa secunda</i>	182	146	170	68	55	65	2.41
G	<i>Sitanion hystrix</i>	_b 22	_b 32	_a 5	11	17	3	.04
Total for Grasses		327	331	390	129	138	142	9.33
F	<i>Allium</i> spp.	-	-	1	-	-	1	.00
F	<i>Arabis</i> spp.	_a -	_b 17	_b 14	-	9	7	.06
F	<i>Arenaria kingii</i>	_a 5	_a -	_b 34	3	-	16	.27
F	<i>Aster</i> spp.	_b 21	_a -	_a -	10	-	-	-
F	<i>Astragalus</i> spp.	_a -	_b 7	_{ab} 2	-	5	2	.01
F	<i>Balsamorhiza hookeri</i>	_b 6	_c 23	_a -	4	10	-	-
F	<i>Calochortus nuttallii</i>	3	-	3	3	-	1	.00
F	<i>Castilleja</i> spp.	-	-	2	-	-	1	.00
F	<i>Collinsia parviflora</i> (a)	-	-	24	-	-	13	.06
F	<i>Crepis acuminata</i>	_a -	_b 7	_a 5	-	7	2	.03
F	<i>Cryptantha</i> spp.	_b 14	_b 15	_a -	7	8	-	-
F	<i>Delphinium bicolor</i>	-	-	1	-	-	1	.00
F	<i>Descurainia</i> spp. (a)	-	-	1	-	-	1	.00
F	<i>Erigeron</i> spp.	-	4	-	-	2	-	-
F	<i>Lathyrus brachycalyx</i>	_a 271	_b 287	_a 242	92	94	87	6.11
F	<i>Machaeranthera canescens</i>	-	-	1	-	-	1	.00
F	<i>Microsteris gracilis</i> (a)	-	-	3	-	-	2	.06
F	<i>Penstemon humilis</i>	-	-	5	-	-	3	.04
F	<i>Phlox hoodii canescens</i>	_b 172	_b 172	_a 100	69	70	43	1.66
F	<i>Phlox longifolia</i>	_a 18	_c 109	_b 58	11	53	27	.31
F	<i>Senecio multilobatus</i>	_a -	_a 3	_b 17	-	2	10	.07
F	<i>Streptanthus</i> spp.	1	-	-	1	-	-	-
Total for Forbs		511	644	513	200	260	218	8.74

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 19A, Study no: 3

Type	Species	Strip Frequency '97	Average Cover % '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
Total Percent Canopy Cover	108

BASIC COVER --

Herd unit 19A, Study no: 3

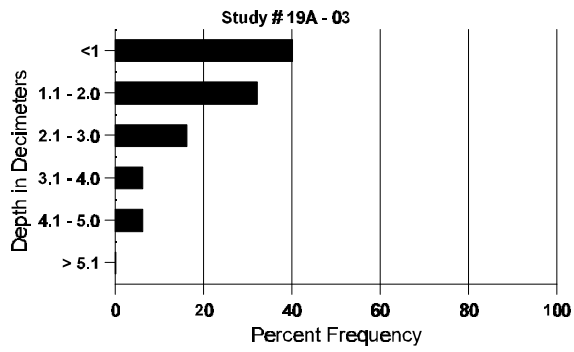
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	332	4.00	9.75	46.04
Rock	194	6.00	3.75	6.25
Pavement	264	7.00	13.50	10.66
Litter	385	52.00	56.00	45.03
Cryptogams	170	9.25	5.75	3.87
Bare Ground	194	21.75	11.25	10.01

SOIL ANALYSIS DATA --

Herd Unit 19A, Study no: 03

Effective rooting depth (inches)	Temp °F (depth)	PH	% sand	% silt	% clay	%OM	PPM P	PPM K	dS/m
15.0	53.6 (15.4)	7.3	37.3	40.2	22.6	3.4	5.6	108.8	.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 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	-	-	13	-	-	-	-	-	-	-	-	-	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%			

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																		
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 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 stenophyllus														
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%	
Eriogonum microthecum														
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%	

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				
Gutierrezia sarothrae																		
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%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	20		-			
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		-			

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	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-4-97

Study site name: Durse Canyon.

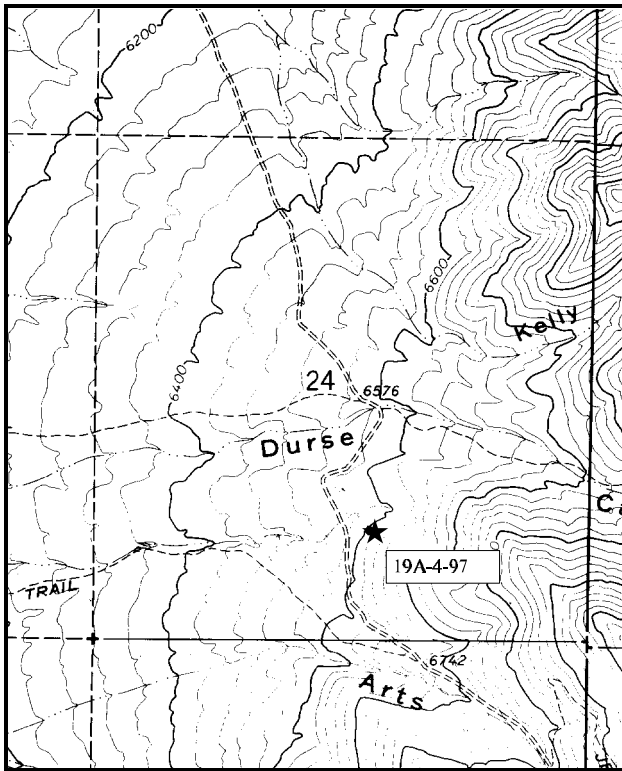
Range Type: Stansbury Cliffrose

Compass bearing: frequency baseline 158T degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (71ft), line 4 (59ft).

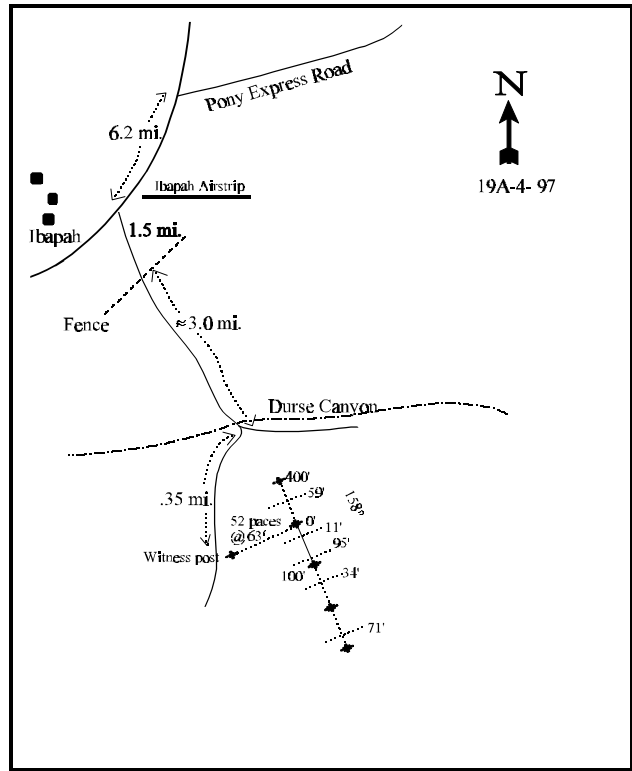
LOCATION DESCRIPTION

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. 0.2 miles farther, there is a red steel "T" fencepost on the left (east) side of the road. From the fencepost, the 0-foot baseline stake is located 52 paces 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 Utah.

Township 10S, Range 19W, Section 24



Diagrammatic Sketch

UTM 4424950.184 N, 249184.210 E

DISCUSSION

Trend Study No. 19A-4 (62A/22-4)

The Durse Canyon study is located on BLM administered land near the mouth of Durse Canyon at an elevation of 6,500 feet. The area is 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. Light to moderate densities of deer utilize the site in winter. The Durse Canyon browse (i.e., cliffrose) production-utilization transect is located in this area.

Soil is alluvially deposited and gravelly with both angular and rounded rocks present. Soil horizons are not sharply differentiated. Effective rooting depth is estimated to be 9 inches with a temperature of 58°F at 12 inches. Soil textural analysis indicates a loam with a neutral pH of 7.2. Erosion is minimal because of the gentle slope and moderate protective vegetation and litter cover.

Browse composition is visually dominated by a vigorous and productive population of Stansbury cliffrose. In 1997, density was estimated to be 840 plants/acre while contributing to 34% of the browse cover. It produces more cover than any other browse species on the site. These plants show light utilization and excellent vigor. Photograph comparisons illustrate an excellent cliffrose seed production in 1989 and again in 1997. Age structure indicates a healthy population with good biotic potential. It appears that the mountain big sagebrush and black sagebrush populations were combined in the past and reported as mostly mountain big sagebrush. In 1997 the two species were separated by morphological characteristics (plant size, leaf size, and leaf glands). Black sagebrush density is estimated to be 1,100 plants/acre in 1997. It now appears to be a healthy population with light utilization and good vigor. Currently, 16% of the population are classified as decadent. It has a fairly good biotic potential (percentage of seedlings to the population) and a good sized young age class of plants (38% of the population). The mountain big sagebrush density is estimated to be 1,100 plants/acre in 1997. Percent decadency has slightly declined to 42% but is still almost as high as it was estimated in 1989 when it peaked at 55%. In 1997, 42% of the plants encountered were classified as decadent and the dead to live ratio was 1:1.3. Even though there is mostly light use at this time, 96% of the decadent plants were classified as dying. Those plants classified with poor vigor have increased to 40%. This would strongly demonstrate that more of the mountain big sagebrush may die in the future. Mountain big sagebrush currently provides 16% of the total browse cover.

Broom snakeweed is a relatively numerous plant but of small stature as it only contributes 3% of the browse cover. The estimated density in 1997 was 1,520 plants/acre. Because nearly half of the population was classified as young, the population could expand under the right climatic conditions. In 1989, point-center quarter data determined 209 Utah juniper and 117 singleleaf pinyon trees/acre. The 1997 point-center quarter data indicates 374 Utah juniper and 347 singleleaf pinyon trees/acre. This great increase in density is mostly due to the increased sample size used in 1997 which more accurately represents the site. Most of the remaining shrubs and trees are undesirable increasers including: stickyleaf low rabbitbrush, prickly pear cactus, and an unidentified browse specie.

Perennial grass sum of nested frequency is similar to that measured in 1989. Sandberg bluegrass is the dominate perennial grass and provides the most herbaceous understory cover. Bluebunch wheatgrass has slightly increased in sum of nested frequency, although not significantly. Cheatgrass is the only annual grass present and provides nearly as much herbaceous understory cover as Sandberg bluegrass. Although not extremely dense, cheatgrass is well dispersed across the site (quadrat frequency of 75%). Other grasses include bottlebrush squirreltail and muttongrass.

Forbs are more diverse and numerous than grasses, but still only make up 32% of the herbaceous cover. However, there are significant numbers of annual mustards and low value biennials included. Longleaf phlox,

Utah locoweed, and heartleaf twistflower are the most abundant perennial species in 1997. Current use of forbs is negligible and preferred and/or succulent forbs are rare.

1983 APPARENT TREND ASSESSMENT

The soil trend appears stable and will probably remain so unless vegetative cover is depleted. However, if pinyon and juniper become more dominant and crowd out other shrub species, erosion is likely to increase. The observable vegetative trends are contradictory. Tree species are thickening, 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 population appears stable while the mountain big sagebrush population shows increased percent decadency. 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 - stable

browse - stable

herbaceous understory - slightly upward

1997 TREND ASSESSMENT

The soil trend is stable with only minimal amounts of erosion apparent. Although much of the vegetative 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 the 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 and 96% of the decadent plants are classified as dying. It would appear that the population is declining. The black sagebrush population seems to be up slightly with many young (38%) and a few seedling plants encountered. The herbaceous understory is slightly upward. Sum of nested frequency for perennial species has increased from 313 in 1983, to 381 in 1989 and finally 490 in 1997.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - slightly upward

HERBACEOUS TRENDS --

Herd unit 19A, Study no: 4

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron spicatum	a3	ab13	b25	1	6	10	.20
G	Bromus tectorum (a)	-	-	235	-	-	75	3.73
G	Poa fendleriana	a-	b17	a1	-	6	1	.03
G	Poa pratensis	2	9	-	1	3	-	-
G	Poa secunda	a77	b188	b194	31	69	71	4.24
G	Sitanion hystrix	42	46	36	21	22	19	.91
Total for Grasses		124	273	491	54	106	176	9.13
F	Alyssum alyssoides (a)	-	-	12	-	-	5	.05
F	Antennaria spp.	-	1	-	-	1	-	-
F	Arabis spp.	19	6	6	10	4	5	.40
F	Asclepias labrifloris	4	-	5	2	-	3	.09
F	Astragalus spp.	-	-	1	-	-	1	.00
F	Astragalus utahensis	a13	a3	b58	5	2	28	1.55
F	Camelina microcarpa (a)	-	-	15	-	-	8	.26
F	Castilleja spp.	-	-	4	-	-	2	.03
F	Collinsia parviflora (a)	-	-	17	-	-	7	.06
F	Cryptantha spp.	b48	b37	a19	23	21	8	.06
F	Descurainia pinnata (a)	-	1	2	-	1	2	.01
F	Epilobium paniculatum (a)	-	-	4	-	-	2	.01
F	Ipomopsis aggregata	9	11	9	5	7	4	.02
F	Lathyrus brachycalyx	-	1	-	-	1	-	-
F	Linum lewisii	1	1	-	1	1	-	-
F	Lithospermum ruderales	a1	b13	a-	1	6	-	-
F	Lygodesmia spinosa	b10	ab4	a-	6	2	-	-
F	Machaeranthera canescens	ab6	a-	b12	2	-	5	.05
F	Microsteris gracilis (a)	-	-	2	-	-	1	.00
F	Oenothera spp.	-	2	-	-	1	-	-
F	Petradoria pumila	a-	a1	b21	-	1	8	.72
F	Phlox longifolia	a20	a14	b65	12	9	29	.24
F	Ranunculus testiculatus (a)	-	-	16	-	-	7	.06
F	Senecio multilobatus	b57	a2	a3	23	2	2	.01
F	Streptanthus cordatus	-	-	31	-	-	15	.67
F	Unknown forb-perennial	a-	b8	a-	-	4	-	-
F	Zigadenus paniculatus	1	3	-	1	2	-	.00

T y p e	Species	Nestled Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
	Total for Forbs	189	108	302	91	65	142	4.34

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 19A, Study no: 4

T y p e	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia nova	20	1.96
B	Artemisia tridentata vaseyana	33	3.84
B	Chrysothamnus viscidiflorus viscidiflorus	21	.53
B	Cowania mexicana stansburiana	33	8.11
B	Gutierrezia sarothrae	23	.65
B	Juniperus osteosperma	10	6.03
B	Opuntia spp.	8	.09
B	Pinus monophylla	8	2.78
B	Unknown browse	15	-
	Total for Browse	171	24.03

CANOPY COVER --

Herd unit 19A, Study no: 4

Species	Percent Canopy '97
Cowania mexicana stansburiana	3
Juniperus osteosperma	3
Pinus monophylla	4
Total Percent Canopy Cover	10

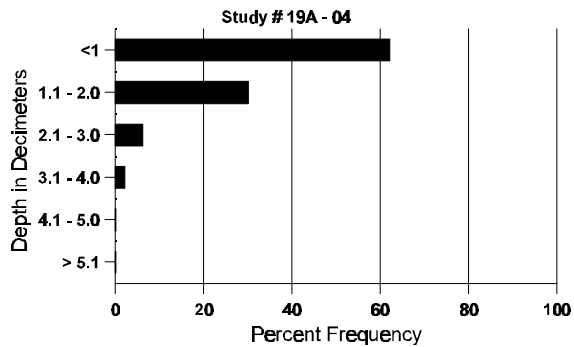
BASIC COVER --
Herd unit 19A, Study no: 4

Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	337	1.25	6.00	35.58
Rock	202	5.75	4.50	5.16
Pavement	290	16.50	25.00	19.35
Litter	378	54.00	53.25	39.18
Cryptogams	135	1.50	3.75	1.75
Bare Ground	195	21.00	7.50	8.62

SOIL ANALYSIS DATA --
Herd Unit 19A, Study no: 04

Effective rooting depth (inches)	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	.7

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 19A, Study no: 4

Type	Quadrat Frequency '97
Rabbit	11
Deer	10

BROWSE CHARACTERISTICS --

Herd unit 19A, Study no: 4

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																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	21	-	-	-	-	-	-	-	-	21	-	-	-	420		21	
M	83	-	3	-	-	-	-	-	-	-	3	-	-	-	100	29 43	3	
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33	7 12	1	
	97	24	1	-	-	-	-	-	-	-	25	-	-	-	500	13 20	25	
D	83	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	9	-	-	-	-	-	-	-	-	6	-	-	3	180		9	
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	380		19	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	133	Dec:	25%			
												'89	33		0%			
												'97	1100		16%			

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																		
S	83	3	-	-	-	-	-	-	-	-	3	-	-	-	100			3
	89	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	97	2	-	-	2	-	-	-	-	-	4	-	-	-	80			4
Y	83	15	-	-	-	-	-	-	-	-	14	1	-	-	500			15
	89	8	-	-	-	-	-	-	-	-	8	-	-	-	266			8
	97	12	-	-	-	-	-	-	-	-	12	-	-	-	240			12
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
D	83	7	10	3	-	-	-	-	-	-	10	3	7	-	666			20
	89	36	4	-	3	-	-	-	-	-	34	3	6	-	1433			43
	97	20	3	-	-	-	-	-	-	-	1	-	-	22	500			25
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	2	-	-	-	-	-	-	-	-	1	-	-	-	880			44
% 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%			-56%							
'97		09%			00%			39%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	2566	Dec:	26%			
												'89	2599		55%			
												'97	1140		44%			
Chrysothamnus viscidiflorus viscidiflorus																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	3	-	-	-	-	-	-	-	-	3	-	-	-	100			3
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	4	-	-	-	-	-	-	-	-	4	-	-	-	133			4
	97	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
M	83	12	-	-	-	-	-	-	-	-	12	-	-	-	400	12	15	12
	89	7	-	-	-	-	-	-	-	-	7	-	-	-	233	8	14	7
	97	15	-	-	1	-	-	-	-	-	16	-	-	-	320	9	14	16
D	83	3	-	-	-	-	-	-	-	-	-	-	3	-	100			3
	89	10	-	-	-	-	-	-	-	-	6	-	4	-	333			10
	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%			20%			+28%							
'89		00%			00%			19%			-26%							
'97		00%			00%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	500	Dec:	20%			
												'89	699		48%			
												'97	520		4%			

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
	89	7	-	-	-	-	-	-	233		7
	97	6	-	-	1	-	-	-	160		8
Y	83	15	-	-	-	-	-	-	500		15
	89	19	-	-	-	-	-	-	633		19
	97	14	-	-	-	-	-	-	280		14
M	83	9	1	-	2	-	-	3	500	54 31	15
	89	15	-	-	2	-	-	-	566	79 69	17
	97	23	1	-	3	-	-	-	540	66 56	27
D	83	-	-	-	-	-	-	-	0		0
	89	1	-	-	-	-	-	-	33		1
	97	-	-	-	-	-	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		03%		00%		00%		+19%			
'89		00%		00%		00%		-32%			
'97		02%		00%		02%					
Total Plants/Acre (excluding Dead & Seedlings)						'83	1000	Dec:	0%		
						'89	1232		3%		
						'97	840		2%		
<i>Gutierrezia sarothrae</i>											
S	83	-	-	-	-	-	-	-	0		0
	89	-	-	-	-	-	-	-	0		0
	97	4	-	-	1	-	-	-	100		5
Y	83	10	-	-	-	-	-	-	333		10
	89	-	-	-	-	-	-	-	0		0
	97	36	-	-	-	-	-	-	720		36
M	83	67	-	-	-	-	-	-	2233	6 7	67
	89	49	-	-	-	-	-	-	1633	7 8	49
	97	39	-	-	-	-	-	-	780	8 10	39
D	83	-	-	-	-	-	-	-	0		0
	89	-	-	-	-	-	-	-	0		0
	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%		-36%			
'89		00%		00%		00%		- 7%			
'97		00%		00%		01%					
Total Plants/Acre (excluding Dead & Seedlings)						'83	2566	Dec:	0%		
						'89	1633		0%		
						'97	1520		1%		

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	
Y	83	1	-	-	-	-	-	-	-	1	-	-	-	33		1		
	89	4	-	-	1	-	-	-	-	5	-	-	-	166		5		
	97	7	-	-	-	-	-	-	-	7	-	-	-	140		7		
M	83	1	-	-	-	-	-	-	-	1	-	-	-	33	45	18	1	
	89	2	-	-	1	-	-	-	-	3	-	-	-	100	209	89	3	
	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%			+75%							
'89		00%			00%			00%			-25%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	66	Dec:	-				
											'89	266		-				
											'97	200		-				
Opuntia spp.																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	89	1	-	-	-	-	-	-	-	1	-	-	-	33		1		
	97	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Y	83	1	-	-	-	-	-	-	-	1	-	-	-	33		1		
	89	1	-	-	-	-	-	-	-	1	-	-	-	33		1		
	97	2	-	-	-	-	-	-	-	2	-	-	-	40		2		
M	83	4	-	-	-	-	-	-	-	4	-	-	-	133	7	12	4	
	89	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	97	8	-	-	1	-	-	-	-	9	-	-	-	180	6	13	9	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	166	Dec:	-				
											'89	33		-				
											'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				
Pinus monophylla																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
Y	83	4	-	-	-	-	-	-	-	-	4	-	-	-	133			4
	89	7	-	-	-	-	-	-	-	-	7	-	-	-	233			7
	97	5	-	-	-	-	-	1	-	-	6	-	-	-	120			6
M	83	3	-	-	-	-	-	-	-	-	3	-	-	-	100	67	71	3
	89	-	-	-	2	-	-	-	-	-	2	-	-	-	66	138	98	2
	97	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%			+22%							
'89		00%			00%			00%			-40%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	233	Dec:	-			
												'89	299		-			
												'97	180		-			
Polygala acanthoclada																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33	13	8	1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	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%			Appeared							
'89		00%			00%			00%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	0%			
												'89	66		50%			
												'97	0		0%			
Tetradymia spinosa																		
M	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33	10	10	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%			Died out							
'89		00%			00%			00%			None							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	33	Dec:	-			
												'89	0		-			
												'97	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				
Unknown browse																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	21	-	-	-	-	-	-	-	-	21	-	-	-	420		21	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	7	-	-	-	-	-	-	-	-	7	-	-	-	140	15	33	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	-				
											'89	0		-				
											'97	560		-				

Trend Study 19A-5-97

Study site name: Chokecherry Springs .

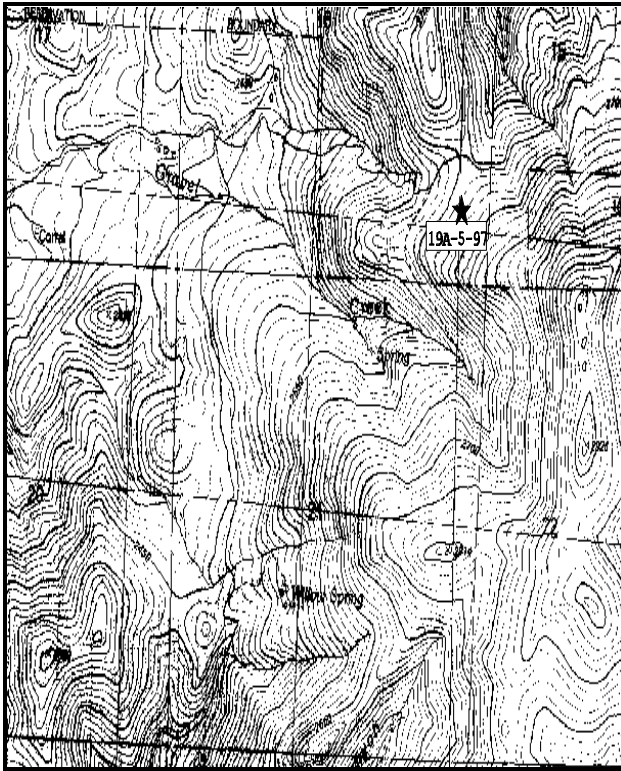
Range Type: Big Sagebrush-grass

Compass bearing: frequency baseline 180 degrees. (Lines 3-4 120°M)

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

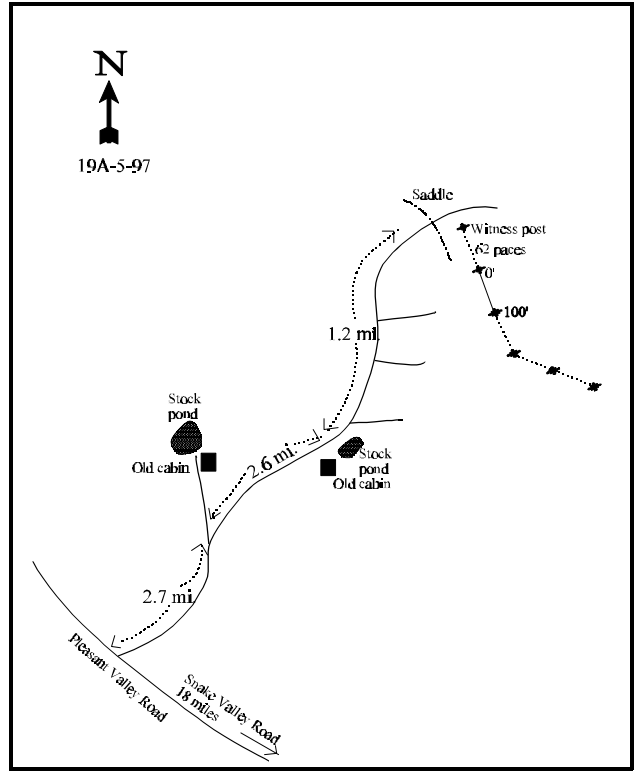
LOCATION DESCRIPTION

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 curleaf mountain mahogany. The baseline markers are green steel fenceposts approximately 12 to 18 inches high.



Map Name: Weaver Canyon, Nevada,

Township 22N, Range 70E, Section 15



Diagrammatic Sketch

UTM 4407452.186 N, 298105.688 E

DISCUSSION

Trend Study No. 19A-5 (62A/22-5)

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 approximately 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 3/4 mile downslope and provides water year around. Other range types in close proximity include curlleaf mountain mahogany, mixed conifer, aspen, mixed mountain brush, and pinyon-juniper. These varied range types provide ample escape cover.

Soil is rocky and well drained from granite parent material. Soil textural analysis indicates a loam-sandy loam with a slightly acidic pH of 6.2. The effective rooting depth (see methods) is estimated to be 14 inches. Average soil temperature is 49.2°F at a depth of 17 inches. Phosphorous levels in the soil profile measure 8.3 ppm, which may be limiting to vegetative growth because 10 ppm is thought to be the minimum necessary for normal plant growth. Erosion continues to be negligible as there is good vegetative and litter cover.

The key browse species, mountain big sagebrush, dominates the site with a moderately dense, mature stand. In 1997, the estimated density is 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 decadency has declined since 1989, however 43% of the decadent plants were classified as dying. The dead to live ratio is 1:8 (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 browse 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 sum of 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 that of what it was in 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 a good vegetative 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 vegetative 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

browse - stable

herbaceous understory - upward

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 to slightly declining. With the high diversity of browse and herbaceous understory species, it is not likely that there will much change in densities in the future. The herbaceous understory trend is stable and provides abundant summer forage.

TREND ASSESSMENT

soil - stable

browse - stable to slightly down

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 19A, Study no: 5

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'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.	b ⁹	ab ³	a ⁻	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 nevadensis	ab ⁵	b ⁴	a ⁻	3	4	-	-
G	Poa secunda	a ¹²	b ⁶⁵	a ⁸	5	31	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 Grasses		399	537	479	142	214	172	19.88
F	Achillea millefolium	-	-	2	-	-	2	.03
F	Agoseris glauca	a ⁻	a ⁻	b ¹⁶	-	-	7	.06
F	Allium spp.	a ³⁸	a ¹⁰	b ¹⁰²	19	6	47	.31

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
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 ⁻	ab ⁸	b ¹⁷	-	3	6	.39
F	<i>Astragalus convallarius</i>	a ⁻	c ¹¹⁹	b ²⁸	-	54	15	.25
F	<i>Aster</i> spp.	-	-	5	-	-	3	.01
F	<i>Astragalus</i> spp.	b ¹⁰⁷	a ²	a ¹⁶	50	1	8	.23
F	<i>Castilleja angustifolia</i>	-	1	-	-	1	-	-
F	<i>Castilleja chromosa</i>	a ⁻	b ¹⁴	b ¹⁷	-	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 ⁻	b ¹⁵	-	-	7	.10
F	<i>Collinsia parviflora</i> (a)	-	-	5	-	-	2	.03
F	<i>Crepis acuminata</i>	16	124	38	9	56	17	.21
F	<i>Delphinium bicolor</i>	b ⁵⁰	a ¹⁴	a ²⁰	24	7	10	.15
F	<i>Delphinium occidentale</i>	1	-	-	1	-	-	-
F	<i>Erigeron</i> spp.	ab ¹⁰⁹	b ¹²⁶	a ⁸⁷	51	57	35	.72
F	<i>Eriogonum umbellatum</i>	-	1	-	-	1	-	-
F	<i>Haplopappus nuttallii</i>	4	-	-	2	-	-	-
F	<i>Heuchera parvifolia</i>	b ¹⁵	a ⁻	a ⁻	6	-	-	-
F	<i>Hymenoxys acaulis</i>	a ⁻	b ¹⁸	a ⁻	-	9	-	-
F	<i>Lomatium</i> spp.	a ⁷	c ¹⁸⁴	b ²⁸	2	67	13	.23
F	<i>Lupinus</i> spp.	a ⁷³	b ¹⁹⁰	b ¹⁸¹	34	74	68	8.41
F	<i>Lygodesmia</i> spp.	-	-	6	-	-	2	.01
F	<i>Mertensia</i> spp.	a ⁻	a ⁻	b ¹⁴	-	-	6	.13
F	<i>Penstemon humilis</i>	b ⁵⁹	a ³⁵	ab ⁵⁴	32	18	22	.56
F	<i>Penstemon</i> spp.	a ²	ab ²⁰	b ²⁷	2	9	11	.74
F	<i>Phlox longifolia</i>	ab ⁷²	b ¹¹⁹	a ⁵⁶	32	51	19	.24
F	<i>Polygonum douglasii</i> (a)	-	-	6	-	-	3	.01
F	<i>Ranunculus</i> spp.	a ⁻	b ⁵⁶	a ⁻	-	28	-	-
F	<i>Senecio integerrimus</i>	a ⁻	c ¹⁴¹	b ²⁴	-	62	11	.18
F	<i>Sedum lanceolatum</i>	3	7	18	3	5	9	.07
F	<i>Senecio</i> spp.	b ¹⁴	a ⁻	a ⁻	6	-	-	-
F	<i>Silene douglasii</i>	b ⁹	a ⁻	a ⁻	4	-	-	-
F	<i>Stellaria jamesiana</i>	a ⁻	b ¹⁰⁰	c ²⁴¹	-	41	78	4.55
F	<i>Swertia</i> spp.	-	-	4	-	-	2	.18
F	<i>Taraxacum officinale</i>	-	6	3	-	2	1	.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'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 Forbs		621	1354	1142	296	592	462	19.88

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 19A, Study no: 5

Type	Species	Strip Frequency '97	Average Cover % '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 --

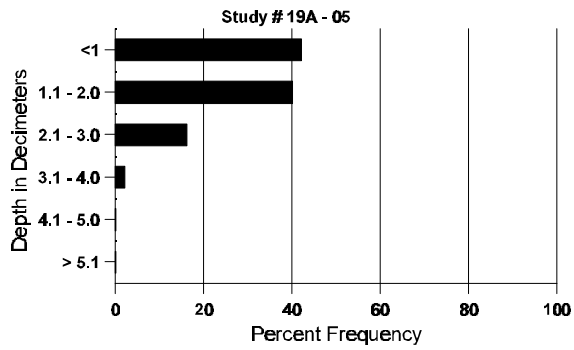
Herd unit 19A, Study no: 5

Cover Type	Nested Frequency '97	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: 05

Effective rooting depth (inches)	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	.7

Stoniness Index



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								
<i>Amelanchier alnifolia</i>													
Y	83	-	2	-	-	-	-	-	-	-	2		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%					Died out		
'89		00%		00%		00%					Appeared		
'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	2	13
	89	17	-	-	-	-	-	-	-	17	-	-	17
	97	19	11	-	-	-	-	-	-	16	-	13	30
X	83	-	-	-	-	-	-	-	-	-	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	0
	97	-	-	-	6	-	-	-	-	-	-	6	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 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 viscidiflorus viscidiflorus</i>											
Y	83	-	-	-	-	-	-	-	0	-	0
	89	11	-	-	-	-	-	-	733	-	11
	97	-	-	-	-	-	-	-	0	-	0
M	83	-	-	-	-	-	-	-	0	-	0
	89	-	-	-	-	-	-	-	0	-	0
	97	2	-	-	-	-	-	-	40	15 13	2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'83		00%		00%		00%		Appeared			
'89		00%		00%		00%		-95%			
'97		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)						'83	0	Dec:	-		
						'89	733		-		
						'97	40		-		
<i>Eriogonum microthecum</i>											
M	83	-	-	-	-	-	-	-	0	-	0
	89	-	-	-	-	-	-	-	0	-	0
	97	1	-	-	2	-	-	-	60	-	3
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'83		00%		00%		00%		None			
'89		00%		00%		00%		Appeared			
'97		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)						'83	0	Dec:	-		
						'89	0		-		
						'97	60		-		
<i>Mahonia repens</i>											
S	83	2	-	-	-	-	-	-	133	-	2
	89	-	-	-	-	-	-	-	0	-	0
	97	1	-	-	-	-	-	-	20	-	1
Y	83	7	-	-	-	-	-	-	466	-	7
	89	34	-	-	-	-	29	-	4200	-	63
	97	14	-	-	-	-	-	-	280	-	14
M	83	28	-	-	-	-	-	-	1866	4 4	28
	89	-	-	-	-	-	-	-	0	-	0
	97	91	-	-	9	-	-	-	2000	3 4	100
% 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 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									
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%			None						
'89		00%			00%			00%			Appeared						
'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%			None						
'89		00%			00%			00%			Appeared						
'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 .

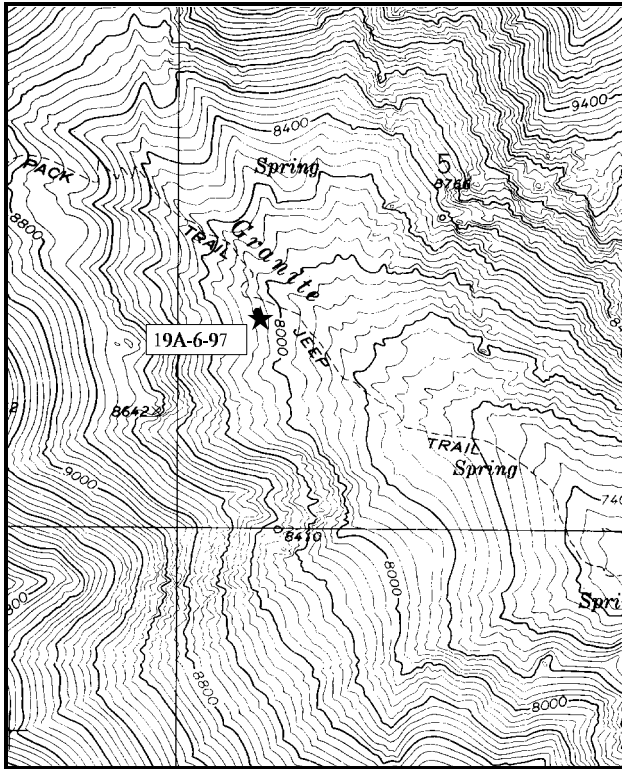
Range type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 246 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

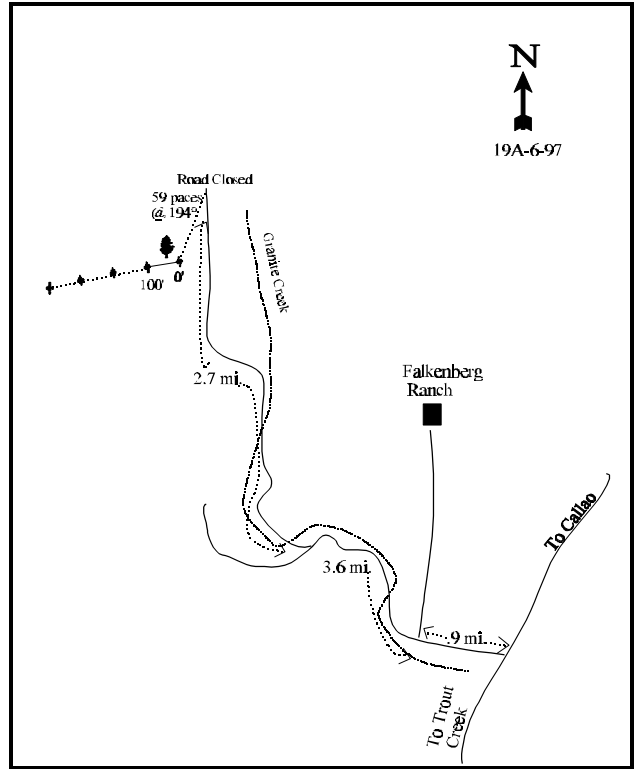
LOCATION DESCRIPTION

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. From the end of the road the 0-foot baseline stake is 59 paces away in a southwesterly direction (i.e., 194 degrees), 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, Utah .

Township 12 S , Range 18 W , Section 5



Diagrammatic Sketch

UTM 4409805.508 N , 251042.335 E

DISCUSSION

Trend Study No. 19A-6 (62A/22-6)

The Granite Creek 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 also found ubiquitously on lupine and sagebrush and impacted 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 with the vegetative quadrats.

Soils are the Flygare (cobble loam) and Cabollo (loam) variety with granitic parent material. Rock outcrops and steep slopes are characteristic of these soil types. Soils appear to be shallow with an effective rooting depth (see methods) of 10 inches. Soil temperature is 52.2°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% and percent decadency remained similar at 42%. In 1997, the estimated density dropped to 2,440 plants/acre, the lowest estimate from all surveys. However, almost all of 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 has increased to 24% while percent decadency has declined to 28%, but 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 is estimated to be 31,480 plants/acre. These plants average 4 inches in height and provide little forage. Subdominant shrubs include mountain snowberry, stickleaf 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 grass were encountered in 1997. Sheep fescue is the most abundant and has significantly increased in sum of nested frequency since 1989. Muttongrass is the only other grass to show a significant increase in sum of nested frequency. Several grass species have significantly decreased in sum of nested frequency and include: 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 preferred forbs include: low penstemon, tailcup lupine, tuber starwort, tall larkspur, Wyoming painted-cup, common dandelion, and aster. Sum of nested frequency for perennial forbs has declined, but only slightly.

1983 APPARENT TREND ASSESSMENT

Both soil and vegetative trend are 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 vegetative cover to keep erosion in check. The browse trend is also 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 improved

browse - stable

herbaceous understory - upward

1997 TREND ASSESSMENT

The soil trend is stable to slightly improved with percent bare soil down to 6% and no erosion apparent at this time. Fifty percent of the vegetative cover is contributed by the herbaceous understory, giving better 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 with increasing height and crown measurements. Percent decadency 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 slightly down. The perennial herbaceous understory sum of nested frequency has gone down for both grasses and forbs since 1989. Diversity is high with no one species dominating the site.

TREND ASSESSMENT

soil - slightly improved

browse - slightly down

herbaceous understory - slightly down

HERBACEOUS TRENDS --

Herd unit 19A, Study no: 6

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'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 lettermani	32	15	44	14	7	17	.67
G	Stipa nelsonii	b89	c155	a23	41	57	11	.21
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	b5	-	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

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	<i>Heuchera parvifolia</i>	_b 31	_a -	_a 1	14	-	1	.03
F	<i>Hydrophyllum</i> spp.	_a -	_b 6	_a -	-	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 116	21	48	54	3.54
F	<i>Machaeranthera canescens</i>	_b 17	_{ab} 12	_a 2	10	7	1	.03
F	<i>Mertensia</i> spp.	_a -	_a -	_b 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>	_a -	_a -	_b 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	_a 17	3	21	9	.15
F	<i>Tragopogon dubius</i>	-	5	-	-	3	-	-
F	Unknown forb-annual	-	-	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 Forbs		337	786	1006	157	377	456	12.08

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 19A, Study no: 6

Type	Species	Strip Frequency '97	Average Cover % '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

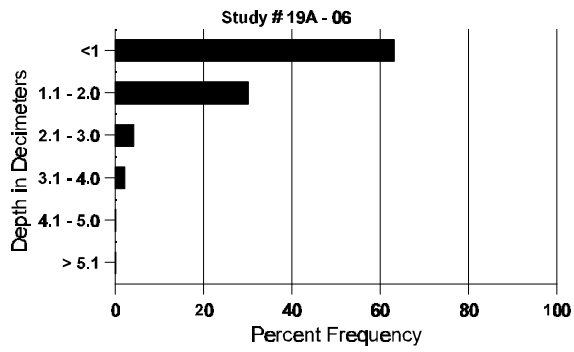
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	357	1.00	21.75	50.95
Rock	230	5.75	7.50	10.07
Pavement	235	9.50	3.25	3.26
Litter	397	67.75	58.25	52.04
Cryptogams	98	.75	0	1.11
Bare Ground	179	15.25	9.25	5.78

SOIL ANALYSIS DATA --

Herd Unit 19A, Study no: 06

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	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	.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 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	83	-	-	-	-	-	-	-	0		0		
	89	9	-	-	1	-	-	1	-	11	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	1533	21 28	46	
	89	34	9	1	2	-	-	-	39	1533	23 28	46	
	97	65	13	1	-	-	1	-	66	1600	29 42	80	
D	83	9	24	-	-	-	-	-	9	1100		33	
	89	34	10	-	-	-	-	-	39	1466		44	
	97	27	3	3	1	-	-	-	19	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 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																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	10	-	-	-	-	-	-	-	-	10	-	-	-	333		10	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	83	17	-	-	-	-	-	-	-	-	17	-	-	-	566	7	8	17
	89	16	-	-	4	-	-	-	-	-	20	-	-	-	666	6	5	20
	97	6	-	-	2	-	-	-	-	-	8	-	-	-	160	9	9	8
D	83	1	-	-	-	-	-	-	-	-	-	1	-	-	33		1	
	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%			+42%							
'89		00%			00%			00%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	599	Dec:	6%			
												'89	1032		3%			
												'97	180		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																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
Y	83	281	-	-	-	-	-	-	-	-	281	-	-	-	9366		281	
	89	557	-	-	4	-	-	-	-	-	561	-	-	-	18700		561	
	97	134	-	-	-	-	-	-	-	-	134	-	-	-	2680		134	
M	83	454	-	-	-	-	-	-	-	-	434	20	-	-	15133	5 6	454	
	89	609	-	-	26	-	-	78	-	-	713	-	-	-	23766	5 7	713	
	97	1399	-	-	26	-	-	15	-	-	1417	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		-			
Opuntia spp.																		
M	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33	5 4	1	
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33	7 9	1	
	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%			+ 0%							
'89		00%			00%			00%			+18%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	33	Dec:	-			
												'89	33		-			
												'97	40		-			
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%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	33	Dec:	-			
												'89	33		-			
												'97	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																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	89	-	-	-	-	-	-	1	-	-	1	-	-	-	33	10	9	
	97	1	-	-	2	-	-	-	-	-	3	-	-	-	60	30	40	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			Appeared							
'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	-	-	
	89	2	-	-	-	-	-	-	-	-	2	-	-	-	66	18	12	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	13	24	
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-7-97

Study site name: Wood Canyon.

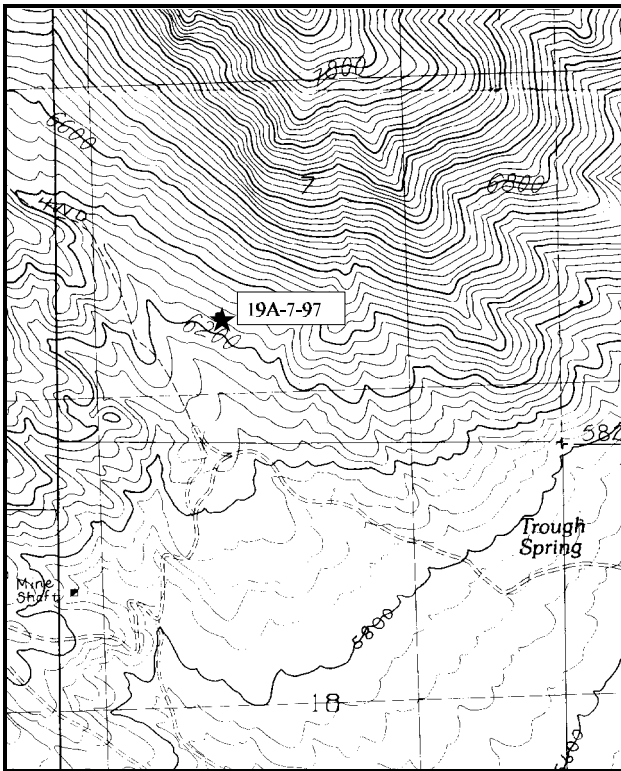
Range type: Desert Shrub

Compass bearing: frequency baseline 9M degrees.

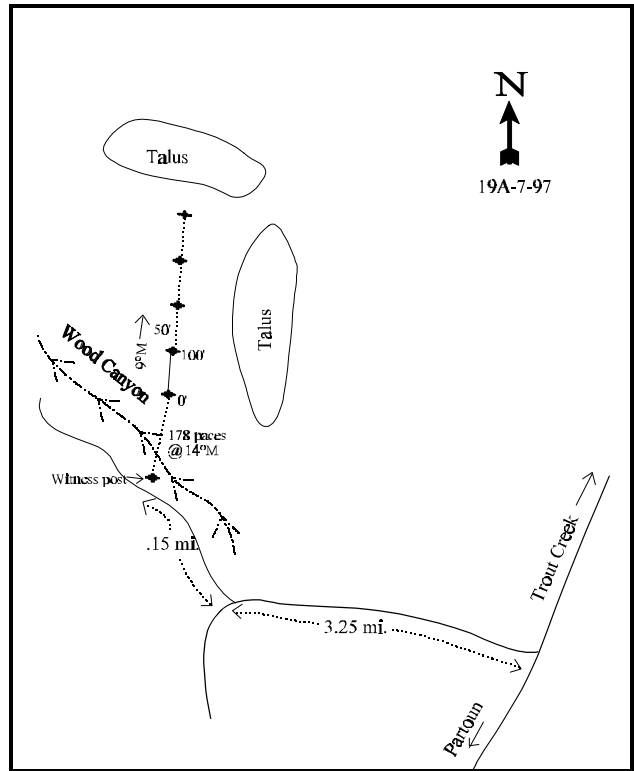
First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

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 $9^{\circ}M$.



Map Name: Partoun



Diagrammatic Sketch

Township 13S, Range 18W, Section 7

UTM 4398238.114 N, 249390.212 E

DISCUSSION

Trend Study No. 19A-7 (62A/22-7)

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 apparently receives some winter deer use. 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 desert open to the south and east. A stock pond one mile to the east is the closest apparent water source.

Soils are the Spager type, which are very gravelly. Effective rooting depth (see methods) was 10 inches with a soil temperature of 71°F at a depth of 11 inches. Soil textural analysis indicates a loam soil with a mildly alkaline pH (7.4). Phosphorous levels in the soil were low (9.2 ppm), which may be limiting to vegetative growth. Erosion continues to be negligible as there is good vegetative and litter cover. Percent rock and pavement cover are high with rock varying in size from small (2-3 inches) to stones and even boulders.

In 1989, shadscale density was estimated to be 1,133 plants/acre. This was a mostly mature population (82%) with little apparent utilization. Currently, there is an estimated density of 1,400 plants/acre, most of which show light utilization. This higher estimate is more the result of the much larger sample size for browse than anything else. Percent decadency has increased from 18% in 1989 to 23% in 1997. What is of concern is that 75% of the decadent plants were classified as dying. The ratio of dead to live plants is 1:2.8, which means that 26% of the population is dead. The percentage of the plants with poor vigor has also increased from 0% in 1989 to 20% in 1997. As reported in 1989, the preferred winterfat is too scarce (60 plants/acre) to provide large quantities of forage. Nevada ephedra is another desirable species with an estimated density of 160 plants/acre in 1997. All plants were classified as mature in 1997 and show light to moderate utilization. The key browse species contribute to about 28% of the total browse cover and shadscale makes up 75% of this valuable browse. Therefore, the trend for key browse would be slightly down.

Broom snakeweed is the dominate browse on the site with an estimated density of 5,200 plants in 1997. This estimate is a little higher, but is more related to the much larger sample sized than any other measured parameter. Currently, it contributes 45% of the browse cover. This is a mature population that does not appear to be expanding because 74% of the decadent plants were classified as dying and the dead to live ratio is 1:6, or 14% are dead. Other species scattered throughout the site in relatively low numbers include: black sagebrush, stickyleaf low rabbitbrush, prickly pear cactus, and yucca.

Although cheatgrass is the most abundant grass on the site, it does not visually dominate due to its small stature this year. Galleta is the most abundant perennial grass and significantly increased in sum of nested frequency in 1997. Indian ricegrass and needle and thread grass are the next most abundant grasses with needle and thread grass significantly increasing in sum of nested frequency. Other grasses include: bottlebrush squirreltail, Sandberg bluegrass, and sand dropseed. Forbs are very infrequent with the annual storksbill being most abundant.

1989 APPARENT TREND ASSESSMENT

Soil erosion is detectable in small quantities, but overall trend is towards stabilization. The excessive amounts of broom snakeweed would 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 present. Trend for key browse is slightly down 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. Herbaceous understory is slightly upward with an overall increase in perennial sum of nested frequency. This comes primarily from the perennial grass component.

TREND ASSESSMENT

soil - stable

browse - slightly down for the key browse (shadscale)

herbaceous understory - slightly upward

HERBACEOUS TRENDS --

Herd unit 19A, Study no: 7

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover % '97
		'89	'97	'89	'97	
G	Bromus tectorum (a)	-	351	-	100	6.15
G	Hilaria jamesii	59	*119	25	47	4.03
G	Oryzopsis hymenoides	63	47	31	21	1.81
G	Poa secunda	-	5	-	2	.06
G	Sitanion hystrix	15	17	8	10	.34
G	Sporobolus cryptandrus	-	3	-	1	.06
G	Stipa comata	8	*52	6	24	1.50
Total for Grasses		145	594	70	205	13.98
F	Alyssum alyssoides (a)	-	11	-	5	.02
F	Astragalus spp.	3	1	2	1	.03
F	Erodium cicutarium (a)	-	83	-	33	1.17
F	Erigeron spp.	-	7	-	2	.03
F	Halogeton glomeratus (a)	13	3	5	1	.00
F	Kochia americana	-	1	-	1	.03
F	Mammillaria spp.	3	-	1	-	-
F	Sphaeralcea grossulariaefolia	9	2	4	1	.03
F	Unknown forb-perennial	2	-	1	-	-
Total for Forbs		30	108	13	44	1.32

* Indicates significant difference at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 19A, Study no: 7

Type	Species	Strip Frequency '97	Average Cover % '97
B	Atriplex confertifolia	42	2.31
B	Ceratoides lanata	3	-
B	Chrysothamnus viscidiflorus viscidiflorus	5	.53
B	Ephedra nevadensis	6	.78
B	Gutierrezia sarothrae	87	4.98
B	Opuntia spp.	18	1.03
B	Tetradymia spinosa	5	1.34
Total for Browse		166	10.98

BASIC COVER --

Herd unit 19A, Study no: 7

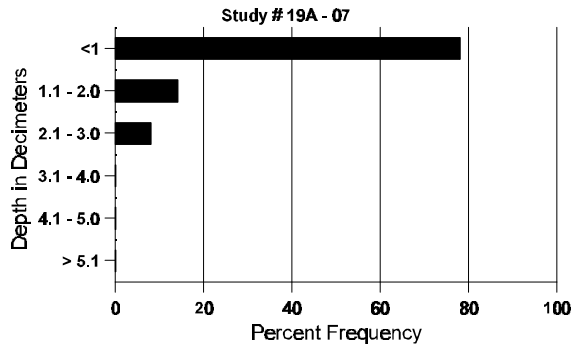
Cover Type	Nested Frequency '97	Average Cover %	
		'89	'97
Vegetation	362	7.25	29.85
Rock	330	23.25	29.92
Pavement	327	38.75	23.06
Litter	376	23.50	21.44
Cryptogams	63	0	.31
Bare Ground	243	7.25	6.78

SOIL ANALYSIS DATA --

Herd Unit 19A, Study no: 07

Effective rooting depth (inches)	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	.8

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19A, Study no: 7

Type	Quadrat Frequency '97
Rabbit	4
Elk	2
Deer	9

BROWSE CHARACTERISTICS --

Herd unit 19A, Study no: 7

A G 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 nova																		
M	'89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	13	20	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'89		00%			00%			00%			None							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	0	Dec:	-			
												'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				
<i>Atriplex confertifolia</i>																		
S	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	89	28	-	-	-	-	-	-	-	-	28	-	-	-	933	10 17	28	
	97	35	7	5	-	-	-	-	-	-	46	-	-	1	940	10 23	47	
D	89	6	-	-	-	-	-	-	-	-	6	-	-	-	200		6	
	97	13	3	-	-	-	-	-	-	-	3	-	1	12	320		16	
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	500		25	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)											'89	1133	Dec:	18%				
											'97	1400		23%				
<i>Ceratoides lanata</i>																		
M	89	2	-	-	-	-	-	-	-	-	2	-	-	-	66	11 15	2	
	97	2	1	-	-	-	-	-	-	-	3	-	-	-	60	9 10	3	
D	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>							
'89		00%			00%			00%			-39%							
'97		33%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'89	99	Dec:	33%				
											'97	60		0%				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
M	89	3	-	-	-	-	-	-	-	-	3	-	-	-	100	8 10	3	
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80	48 16	4	
D	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%			+ 0%							
'97		00%			00%			20%										
Total Plants/Acre (excluding Dead & Seedlings)											'89	100	Dec:	0%				
											'97	100		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				
<i>Ephedra nevadensis</i>																		
Y	89	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	89	4	-	-	-	-	-	-	-	-	4	-	-	-	133	11	21	
	97	7	1	-	-	-	-	-	-	-	8	-	-	-	160	17	35	
D	89	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	332	Dec:	20%			
												'97	160		0%			
<i>Gutierrezia sarothrae</i>																		
S	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	89	24	-	-	-	-	-	-	-	-	24	-	-	-	800		24	
	97	18	-	-	-	-	-	-	-	-	18	-	-	-	360		18	
M	89	81	-	-	-	-	-	-	-	-	81	-	-	-	2700	7	6	
	97	208	-	-	-	-	-	-	-	-	205	-	-	3	4160	8	12	
D	89	31	-	-	-	-	-	-	-	-	15	-	13	3	1033		31	
	97	34	-	-	-	-	-	-	-	-	8	1	-	25	680		34	
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	860		43	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	4533	Dec:	23%			
												'97	5200		13%			
<i>Mammillaria spp.</i>																		
Y	89	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			00%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	66	Dec:	-			
												'97	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				
Opuntia spp.																		
Y	89	10	-	-	-	-	-	-	-	-	10	-	-	-	333		10	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	89	7	-	-	-	-	-	-	-	7	-	-	-	233	5	12	7	
	97	19	-	-	1	-	-	-	-	20	-	-	-	400	10	17	20	
D	89	1	-	-	-	-	-	-	-	-	-	-	1	33		1		
	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%			06%			-23%							
'97		00%			00%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	599	Dec:	6%			
												'97	460		4%			
Tetradymia spinosa																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	97	2	1	-	-	-	-	-	-	-	3	-	-	60	15	28	3	
D	89	2	-	-	-	-	-	-	-	2	-	-	-	66		2		
	97	2	-	-	-	-	-	-	-	1	-	-	1	40		2		
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	66	Dec:	100%			
												'97	100		40%			
Yucca spp.																		
M	89	1	-	-	-	-	-	-	-	1	-	-	-	33	18	37	1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'89		00%			00%			00%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	33	Dec:	-			
												'97	0		-			

Trend Study 19A-8-97

Study site name: The Basin.

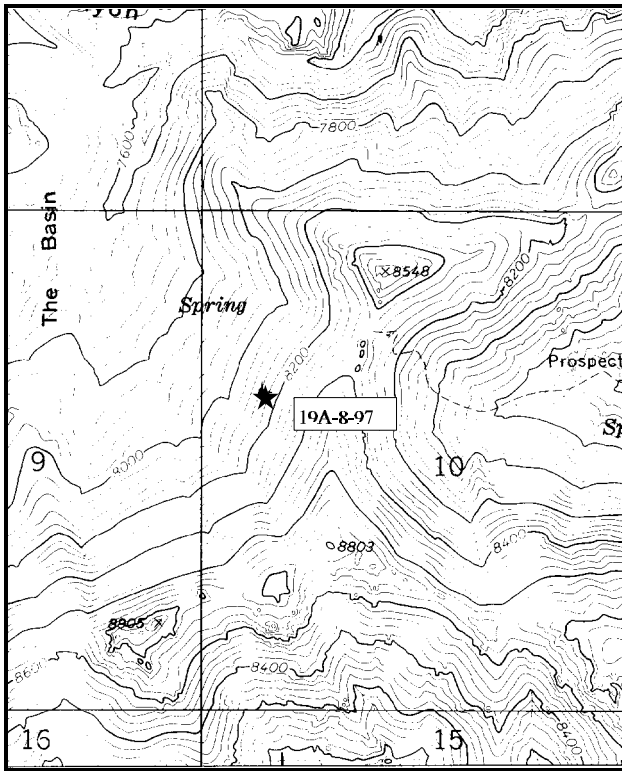
Range type: Big Sagebrush-Grass

Compass bearing: frequency baseline 288M degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

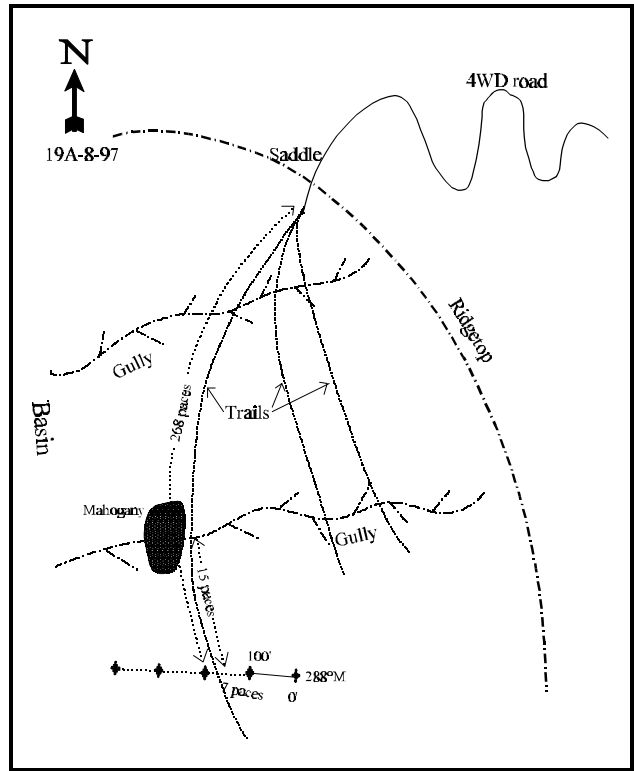
LOCATION DESCRIPTION

From the bridge outside the CCC camp near Callao, take the fork off the main Snake Valley Road going northwest 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

Township 11S, Range 18W, Section 10



Diagrammatic Sketch

UTM 4418878.988 N, 255008.457 E

DISCUSSION

Trend Study No. 19A-8 (62A/22-8)

The Basin study is located midway up the Deep Creek Mountain range in an 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, five 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 and springs in the bottom of the basin provide a perennial water source about 1/4 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 soil pH (6.4). Effective rooting depth (see methods) is estimated to be 10 inches and the soil temperature measured at 12 inches is 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. It also contributed 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 shrubs are low-growing, averaging 15 inches in height. Even though the sagebrush are relatively short in stature, the uniform stand of mature plants contributes to an average canopy cover of 14%. 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 is mostly light to moderate with the plants still showing good vigor. Slenderbush eriogonum has 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 singleleaf 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 dominate 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, and there appears to be excessive pavement. Contingent upon the vegetative trend, 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 shape 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 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

browse - stable

herbaceous understory - downward

HERBACEOUS TRENDS --

Herd unit 19A, Study no: 8

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover % '97
		'89	'97	'89	'97	
G	Agropyron spicatum	53	59	22	25	.74
G	Festuca ovina	187	208	74	70	9.50
G	Poa fendleriana	172	*80	68	34	1.41
G	Poa secunda	200	*112	82	51	2.47
G	Sitanion hystrix	9	2	5	2	.01
G	Stipa columbiana	-	16	-	7	.28
Total for Grasses		621	477	251	189	14.42
F	Arabis spp.	57	*16	31	6	.03
F	Arenaria fendleri	244	*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 bicolor	-	*63	-	31	.40
F	Erigeron spp.	-	*44	-	20	.28
F	Eriogonum jamesii	114	*-	49	-	-

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover % '97
		'89	'97	'89	'97	
F	Hackelia patens	-	16	-	7	.11
F	Linum lewisii	38	*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	78	*59	37	27	.61
F	Penstemon spp.	-	2	-	1	.15
F	Phlox hoodii	-	3	-	1	.00
F	Phlox longifolia	131	*95	57	44	.32
F	Polygonum douglasii (a)	-	13	-	8	.04
F	Ranunculus spp.	142	*-	65	-	-
F	Senecio integerrimus	-	1	-	1	.03
F	Sedum lanceolatum	6	*15	2	6	.10
F	Sphaeralcea coccinea	-	3	-	1	.03
F	Taraxacum officinale	2	*22	1	12	.19
F	Townsendia spp.	6	-	4	-	-
Total for Forbs		1066	846	466	370	9.90

* Indicates significant difference at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 19A, Study no: 8

T y p e	Species	Strip Frequency '97	Average Cover % '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

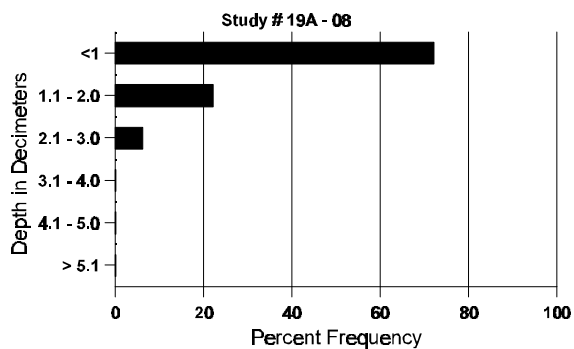
Cover Type	Nested Frequency '97	Average Cover %	
		'89	'97
Vegetation	345	16.50	42.42
Rock	89	2.00	1.91
Pavement	323	52.50	39.23
Litter	361	22.00	29.03
Cryptogams	10	0	.05
Bare Ground	193	7.00	3.95

SOIL ANALYSIS DATA --

Herd Unit 19A, Study no: 08

Effective rooting depth (inches)	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	.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 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.		
<i>Artemisia tridentata vaseyana</i>																		
S	89	13	-	-	-	-	-	-	-	-	13	-	-	-	866		13	
	97	23	-	-	-	-	-	-	-	-	23	-	-	-	460		23	
Y	89	32	10	-	-	-	-	-	-	-	41	-	1	-	2800		42	
	97	38	11	2	-	-	-	-	-	-	51	-	-	-	1020		51	
M	89	2	101	109	-	-	-	-	-	-	206	1	5	-	14133	7 13	212	
	97	219	94	2	-	-	-	2	-	-	308	6	3	-	6340	15 25	317	
D	89	21	7	4	-	-	-	-	-	-	31	-	1	-	2133		32	
	97	56	9	5	3	-	-	-	-	-	57	-	-	14	1460		73	
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	6	-	-	-	-	-	-	-	-	6	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%			None							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'89	0	Dec:	-				
											'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				
<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	-	-	-	-	-	13	-	-	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		-				
<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%			Appeared							
'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%			Appeared							
'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%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'89	0	Dec:	-				
											'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				
Symphoricarpos oreophilus																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	2	-	-	-	-	-	-	-	-	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%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	0	Dec:	-			
												'97	60		-			

SUMMARY

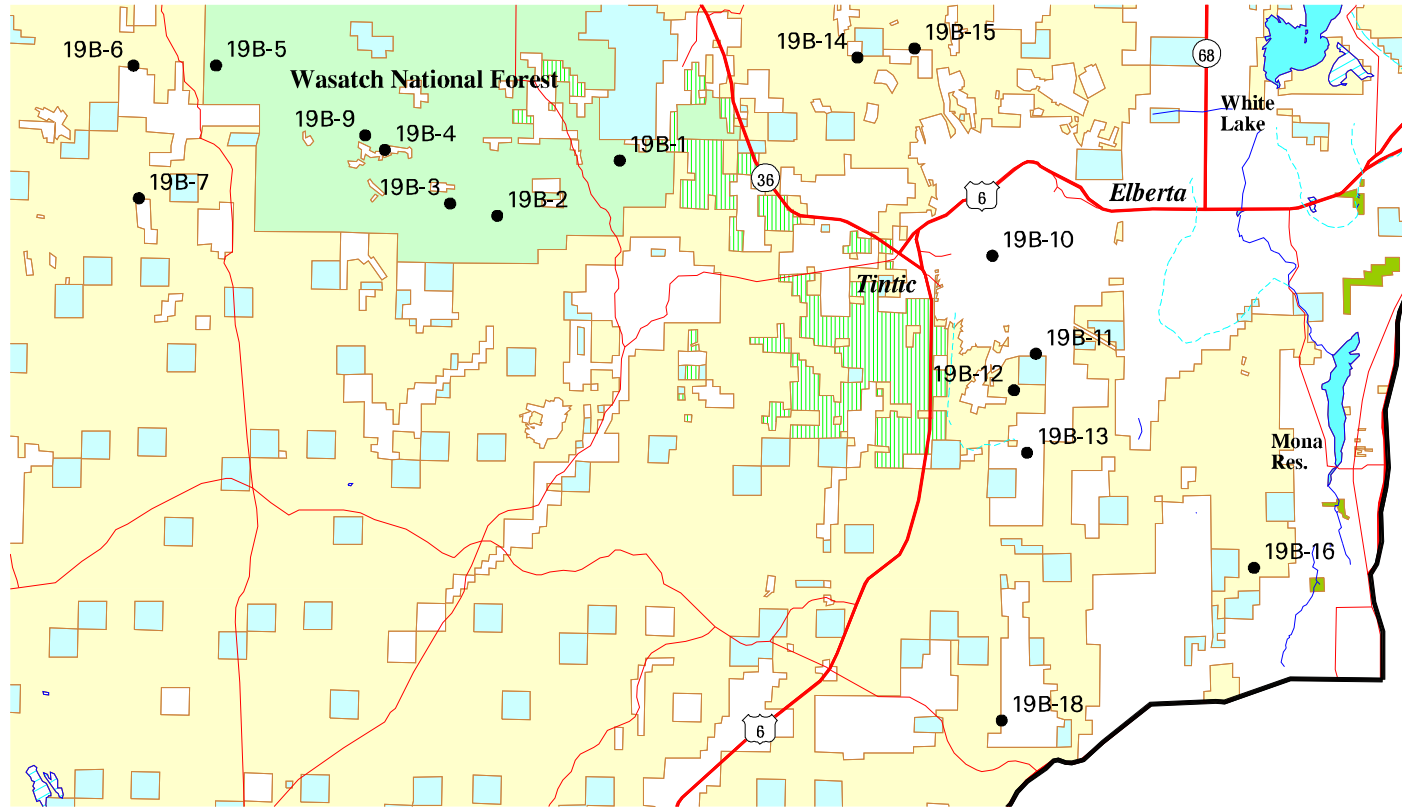
WILDLIFE MANAGEMENT UNIT - 19A - WEST DESERT

Overall soil trends are stable with little soil erosion apparent on any of the sites. Several sites are steep but vegetation and litter cover are adequate to keep soil erosion to a minimum. Browse trends are stable on three of the eight sites. These include: Trail Gulch (19A-1), Durse Canyon (19A-4), and The Basin (19A-8). Refer to individual site write-ups for details. The herbaceous understory trend varies from site to site. Three sites sampling winter range (Ochre Mountain, Durse Canyon, and Wood Canyon) show slightly upward trends. This is due to an increase in sum of nested frequency for grasses and forbs. Sevy Mountain (19A-3), Granite Creek (19A-6), and The Basin (19A-8) show slightly downward trends.

Site	1989			1997		
	Soil	Browse	Grass & Forb	Soil	Browse	Grass & Forb
19A-1 Trail Gulch	0	0	0	0	0	0
19A-2 Ochre Mountain	0	-	+	0	-	+
19A-3 Sevy Mountain	0	0	+	0	-	-
19A-4 Durse Canyon	0	0	-	0	0	+
19A-5 Chokecherry Springs	0	0	+	0	0/-	0
19A-6 Granite Creek	+	0	+	+	-	-
19A-7 Wood Canyon	established in 1989			0	-	+
19A-8 The Basin	established in 1989			0	-	-














(0) = stable, (+) = upward, (-) = downward, (0/-) = stable to slightly downward

Management Unit 19B



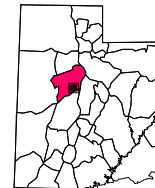
Map Scale 1:380,160 (1" = 6.0 miles)

Legend

- | | | |
|---|---|--|
|  Forest Service |  State Wildlife Res. |  Secondary Road |
|  BLM |  Perennial Water Body |  Perennial Stream |
|  State of Utah |  Intermittent Water Body |  Ditch, Canal, Aqueduct |
|  Private Land |  Transect Location | |
|  Bankhead Jones (grasslands) |  Primary Road | |



Unit Location



UDAF GIS May, 2000

WILDLIFE MANAGEMENT UNIT - 19 - WEST DESERT

WILDLIFE MANAGEMENT SUBUNIT 19B–WEST DESERT, VERNON

Boundary Description

Tooele and Juab counties - Boundary begins at Highway SR-36 and the Pony Express Road; then north on SR-36 to Highway SR-73; east on SR-73 to Interstate 15; south on I-15 to Highway SR-132 at Nephi; west on SR-132 to Highway US-6; west on US-6 to Highway 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.

Buck harvest and hunter success have both improved on the Vernon and Tintic Mountain ranges in 1996. Predation on fawns is major problem on the Vernon Mountains. In 1996, a predator management plan was implemented and several coyote dens were destroyed in the immediate vicinity of the prime fawning areas. The Vernon hunting unit was closed to hunting in 1997 for an indefinite period. The Tintic mountains have other problems, including a lack of quality summer range. In the summer of 1996, more than 100,000 acres were burned. This area was seeded and may offer better forage quality in the future.

Eighteen studies were established in 1983. Eight studies are located on winter range and the other 10 studies are located on summer range. All studies were reevaluated 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 the future, these sites will be reread if they are determined as key areas again.

Trend Study 19B-1-97

Study site name: Sabie Mountain.

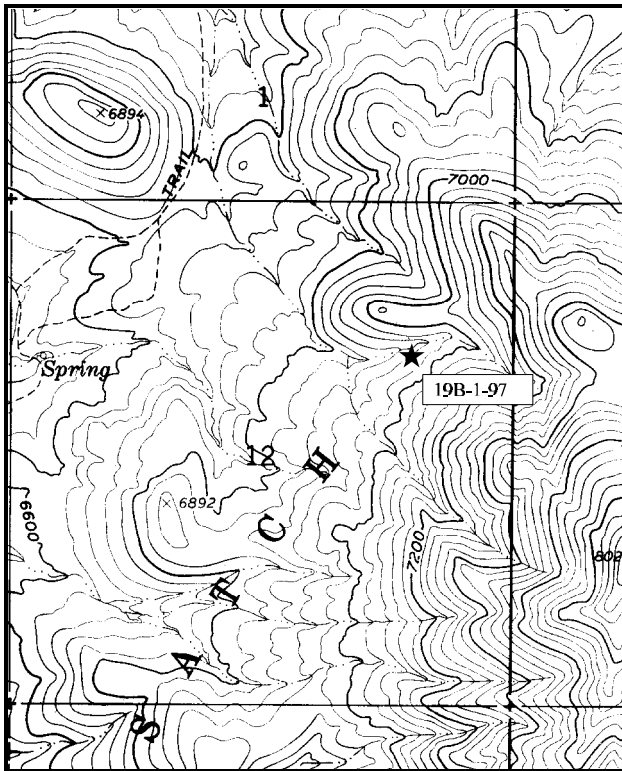
Range Type: Big sage-grass

Compass bearing: frequency baseline 319 degrees. (Lines 2-4 139°M)

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

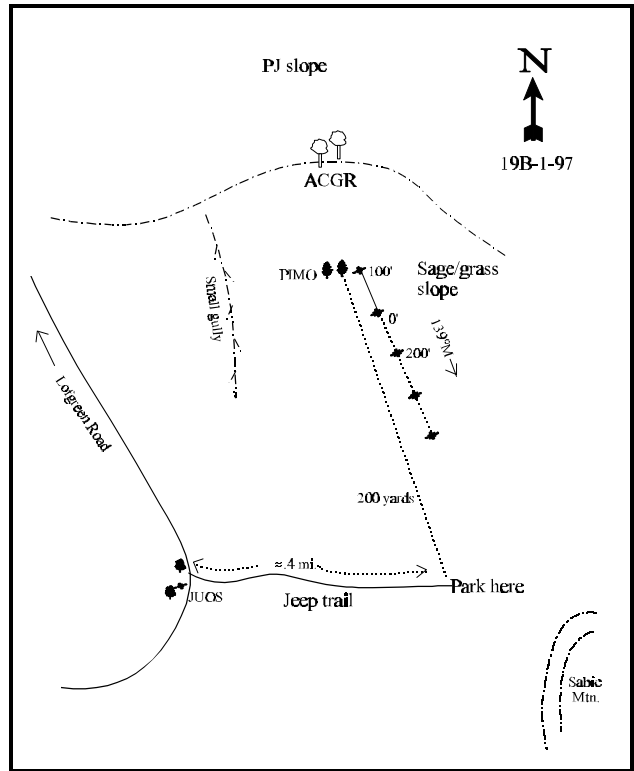
LOCATION DESCRIPTION

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 agate. Continue 0.5 miles to an intersection. Turn left (east) and follow this road 0.4 miles across a reseeding 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.



Map Name: Sabie Mountain

Township 10S, Range 5W, Section 12



Diagrammatic Sketch

UTM 4425366.448 N, 384834.914 E

DISCUSSION

Trend Study No. 19B-1 (23/13-1)

The Sabie Mountain 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 also has a diverse and productive herbaceous understory as it contributes 40% of the total cover. A pellet group transect was read in 1997 and ran parallel to the baseline. It determined that there were 7 deer days use/acre and 14 cow days use/acre in the area.

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 analysis indicates a loam-clay loam with a slightly acidic pH (6.3). Effective rooting depth (see methods) is 13 inches with a soil temperature of 52.8°F measured at 15 inches. As reported in 1983, some past erosion is apparent, evidenced by a few gullies in the vicinity. Percent bare ground has declined from 27% in 1983, to 11% in 1989, and finally 5% in 1997. 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 was not the case in 1989 or 1997.

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. This estimated density is more than double any previous estimate. The age structure is relatively similar to that of 1989 with 73% of the population classified as mature and 25% of the population determined as decadent. The dead to live ratio in 1997 was 1:6, or 15% of the population is dead. An indicator of more possible losses to the population is that 55% of the decadent plants were classified as dying. Utilization has changed some over the years, ranging from 31% moderate use in 1983 to 20% moderate use in 1997. Mountain big sagebrush has an estimated canopy cover value of 23%. This high percent canopy cover is likely affecting herbaceous understory production. Trend for mountain big sagebrush, which provides 62% of the browse cover, is slightly down.

Saskatoon serviceberry has an estimated density of 280 plants/acre. This plant has exhibited the most utilization in the past with moderate to heavy utilization in 1983 and 1989 shifting to light utilization in 1997. Mountain snowberry is the most abundant browse with an estimated density of 5,060 plants/acre in 1997. Ninety-three percent of the plants encountered in 1997 were classified as mature with very few seedling, young, or decadent plants present. Age structure currently indicates a stable population. Stickyleaf low rabbitbrush has an estimated density of 2,640 plants/acre. These are mostly mature plants with good vigor and very little utilization. Oregon grape, first encountered in 1997 with the greatly enlarged sample size, has an estimated density of 2,820 plants/acre. This is a mature population with an average height of 3 inches. Wood's rose was also encountered for the first time in 1997 with an estimated density of 1,820 plants/acre. Point-centered quarter data indicates pinyon and juniper density respectively at 26 and 9 trees/acre in 1997.

Muttongrass is the most abundant grass on the site and has changed little through the years with regard to sum of nested frequency since 1989. Both bluebunch wheatgrass and Sandberg bluegrass occur with the same nested frequencies, which are not significantly different from their 1989 values. Several other grasses are scattered throughout the site in low abundance and include: oniongrass, spike fescue, bottlebrush squirreltail, basin wildrye, and bulbous bluegrass. As reported in 1983, grasses show good productivity and vigor with light utilization.

Forbs are important to wildlife on summer ranges with the composition on this site being diverse and productive. Perennial forb sum of nested frequency is about half that reported in 1989. Many species have significantly declined in frequency since 1989, including: tapertip hawksbeard, oneflower helianthella, longleaf phlox, American vetch, and hoary aster.

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 vegetative and litter cover. The three principal vegetative components, 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 - upward

browse - stable

herbaceous understory - stable

1997 TREND ASSESSMENT

The soil trend continues to improve with a decrease in percent bare ground. Little erosion is apparent and there is ample vegetation and litter to keep erosion to a minimum. The soil trend is upward. The data indicates that serviceberry and snowberry are stable populations. Together these two species provide about 27% of the key browse on the site. Another key browse species, mountain big sagebrush, provides 62% of the total browse cover, the majority of the browse for the site. The trend for mountain big sagebrush is down. The overall trend for the key browse would be slightly down. Realizing that the population estimate is much larger in 1997, this increase is due almost entirely to the much larger sampling design. To become more aware of the differences in sampling between years, the 1989 sample only inventoried 28 sagebrush plants to estimate its population parameters, while in 1997, 247 plants were sampled to determine its population characteristics. Therefore, the higher estimate is the result of a better design giving a much accurate estimate of its population parameters. 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 is going to continue because 55% of the decadent plants were classified as dying, meaning that 583 plants/acre will 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 considered relatively high (23%) and is likely affecting herbaceous understory production. Perennial grass sum of nested frequency through the years has not varied much, not more than 4-7% from its highest value. The grass trend would be considered stable. The perennial forbs have shown much more variation in their sum of nested frequency values between years. From the high value in 1989, they have varied from 16% to 45% lower. The largest deviation from the high in 1989 was in 1997. The forb trend is downward. The forbs make up 54% of the herbaceous understory cover. The overall trend for the herbaceous understory would be slightly downward.

TREND ASSESSMENT

soil - upward

browse - slightly downward

herbaceous understory - slightly downward

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 1

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron spicatum	a59	b93	ab53	20	34	21	1.65
G	Agropyron trachycaulum	b9	ab5	a-	4	3	-	-
G	Bromus marginatus	4	-	-	1	-	-	-
G	Elymus cinereus	-	-	3	-	-	2	.41
G	Leucopoa kingii	-	3	7	-	1	3	.18
G	Melica bulbosa	11	18	9	4	7	5	.08
G	Poa bulbosa	-	-	3	-	-	1	.03
G	Poa fendleriana	a200	b241	b240	77	87	80	7.65
G	Poa secunda	b58	a23	ab53	24	12	19	1.13
G	Sitanion hystrix	b19	ab6	a5	10	4	3	.01
Total for Grasses		360	389	373	140	148	134	11.17
F	Agoseris glauca	c29	a-	b11	16	-	6	.08
F	Allium spp.	b32	a10	a5	15	5	3	.01
F	Arabis spp.	2	9	6	1	5	3	.01
F	Astragalus cibaricus	ab20	b28	a2	8	17	2	.01
F	Astragalus convallarius	58	70	70	28	37	34	2.25
F	Balsamorhiza hookeri	a3	a2	b19	1	2	10	.66
F	Balsamorhiza sagittata	b30	b44	a12	15	24	6	.66
F	Calochortus bruneanus	-	2	-	-	1	-	-
F	Castilleja linariaefolia	1	4	-	1	2	-	-
F	Calochortus nuttallii	1	1	-	1	1	-	-
F	Cirsium neomexicanum	ab14	b14	a2	6	11	2	.03
F	Comandra pallida	a46	a42	b66	19	21	34	.90
F	Collinsia parviflora (a)	-	-	22	-	-	10	.07
F	Crepis acuminata	b155	c222	a59	67	83	34	.74
F	Delphinium bicolor	a-	ab3	b9	-	1	4	.02
F	Erigeron eatonii	a-	b29	a4	-	14	2	.01
F	Eriogonum racemosum	20	27	21	10	12	11	.28
F	Eriogonum umbellatum	4	3	10	4	2	6	.29
F	Fritillaria atropurpurea	-	3	1	-	1	1	.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	<i>Helianthella uniflora</i>	_b 92	_b 114	_a 63	46	47	31	2.52
F	<i>Hydrophyllum capitatum</i>	-	4	-	-	2	-	-
F	<i>Lithospermum ruderales</i>	4	2	4	2	1	2	.03
F	<i>Lomatium grayi</i>	_{ab} 8	_b 17	_a 4	3	8	2	.04
F	<i>Lupinus argenteus</i>	_a 5	_a -	_b 9	2	-	6	.87
F	<i>Lupinus spp.</i>	_a -	_a 2	_b 60	-	1	26	1.50
F	<i>Machaeranthera canescens</i>	_b 26	_b 33	_a 7	13	15	5	.02
F	<i>Mertensia oblongifolia</i>	_a -	_b 15	_a -	-	8	-	-
F	<i>Microsteris gracilis</i> (a)	-	-	3	-	-	1	.00
F	<i>Orobanche fasciculata</i>	-	1	-	-	1	-	-
F	<i>Penstemon glaber</i>	_b 10	_a -	_a -	4	-	-	-
F	<i>Penstemon spp.</i>	-	5	5	-	2	3	.01
F	<i>Phlox longifolia</i>	_a 80	_b 124	_a 72	35	54	36	.37
F	<i>Polygonum douglasii</i> (a)	-	-	6	-	-	2	.01
F	<i>Senecio integerrimus</i>	_a -	_a 3	_b 14	-	2	6	.22
F	<i>Senecio multilobatus</i>	_a -	_a -	_b 6	-	-	5	.06
F	<i>Taraxacum officinale</i>	-	-	1	-	-	1	.00
F	<i>Tragopogon dubius</i>	4	-	-	3	-	-	-
F	<i>Vicia americana</i>	_b 199	_b 191	_a 17	75	76	7	.13
F	<i>Wyethia amplexicaulis</i>	28	28	23	12	13	12	1.06
F	<i>Zigadenus paniculatus</i>	_b 10	_a 1	_a -	6	1	-	-
Total for Forbs		881	1053	613	393	470	313	12.97

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 19B, Study no: 1

Type	Species	Strip Frequency '97	Average Cover % '97
B	Amelanchier alnifolia	11	.15
B	Artemisia tridentata vaseyana	91	22.50
B	Chrysothamnus viscidiflorus viscidiflorus	55	1.48
B	Juniperus osteosperma	3	.53
B	Mahonia repens	22	1.11
B	Pinus monophylla	1	-
B	Rosa woodsii	22	.98
B	Symphoricarpos oreophilus	82	9.67
Total for Browse		287	36.43

BASIC COVER --

Herd unit 19B, Study no: 1

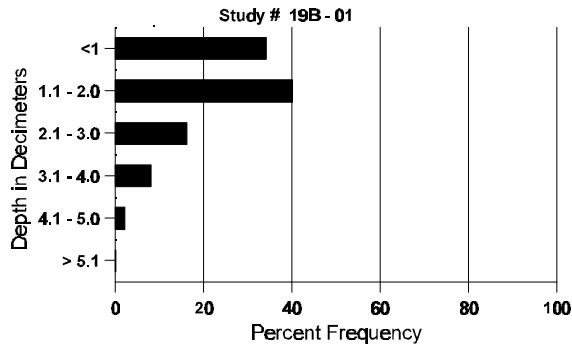
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	344	3.50	9.75	52.32
Rock	176	12.50	8.75	5.75
Pavement	219	5.00	11.50	5.65
Litter	396	51.75	58.50	57.13
Cryptogams	8	.25	.25	.04
Bare Ground	199	27.00	11.25	5.33

SOIL ANALYSIS DATA --

Herd Unit 19B, Study no: 01

Effective rooting depth (inches)	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 '97
Rabbit	6
Elk	1
Deer	8

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				
<i>Amelanchier alnifolia</i>																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	2	-	-	-	-	-	-	2	-	-	-	133			2
	97	5	1	-	-	-	-	-	-	-	6	-	-	-	120			6
M	83	-	1	1	-	-	-	-	-	-	-	-	2	-	133	20	3	2
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	1	-	3	-	1	-	-	-	5	-	1	-	120	19	18	6
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	-	2	-	-	-	-	-	-	-	2	-	-	-	40			2
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	133	Dec:	0%			
												'89	199		33%			
												'97	280		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>Artemisia arbuscula</i>																			
M	83	1	-	-	-	-	-	-	-	-	1	-	-	-	66	12	9	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%			Died out								
'89		00%			00%			00%			None								
'97		00%			00%			00%											
Total Plants/Acre (excluding Dead & Seedlings)												'83	66	Dec:	-				
												'89	0		-				
												'97	0		-				
<i>Artemisia tridentata vaseyana</i>																			
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	97	3	-	-	-	-	-	1	-	-	4	-	-	-	80			4	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	89	2	-	-	-	-	-	-	-	2	-	-	-	133			2		
	97	3	-	-	-	-	-	-	-	3	-	-	-	60			3		
M	83	16	6	-	-	-	-	-	-	17	5	-	-	1466	23	20	22		
	89	15	5	-	-	-	-	-	-	10	3	7	-	1333	26	30	20		
	97	118	33	2	2	-	-	-	-	154	-	1	-	3100	26	32	155		
D	83	2	2	-	-	-	-	-	-	3	1	-	-	266			4		
	89	5	1	-	-	-	-	-	-	3	1	2	-	400			6		
	97	44	9	-	-	-	-	-	-	24	-	-	29	1060			53		
X	83	-	-	-	-	-	-	-	-	-	-	-	-	0			0		
	89	-	-	-	-	-	-	-	-	-	-	-	-	0			0		
	97	-	-	-	-	-	-	-	-	-	-	-	-	720			36		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>								
'83		31%			00%			00%			+ 7%								
'89		21%			00%			32%			+56%								
'97		20%			.94%			14%											
Total Plants/Acre (excluding Dead & Seedlings)												'83	1732	Dec:	15%				
												'89	1866		21%				
												'97	4220		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>																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	23	-	-	-	-	-	-	-	-	23	-	-	-	1533		23	
	97	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10	
M	83	55	-	-	-	-	-	-	-	-	55	-	-	-	3666	8	8	55
	89	30	-	-	2	-	-	-	-	-	28	1	3	-	2133	18	18	32
	97	82	-	-	25	-	-	8	-	-	113	2	-	-	2300	13	12	115
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	8	2	-	-	-	-	-	-	-	10	-	-	-	666		10	
	97	7	-	-	-	-	-	-	-	-	2	-	-	5	140		7	
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%			+15%							
'89		03%			00%			05%			-39%							
'97		00%			00%			04%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	3666	Dec:	0%				
											'89	4332		15%				
											'97	2640		5%				
<i>Eriogonum microthecum</i>																		
Y	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%			00%			Appeared							
'89		33%			00%			67%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	-				
											'89	200		-				
											'97	0		-				
<i>Juniperus osteosperma</i>																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	-				
											'89	0		-				
											'97	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				
Mahonia repens																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	8	-	-	3	-	-	-	-	-	11	-	-	-	220		11	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	110	-	-	20	-	-	-	-	-	130	-	-	-	2600	3 5	130	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	2820		-			
Pinus monophylla																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
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%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	20		-			
Rosa woodsii																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	37	-	-	5	-	-	-	-	-	42	-	-	-	840		42	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	36	-	-	13	-	-	-	-	-	49	-	-	-	980	8 10	49	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	1820		-			

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	-	-	-	-	-	1	-	-	3	-	-	-	200		3	
	97	-	-	-	2	-	-	-	-	-	2	-	-	-	40		2	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	27	14	-	6	3	-	2	-	-	52	-	-	-	3466		52	
	97	9	-	-	4	-	-	-	-	-	13	-	-	-	260		13	
M	83	99	-	-	-	-	-	-	-	-	99	-	-	-	6600	22 14	99	
	89	45	22	2	6	-	-	-	-	-	75	-	-	-	5000	18 17	75	
	97	140	-	-	96	-	-	-	-	-	236	-	-	-	4720	13 20	236	
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	2	3	-	1	-	-	-	-	-	4	-	2	-	400		6	
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	6600	Dec:	0%				
											'89	8866		5%				
											'97	5060		2%				

Trend Study 19B-2-97

Study site name: Upper Little Valley

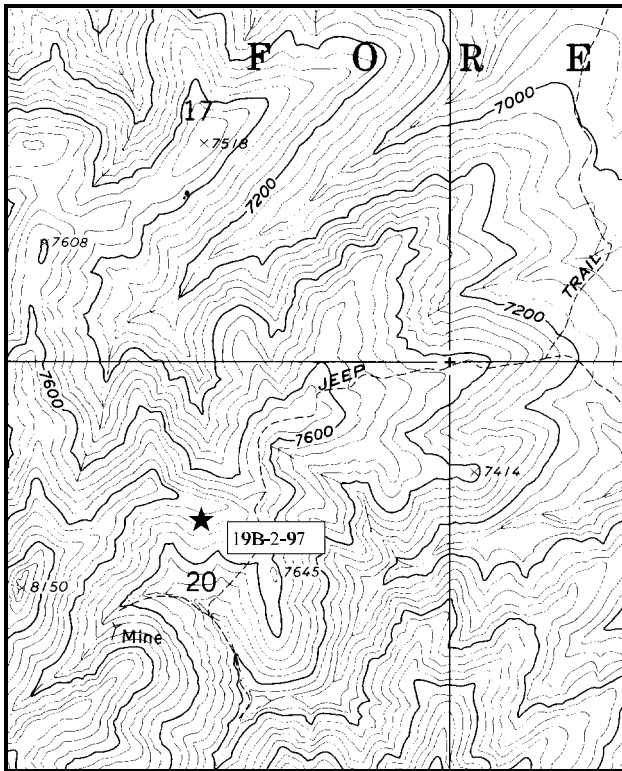
Range Type: Mountain brush

Compass bearing: frequency baseline 188 degrees. (Line 2 195°M, line 3 203°M, line 4 178°M)

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

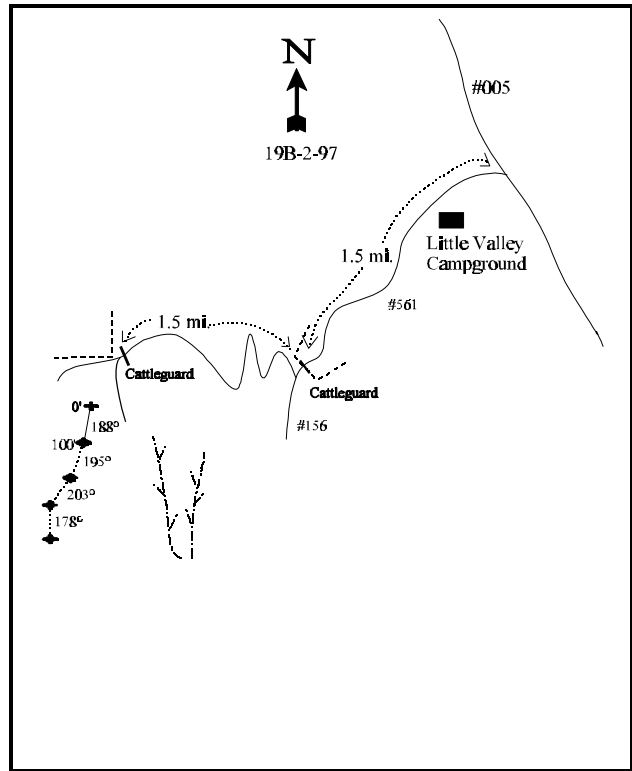
LOCATION DESCRIPTION

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 miles to an intersection. Bear right and continue southerly up the ridge for 0.85 miles to a fence corner on the ridgeline. 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

Township 10S, Range 5W, Section 20



Diagrammatic Sketch

UTM 4422211.911 N, 377844.461 E

DISCUSSION

Trend Study No. 19B-2 (13/23-2)

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 relatively steep (25% to 30%) south facing slope. Elevation is approximately 7,300 feet. Numerous intermittent and perennial streams in the area provide good distribution of water. However, thermal and escape cover is inadequate for 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 the site potential on the upper slopes.

The soil is relatively shallow and rocky with numerous basalt rocks and outcrops noticeable in the immediate area. Texture is coarse and well-drained. Soil textural analysis indicates it to be a sandy clay loam with a slightly acidic pH (6.2). There is little exposed bare soil and ample vegetation and litter cover to protect against erosion. Effective rooting depth (see methods) is 12 inches with a soil temperature of 60°F measured at 14 inches.

Mountain snowberry provides 28% of the total vegetative cover on the site or 56% of the browse cover. It had an estimated density of 3,000 plants/acre in 1997. Mature age structure has changed very little over all years, but percentage of young and decadent plants have varied dramatically. The percentage of plants with poor vigor is staying relatively high and 61% of the decadent plants are classified as dying. This could be indicating a slight decline for this population in the future if dry conditions continue. Utilization has been consistently mostly light through the years, yet there are indications of some slight downward changes in the population which are probably chiefly moisture related. Saskatoon serviceberry has an estimated density of 640 plants/acre in 1997. These plants are moderately hedged and exhibit a stable population. Average height is 53 inches with an average crown diameter of 55 inches. It was reported in 1983 that tent caterpillars were present on most serviceberry plants but their activity appears to have not continued from that point. Mountain big sagebrush density is estimated to be 340 plants/acre in 1997. This is down considerably from what was estimated in 1989. The number of dead plants in the population cannot explain this drop in density, as it can only explain 44% of the loss. The majority of the change can be attributed to the much larger sample size which gives more accurate density estimates for populations that have discontinuous and/or clumped distributions. Utilization is light with few plants currently exhibiting poor vigor. Nearly all plants encountered (88%) were classified as mature with more dead plants encountered than live plants in 1997. 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.

Oregon grape is the most abundant browse species with an estimated density of 7,560 plants/acre in 1997. These plants are very small, 5 inches in height and 7 inches in crown diameter, and offer very little forage. They contribute only 10% of the browse cover. Martin ceanothus has an estimated density of 300 plants/acre in 1997 and was found mostly on the upper portion of the slope. Increaser shrubs are represented by pricklypear cactus and stickyleaf low rabbitbrush, neither of which are abundant.

Perennial grass sum of nested frequency has decreased slightly since 1989, yet is similar to that of 1983. Muttongrass, slender wheatgrass, and mountain brome nested frequency have all significantly declined since 1989, while there was a significant increase in Sandberg bluegrass. However, Sandberg bluegrass only contributes 7% of the grass cover. No utilization was evident in 1997. Cheatgrass is currently the most abundant grass and it was found in 70% of the quadrats in 1997. It appears that the cheatgrass is not as prevalent as in years past when comparing photographs. However, data comparisons cannot be made since annual species were not included in the earlier readings. Other grasses include: bluebunch wheatgrass, oniongrass, bottlebrush squirreltail, and Letterman needlegrass.

Perennial forb sum of nested frequency shows a slight increase since 1989. The most abundant perennial species were: wild onion, longleaf phlox, tapertip hawksbeard, gray lomatium, and tailcup lupine. Annual forb sum of nested frequency value is nearly as high as the perennials. The most common annual species are pale alyssum, slenderleaf collomia, and blue-eyed Mary. Due to the dry conditions during the 1997 survey, forb identification it was extremely difficult.

1983 APPARENT TREND ASSESSMENT

Soil trend is 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 is 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 with well structured browse populations. The herbaceous understory trend is downward with a decrease in forb sum of nested frequency.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable

1997 TREND ASSESSMENT

Soil trend is slightly upward with a decline in percent bare ground cover and ample vegetative and litter cover to protect the soil from downslope movement. The overall browse trend is stable to slightly down. 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 browse cover. This population could be on the way out with no young or seedling plants encountered in 1997. The snowberry population could also have more losses in the future with most of the decadent plants being classified as dying and it makes up 56% of the browse cover. The herbaceous understory trend is stable.

TREND ASSESSMENT

soil - slightly upward

browse - stable to slightly down

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 2

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron spicatum	31	49	60	12	22	22	1.86
G	Agropyron trachycaulum	ab3	b9	a-	1	4	-	-
G	Bromus carinatus	a41	b72	a49	20	30	19	1.17
G	Bromus tectorum (a)	-	-	187	-	-	70	1.71
G	Melica bulbosa	ab3	a-	b8	1	-	4	.26
G	Poa fendleriana	b78	ab78	a50	33	37	24	2.99
G	Poa secunda	a-	b9	c28	-	5	14	.66
G	Sitanion hystrix	b58	a27	a25	28	13	10	.65
G	Stipa lettermani	3	-	3	1	-	1	.03
Total for Grasses		217	244	410	96	111	164	9.33
F	Achillea millefolium	1	-	-	1	-	-	-
F	Agoseris glauca	b12	a-	b26	7	-	13	.47
F	Alyssum alyssoides (a)	-	-	249	-	-	77	4.31
F	Allium campanulatum	c182	a70	b100	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	6	8	3	.82
F	Camelina microcarpa (a)	-	-	11	-	-	4	.02
F	Chaenactis douglasii	3	-	-	2	-	-	-
F	Cirsium neomexicanum	9	8	3	4	4	2	.21
F	Collomia linearis (a)	-	-	88	-	-	35	.38
F	Comandra pallida	b81	a43	a29	36	21	14	.35
F	Collinsia parviflora (a)	-	-	32	-	-	12	.06
F	Crepis acuminata	63	59	50	33	31	23	1.20
F	Cryptantha spp.	4	-	-	1	-	-	-
F	Delphinium bicolor	b12	a-	b21	7	-	14	.15
F	Epilobium paniculatum (a)	-	-	15	-	-	7	.06
F	Eriogonum racemosum	b17	ab9	a3	7	5	1	.15
F	Hackelia patens	b11	b10	a-	4	4	-	-
F	Heuchera parvifolia	1	-	-	1	-	-	-
F	Helianthella uniflora	3	-	-	1	-	-	-
F	Hymenoxys acaulis	a-	a-	b45	-	-	18	4.65
F	Hydrophyllum capitatum	b87	a-	a-	33	-	-	-

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	Lepidium spp. (a)	a ⁻	b ²¹	a ⁻	-	10	-	-
F	Lithospermum ruderales	b ⁹	a ¹	a ³	5	1	1	.15
F	Lomatium grayi	52	30	49	25	16	22	1.50
F	Lupinus caudatus	b ⁷⁸	a ⁷²	a ⁴⁴	35	34	23	1.74
F	Machaeranthera canescens	1	-	1	1	-	1	.03
F	Microsteris gracilis (a)	-	-	24	-	-	9	.14
F	Penstemon spp.	-	-	5	-	-	3	.01
F	Phlox longifolia	29	43	56	15	24	23	.63
F	Polygonum douglasii (a)	-	-	21	-	-	10	.10
F	Senecio integerrimus	-	6	5	-	3	2	.18
F	Senecio spp.	-	3	-	-	1	-	-
F	Taraxacum officinale	a ⁻	b ²¹	a ⁵	-	12	3	.12
F	Tragopogon dubius	20	30	17	10	17	8	.07
F	Vicia americana	b ⁸	a ⁻	a ⁻	4	-	-	-
F	Wyethia amplexicaulis	-	-	5	-	-	2	.15
F	Zigadenus paniculatus	a ⁻	a ⁻	b ⁸	-	-	4	.02
Total for Forbs		696	444	936	323	225	386	18.62

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 19B, Study no: 2

T y p e	Species	Strip Frequency '97	Average Cover % '97
B	Amelanchier alnifolia	22	5.56
B	Artemisia tridentata vaseyana	13	2.57
B	Ceanothus martinii	7	.33
B	Chrysothamnus viscidiflorus viscidiflorus	5	.93
B	Juniperus osteosperma	1	-
B	Mahonia repens	25	2.66
B	Opuntia spp.	6	.15
B	Symphoricarpos oreophilus	66	15.70
Total for Browse		145	27.91

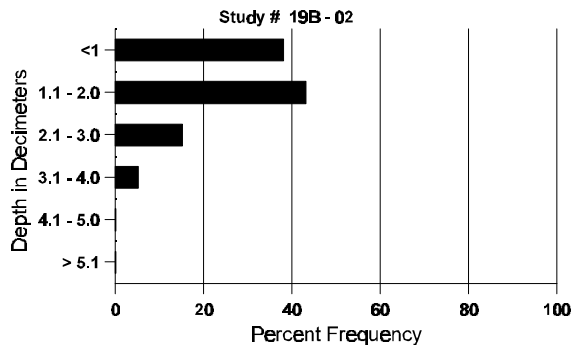
BASIC COVER --
Herd unit 19B, Study no: 2

Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	356	4.75	10.25	50.93
Rock	190	5.50	9.25	6.74
Pavement	171	3.25	3.25	1.85
Litter	383	71.50	63.50	53.03
Cryptogams	2	0	0	.03
Bare Ground	199	15.00	13.75	8.91

SOIL ANALYSIS DATA --
Herd Unit 19B, Study no: 02

Effective rooting depth (inches)	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	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 19B, Study no: 2

Type	Quadrat Frequency '97
Rabbit	3
Elk	2
Deer	26

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											
<i>Amelanchier alnifolia</i>																
Y	83	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	3	-	1	4	-	-	-	-	-	-	-	533		8	
	97	2	-	-	-	-	-	-	-	-	-	-	40		2	
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
D	83	-	1	1	-	-	-	-	-	-	-	-	133		2	
	89	2	1	1	-	-	-	-	-	-	-	-	266		4	
	97	-	-	-	-	1	-	-	-	-	-	-	20		1	
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		64%		36%		09%		+39%								
'89		28%		22%		06%		-47%								
'97		50%		13%		03%										
Total Plants/Acre (excluding Dead & Seedlings)										'83	733	Dec:	18%			
										'89	1199		22%			
										'97	640		3%			
<i>Artemisia tridentata vaseyana</i>																
Y	83	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	1	-	-	-	-	-	-	-	-	-	-	66		1	
	97	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	83	6	5	1	-	-	-	-	-	-	-	-	800	21	31	12
	89	10	3	-	-	-	-	-	-	-	-	-	866	20	25	13
	97	15	-	-	-	-	-	-	-	-	-	-	300	26	43	15
D	83	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	3	1	-	-	-	-	-	-	-	-	-	266		4	
	97	1	-	-	-	-	-	-	-	-	1	-	40		2	
X	83	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	380		19	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)										'83	800	Dec:	0%			
										'89	1198		22%			
										'97	340		12%			

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>Ceanothus martinii</i>																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	83	-	7	-	-	-	-	-	-	-	7	-	-	-	466		7	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	83	-	4	-	-	-	-	-	-	-	4	-	-	-	266	7	11	4
	89	5	3	-	2	-	-	1	-	-	11	-	-	-	733	8	11	11
	97	5	-	-	1	5	-	-	-	-	11	-	-	-	220	8	27	11
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	732	Dec:	-			
												'89	733		-			
												'97	300		-			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	83	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	89	1	-	-	1	-	-	-	-	-	1	1	-	-	133		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	83	2	-	-	-	-	-	-	-	-	2	-	-	-	133	11	13	2
	89	3	-	-	-	-	-	-	-	-	3	-	-	-	200	13	19	3
	97	9	-	-	-	-	-	-	-	-	9	-	-	-	180	15	32	9
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	199	Dec:	-			
												'89	333		-			
												'97	180		-			
<i>Juniperus osteosperma</i>																		
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%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	40		-			

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				
Mahonia repens																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	2	-	-	2	-	-	-	133		2	
	97	62	-	-	20	-	-	-	-	-	82	-	-	-	1640		82	
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
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%			+58%							
'89		00%			00%			00%			+83%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	533	Dec:	0%				
											'89	1265		5%				
											'97	7560		0%				
Opuntia spp.																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	2	-	-	2	-	-	-	133		2	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	83	9	-	-	-	-	-	-	-	-	9	-	-	-	600	6	13	9
	89	8	-	-	-	-	-	-	-	-	7	1	-	-	533	8	22	8
	97	7	-	-	-	-	-	-	-	-	5	-	-	2	140	6	11	7
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		00%			00%			00%			+18%							
'89		00%			00%			00%			-75%							
'97		00%			00%			22%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	600	Dec:	0%				
											'89	732		9%				
											'97	180		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				
Pachistima myrsinites																		
Y	83	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	89	2	-	-	3	-	-	-	-	-	5	-	-	-	333		5	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	83	7	-	-	-	-	-	-	-	-	7	-	-	-	466	5	4	7
	89	-	-	-	1	-	3	3	-	-	7	-	-	-	466	2	2	7
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	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%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	532	Dec:	-			
												'89	799		-			
												'97	0		-			
Symphoricarpos oreophilus																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	83	7	-	-	-	-	-	-	-	-	7	-	-	-	466		7	
	89	1	-	-	1	-	-	-	-	-	2	-	-	-	133		2	
	97	19	7	1	6	-	-	2	-	-	33	1	-	1	700		35	
M	83	8	2	-	-	-	-	-	-	-	10	-	-	-	666	19	15	10
	89	7	4	-	3	-	-	-	-	-	13	-	1	-	933	19	22	14
	97	30	20	9	26	4	-	3	-	-	91	1	-	-	1840	25	45	92
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	5	3	-	-	-	-	-	-	-	6	-	2	-	533		8	
	97	16	4	1	-	2	-	-	-	-	6	1	2	14	460		23	
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		12%			00%			00%			+29%							
'89		29%			00%			13%			+47%							
'97		25%			07%			11%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	1132	Dec:	0%			
												'89	1599		33%			
												'97	3000		15%			

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 canescens																		
M	'83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	19	38	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>% Change</u>						
	'83	00%			00%			00%				None						
	'89	00%			00%			00%				None						
	'97	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	0		-			

Trend Study 19B-3-97

Study site name: Bennion Creek.

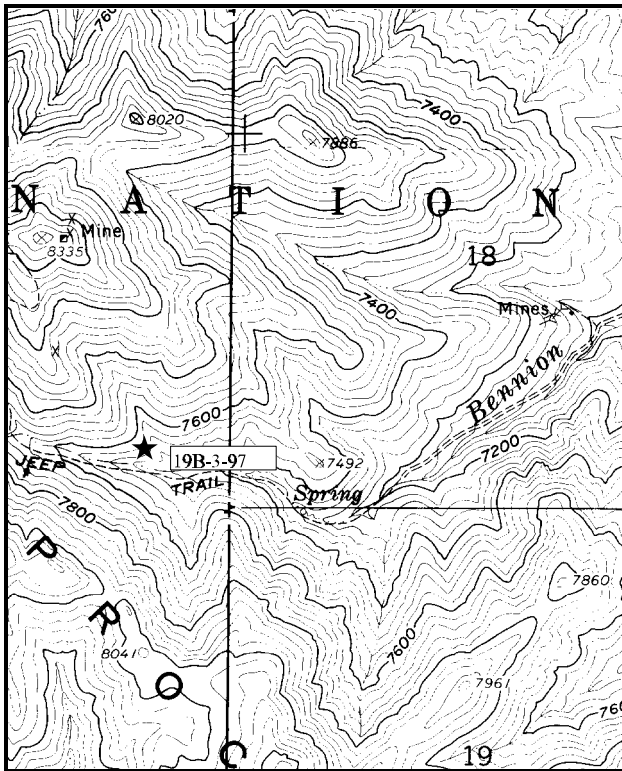
Range Type: Mountain brush

Compass bearing: frequency baseline 302 degrees. (Lines 2-4 312°M)

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

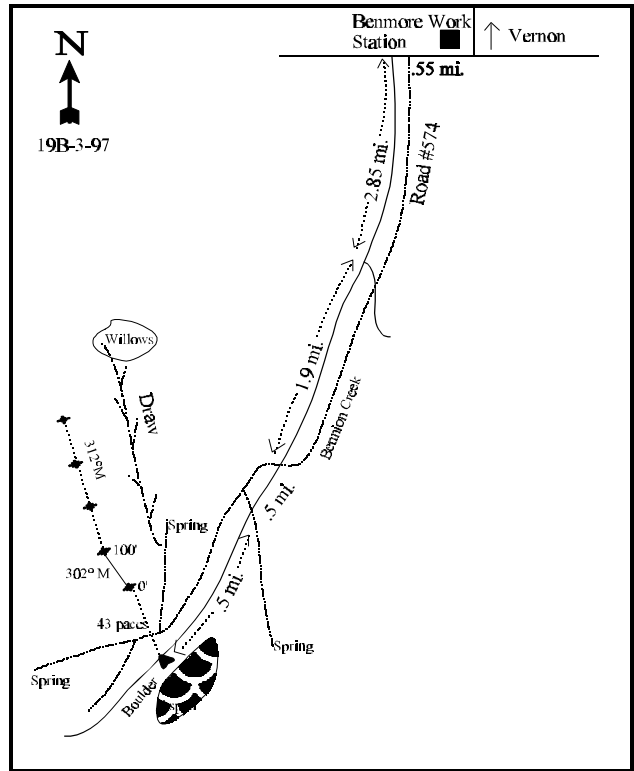
LOCATION DESCRIPTION

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 1/2 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

UTM 4422913.105 N, 375149.563 E

DISCUSSION

Trend Study No. 19B-3 (23/13-3)

The Bennion Creek study is typical of deer summer range found on the Sheeprock Mountains. The study samples a low-growing, mixed mountain brush community at an elevation of 7,600 feet. The site has an easterly aspect and a 10-15% percent slope. The site is close to the bottom of the slope and acts as a source of perennial water. A moderately large aspen stand and some relatively dense thickets of chokecherry-serviceberry nearby provide warm season cover. 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, few deer pellet groups were encountered and cow sign was from earlier in the year.

Soil is coarse textured and relatively shallow with angular shaped granite or other igneous rocks on the surface. The effective rooting depth (see methods) is 12 inches with a soil temperature of 57°F at the depth of 13 inches. Some soil movement is apparent, but appears minimal. Vegetation and litter cover appear adequate to prevent excessive runoff and soil loss.

Saskatoon serviceberry and mountain big sagebrush are two of the main key species on this site. Estimated density for Saskatoon serviceberry is 700 plants/acre in 1997. This is a similar estimate to that in 1983 and 1989. However, percent decadency is progressively deteriorating from a low of 9% in 1983 to a high of 37% in 1997. Other evidence of a downward trend is that 46% of the decadent plants were classified as dying and that those plants determined to have poor vigor has risen to 17%. None were classified with poor vigor in the other years. Height measurements are similar over all years with crown diameter increasing to 35 inches in 1997, an increase from 19 inches measured in 1989. Utilization in 1983 and 1989 was reported to be light to moderate. In 1997, utilization is moderate to heavy. Mountain big sagebrush density is estimated to be 940 plants/acre in 1997. This is a mature/decadent population with no seedling in any sampled year and only 1 young encountered in 1997. Percent decadency has increased since 1989, and similar to that of 1983. The percentage of the plants in poor vigor is slowly increasing from 0% in 1983 to 21% in 1997. The ratio of dead to live plants is 1:2.7, or about 27% are dead. The trend for this species is also down. Serviceberry and mountain big sagebrush contribute 36% of the browse cover.

Mountain snowberry, although having a lower wildlife preference, is the most abundant browse on the site with an estimated density of 3,620 plants/acre. It provides 44% of the browse cover or nearly 10% of the canopy cover. Age structure indicates a stable, mostly mature population. Utilization is light over all years with most plants exhibiting good vigor. Those with moderate use have increased through the years, where it is now up to 16%. Estimated density for mountain lover in 1997 is 1,560 plants/acre. This mostly mature population is small statured averaging 5 inches in height. Due to the greatly increased sample size, Oregon grape was encountered for the first time in 1997. Estimated density is 1,920 plants/acre with two-thirds of the population classified as mature. Other shrubs scattered around the site include: black sagebrush, stickyleaf low rabbitbrush, wyeth eriogonum, and pricklypear cactus.

The principal grass species include: spike fescue, mutton bluegrass, oniongrass, and bluebunch wheatgrass. Spike fescue, oniongrass, and bluebunch wheatgrass have all significantly increased in nested frequency since 1989, while mountain brome and Carex have significantly decreased. Overall perennial grass sum of nested frequency has increased from 422 in 1983 to 440 in 1989 and 522 in 1997. Cheatgrass occurs in very low numbers and was encountered in only two quadrats in 1997. Other grass species include: Sandberg bluegrass, Kentucky bluegrass, Letterman needlegrass, timothy, and slender wheatgrass.

Perennial forb sum of nested frequency has declined over all years from 1,035 in 1983 to 687 in 1997. The most abundant perennial forb species include: sierra onion, tapertip hawksbeard, aster, and lomatium. Annual

forbs are in relatively low abundance and include: blue eyed Mary, slenderleaf collomia, and pale alyssum. Many of the forbs encountered in 1997 were dried up making some identification difficult.

1983 APPARENT TREND ASSESSMENT

Soil trend is stable. This soil, however, would rapidly erode if vegetative 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 lead 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 vegetative and litter cover. The soil trend is stable. The browse populations have changed very little since 1983 and appear to be stable. The browse trend is therefore stable. 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

browse - stable

herbaceous understory - stable

1997 TREND ASSESSMENT

Percent bare ground cover continues to decline from a high of 27% in 1983 to 7% in 1997. Soil erosion is minimal with ample vegetation and litter cover to provide protection. Soil trend is upward. Saskatoon serviceberry density appears stable but the percentage of plants with poor vigor continues to increase. The mountain big sagebrush population could be declining with 1/3 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, spike fescue, bluebunch wheatgrass, 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 upward

browse - slightly downward, especially for serviceberry and mountain big sagebrush

herbaceous understory - stable overall, slightly up for grasses and slightly down for forbs

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 3

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	<i>Agropyron spicatum</i>	ab49	a48	b70	23	24	32	1.90
G	<i>Agropyron trachycaulum</i>	ab12	b14	a1	6	8	1	.00
G	<i>Bromus carinatus</i>	b57	b53	a33	26	28	14	.36
G	<i>Bromus tectorum</i> (a)	-	-	4	-	-	2	.03
G	<i>Carex</i> spp.	b11	c26	a-	4	8	-	-
G	<i>Leucopoa kingii</i>	a87	a84	b137	33	37	54	6.78
G	<i>Melica bulbosa</i>	a26	a26	b109	12	16	46	2.29
G	<i>Phleum pratense</i>	-	-	3	-	-	1	.03
G	<i>Poa fendleriana</i>	147	140	120	58	61	47	3.48
G	<i>Poa pratensis</i>	14	13	13	6	5	4	.36
G	<i>Poa secunda</i>	13	29	31	6	14	13	.57
G	<i>Stipa lettermani</i>	5	7	5	2	4	2	.06
Total for Grasses		422	440	526	177	205	216	15.90
F	<i>Achillea millefolium</i>	3	-	3	1	-	1	.03
F	<i>Agoseris glauca</i>	a5	c69	b23	3	38	13	.07
F	<i>Alyssum alyssoides</i> (a)	-	-	79	-	-	30	.15
F	<i>Allium campanulatum</i>	c202	a121	b160	78	59	62	.79
F	<i>Arabis</i> spp.	-	6	1	-	3	1	.01
F	<i>Artemisia ludoviciana</i>	4	1	10	2	1	4	.60
F	<i>Astragalus cibarius</i>	b60	b59	a17	28	27	8	.26
F	<i>Aster</i> spp.	a91	b115	a72	33	45	24	1.04
F	<i>Balsamorhiza sagittata</i>	ab18	b26	a5	7	15	2	.66
F	<i>Castilleja chromosa</i>	a-	ab3	b7	-	2	4	.04
F	<i>Castilleja linariaefolia</i>	b7	a-	ab3	4	-	2	.01
F	<i>Calochortus nuttallii</i>	2	3	8	1	2	4	.02
F	<i>Chaenactis douglasii</i>	1	-	1	1	-	1	.00
F	<i>Cirsium</i> spp.	b29	a5	a7	18	4	5	.34
F	<i>Collomia linearis</i> (a)	-	-	79	-	-	33	.24
F	<i>Comandra pallida</i>	b35	b35	a-	13	15	-	-
F	<i>Collinsia parviflora</i> (a)	-	-	83	-	-	32	.16
F	<i>Crepis acuminata</i>	b138	b140	a86	61	70	40	2.53
F	<i>Cymopterus longipes</i>	a-	a-	b14	-	-	8	.19
F	<i>Delphinium bicolor</i>	c31	a-	b13	18	-	9	.04
F	<i>Epilobium paniculatum</i> (a)	-	-	25	-	-	10	.07

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	<i>Erysimum asperum</i>	_b 15	_a -	_a -	8	-	-	-
F	<i>Erigeron divergens</i>	4	1	8	2	1	3	.09
F	<i>Eriogonum</i> spp.	-	-	3	-	-	1	.03
F	<i>Eriogonum racemosum</i>	_b 49	_b 42	_a 3	27	21	1	.01
F	<i>Eriogonum umbellatum</i>	_b 40	_b 38	_a 13	16	19	6	.17
F	<i>Fritillaria pudica</i>	2	-	-	1	-	-	-
F	<i>Hackelia patens</i>	2	-	2	1	-	1	.00
F	<i>Holosteum umbellatum</i> (a)	-	-	5	-	-	2	.01
F	<i>Hydrophyllum capitatum</i>	_b 28	_a -	_a -	14	-	-	-
F	<i>Lactuca serriola</i>	-	-	2	-	-	1	.00
F	<i>Lithospermum</i> spp.	-	-	-	-	-	-	.00
F	<i>Lomatium</i> spp.	_b 149	_b 163	_a 45	66	67	21	.72
F	<i>Lupinus caudatus</i>	_c 59	_b 23	_a -	29	12	-	-
F	<i>Lupinus sericeus</i>	_b 29	_{ab} 19	_a 11	14	9	5	.33
F	<i>Machaeranthera canescens</i>	6	1	11	3	1	4	.03
F	<i>Microsteris gracilis</i> (a)	-	-	20	-	-	10	.05
F	<i>Orobanche uniflora</i>	2	-	-	1	-	-	-
F	<i>Phlox longifolia</i>	17	32	18	11	14	8	.21
F	<i>Polygonum douglasii</i> (a)	-	-	67	-	-	26	.22
F	<i>Senecio integerrimus</i>	_a 7	_b 43	_b 44	4	22	21	.54
F	<i>Tragopogon dubius</i>	-	1	1	-	1	1	.03
F	<i>Veronica biloba</i> (a)	-	-	8	-	-	3	.01
F	<i>Wyethia amplexicaulis</i>	_a -	_a 3	_b 21	-	2	7	.91
Total for Forbs		1035	949	978	465	450	414	10.72

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 19B, Study no: 3

Type	Species	Strip Frequency '97	Average Cover % '97
B	Amelanchier alnifolia	32	3.65
B	Artemisia nova	8	.44
B	Artemisia tridentata vaseyana	40	4.48
B	Chrysothamnus viscidiflorus viscidiflorus	4	.38
B	Eriogonum heracleoides	18	.27
B	Juniperus osteosperma	1	-
B	Mahonia repens	16	.75
B	Opuntia spp.	3	.15
B	Pachistima myrsinites	21	.70
B	Rosa woodsii	21	1.88
B	Symphoricarpos oreophilus	68	9.90
Total for Browse		232	22.63

BASIC COVER --

Herd unit 19B, Study no: 3

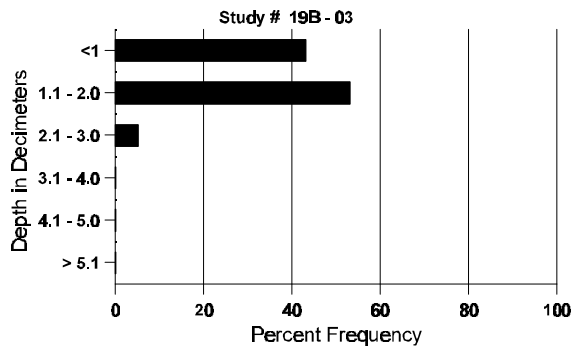
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	354	3.50	8.50	49.18
Rock	265	12.00	10.25	12.07
Pavement	266	2.50	13.75	5.51
Litter	386	55.50	52.75	50.44
Cryptogams	31	0	0	.17
Bare Ground	200	26.50	14.75	7.03

SOIL ANALYSIS DATA --

Herd Unit 19B, Study no: 03

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.2	56.8 (13.2)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 19B, Study no: 3

Type	Quadrat Frequency '97
Rabbit	1
Elk	1
Deer	8
Cattle	5

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 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						
<i>Amelanchier alnifolia</i>											
S	83	-	-	-	-	-	-	-	0		0
	89	1	-	-	-	-	-	-	66		1
	97	-	-	-	-	-	-	-	0		0
Y	83	5	1	-	-	-	-	-	400		6
	89	4	1	-	1	-	-	-	400		6
	97	-	1	-	2	-	-	-	60		3
M	83	1	3	-	-	-	-	-	266	33 21	4
	89	1	4	-	-	-	-	-	333	34 19	5
	97	-	1	5	1	7	5	-	380	33 35	19
D	83	-	1	-	-	-	-	-	66		1
	89	1	1	-	-	-	-	-	133		2
	97	-	7	3	-	1	2	-	260		13
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		45%		00%		00%		+15%			
'89		46%		00%		00%		-19%			
'97		49%		43%		17%					
Total Plants/Acre (excluding Dead & Seedlings)						'83	732	Dec:	9%		
						'89	866		15%		
						'97	700		37%		
<i>Artemisia nova</i>											
Y	83	1	-	-	-	-	-	-	66		1
	89	-	-	-	-	-	-	-	0		0
	97	-	-	-	-	-	-	-	0		0
M	83	1	-	-	-	-	-	-	66	14 23	1
	89	-	-	-	-	-	-	-	0	- -	0
	97	9	-	-	-	-	-	-	180	12 22	9
D	83	-	-	-	-	-	-	-	0		0
	89	-	-	-	-	-	-	-	0		0
	97	1	2	-	-	-	-	-	60		3
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>% Change</u>			
'83		00%		00%		00%		Died out			
'89		00%		00%		00%		Appeared			
'97		17%		00%		25%					
Total Plants/Acre (excluding Dead & Seedlings)						'83	132	Dec:	0%		
						'89	0		0%		
						'97	240		25%		

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>																		
Y	83	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	89	1	-	-	-	-	-	-	-	-	-	-	1	-	66		1	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
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
D	83	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	11	3	-	-	-	-	-	-	-	5	1	-	8	280		14	
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	360		18	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	532	Dec:	25%				
											'89	666		0%				
											'97	940		30%				
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	2	-	-	-	-	-	-	-	-	2	-	-	-	133	16	10	2
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60	16	28	3
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%			Appeared							
'89		00%			00%			00%			-40%							
'97		00%			00%			25%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	0%				
											'89	133		0%				
											'97	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				
Eriogonum heracleoides																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	23	-	-	2	-	-	1	-	-	26	-	-	-	520	12	13	
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%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			03%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	0%				
											'89	0		0%				
											'97	680		3%				
Juniperus osteosperma																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	2	-	-	-	-	-	-	-	-	-	2	-	-	40	-	-	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	-				
											'89	0		-				
											'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				
Mahonia repens																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	32	-	-	-	-	-	-	-	-	32	-	-	-	640		32	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	64	-	-	-	-	-	-	-	-	64	-	-	-	1280	4	6	64
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	1920		-			
Opuntia spp.																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	7	-	-	-	-	-	-	-	-	7	-	-	-	140	8	32	7
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	140		-			
Pachistima myrsinites																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	97	18	-	-	1	-	-	-	-	-	19	-	-	-	380		19	
M	83	11	-	-	-	-	-	-	-	-	11	-	-	-	733	5	4	11
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	40	-	-	15	-	-	4	-	-	59	-	-	-	1180	5	12	59
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	733	Dec:	-			
												'89	133		-			
												'97	1560		-			

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total					
		1	2	3	4								
Rosa woodsii													
S	83	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	0		0	
	97	13	-	-	-	-	-	-	-	13		13	
Y	83	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	0		0	
	97	37	-	-	-	-	-	-	-	37		37	
M	83	-	-	-	-	-	-	-	-	0	-	0	
	89	-	-	-	-	-	-	-	-	0	-	0	
	97	16	-	-	1	-	-	-	-	17	12 17	17	
D	83	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	0		0	
	97	3	-	-	-	-	-	-	-	2		3	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>% Change</u>					
'83		00%		00%		00%		None					
'89		00%		00%		00%		Appeared					
'97		00%		00%		02%							
Total Plants/Acre (excluding Dead & Seedlings)										'83	0	Dec:	0%
										'89	0		0%
										'97	1140		5%
Symphoricarpos oreophilus													
S	83	-	-	-	-	-	-	-	-	0		0	
	89	2	-	-	-	-	-	-	-	133		2	
	97	1	-	-	-	-	-	-	-	20		1	
Y	83	16	-	-	-	-	-	-	-	5 11	1066	16	
	89	43	2	-	10	-	-	4	-	57 - 2	3933	59	
	97	28	3	-	7	-	-	-	-	37 - - 1	760	38	
M	83	21	-	-	-	-	-	-	-	3 18	1400	24 21	
	89	23	-	-	-	-	-	-	-	23 - - -	1533	30 31	
	97	78	19	-	27	5	-	-	-	117 3 9	2580	16 29	
D	83	-	-	-	-	-	-	-	-	0		0	
	89	7	1	-	-	-	-	-	-	8 - - -	533	8	
	97	9	2	2	1	-	-	-	-	7 - - 7	280	14	
% 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%		09%							
Total Plants/Acre (excluding Dead & Seedlings)										'83	2466	Dec:	0%
										'89	5999		9%
										'97	3620		8%

Trend Study 19B-4-97

Study site name: Harker Canyon .

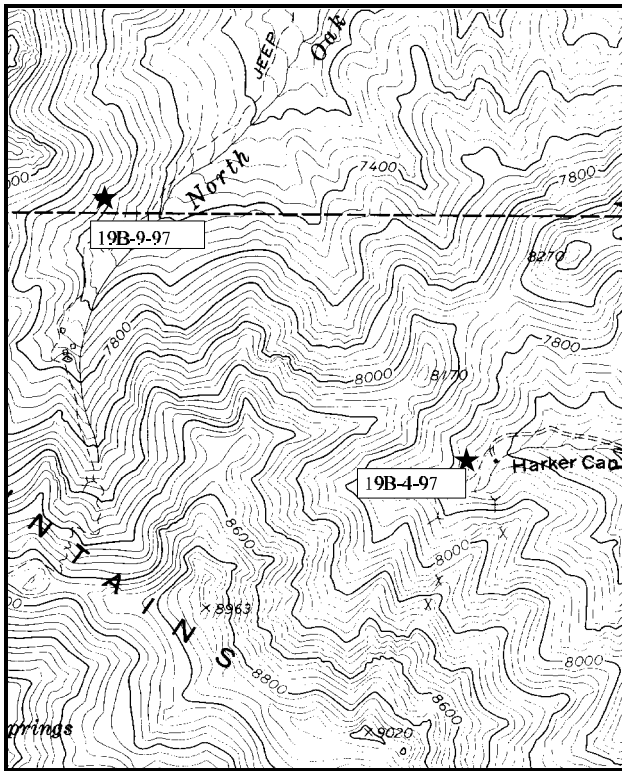
Range type: Snowberry

Compass bearing: frequency baseline 270 degrees. (Line 3-4 300°M)

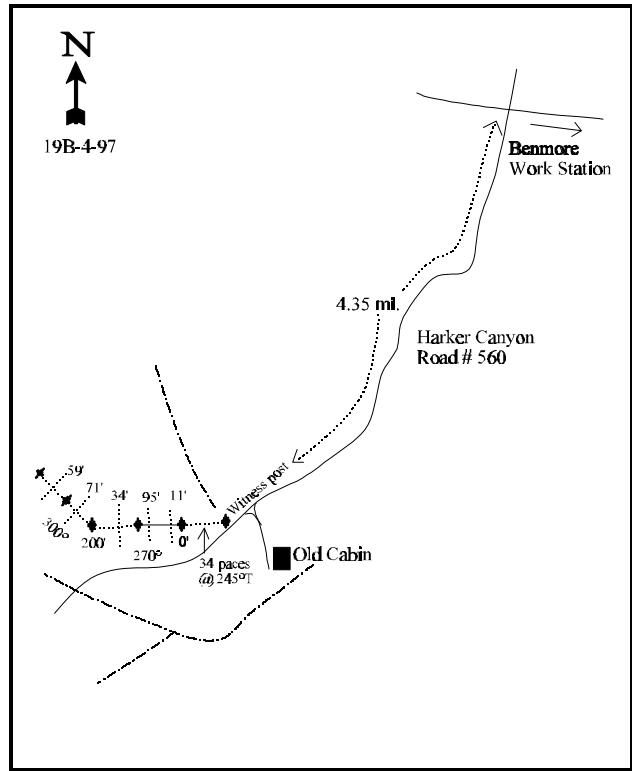
First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

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 2.05 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 left hand side of the road, look for a green steel "T" fencepost on the right side of the road (i.e., northeast). From the fencepost the 0-foot stake of the baseline is 34 paces away at an azimuth of 245 degrees true. The study is marked by green steel "T" fenceposts approximately 12-18 inches in height.



Map Name: Erickson Knoll, Utah



Diagrammatic Sketch

Township 10 S , Range 6 W , Section Unsurveyed (3)

UTM 4425977.513 N , 371420.484 E

DISCUSSION

Trend Study No. 19B-4 (23/13-4)

The Harker Canyon study samples deer summer range located near the upper end of Harker Canyon. The study is on land administered by the Forest Service at an elevation of 7,640 feet. Aspect is to the east with a 35% slope. The range type is mixed mountain brush. There is a perennial water source about 150 yards away. 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 curleaf mountain mahogany. In 1983, two mature bucks and one doe were observed, as well as a moderate number of deer pellet groups and cattle droppings. Only a few deer and elk pellet groups were observed in 1997.

Soil is coarse, well-drained, and rocky throughout. Soil textural analysis indicates it to be a loam with a moderately acidic pH (6.0). The effective rooting depth (see methods) is 13 inches with a soil temperature of 54°F measured at 14 inches. Organic matter content is estimated to be 5.4%. As reported in the past, erosion is negligible as there is little bare ground, except on animal trails that zig-zag through the area.

Vegetative cover is dominated by browse, especially mountain snowberry. The mountain snowberry population does not appear to be expanding with an estimated density of 2,620 plants/acre in 1997. This is a mostly mature population with 90% of the plants encountered classified as mature. They are quite large plants with an estimated canopy cover of 23% in 1997. Utilization is light and plants show good vigor over all years. Saskatoon serviceberry shows light to moderate utilization in 1997 and only light use in previous surveys. Currently, density is estimated to be 560 plants/acre, most of which were classified as mature (86%). Average height is 55 inches and average crown diameter is 51 inches. This population estimate is much smaller than previously reported, however it is in response to the much larger sample design used in 1997, for there were no dead plants found in the serviceberry population. The most abundant browse in 1983, mountain big sagebrush, declined to 800 plants/acre in 1989. There was also a significant increase in the percent of plants classified as decadent. In 1989, it was noted that seed production was excellent. Mountain big sagebrush density is currently estimated to be 1,540 plants/acre. This increase in density is due to the much larger sample sized giving more accurate density estimate for shrubs with distributions that are discontinuous or clumped. Percent decadency has decreased to only 8% of the population while the number of plants classified in poor vigor has remained nearly the same at 16%.

In 1997, Oregon grape density was estimated to be 2,180 plants/acre. This large change in density is also more reflective of the sample size than anything else. These plants are small in stature measuring 4 inches in height. Most plants (86%) were classified as mature with the remaining classified as young. Due to the increased sample size used in 1997, Wood's rose was encountered for the first time. Density is estimated to be 880 plants/acre with no apparent utilization and good vigor. Mountain ceanothus was also encountered for the first time in 1997 with an estimated density of 580 plants/acre. There was no apparent utilization and vigor was good. Mountain lover had an estimated density of 14,732 plants/acre in 1989 but was not encountered in 1997 due to the increased sample size which more accurately represents the site. Other browse species include: white rubber rabbitbrush, stickyleaf low rabbitbrush, black sagebrush, and curleaf mountain mahogany.

Perennial grass sum of nested frequency has slightly decreased since 1989, but is higher than that recorded in 1983. Mountain brome, spike fescue, and muttongrass have all significantly increased in nested frequency while slender wheatgrass has significantly declined. Oniongrass, the most abundant grass, declined but not significantly. Cheatgrass was encountered in only 1 quadrat in 1997. Other grasses include: bluebunch wheatgrass, sheep fescue, Kentucky bluegrass, and three species of needlegrass.

Perennial forb sum of nested frequency has greatly declined from 897 in 1989 to 393 in 1997. The decline is due to significant decreases in several species including: tapertip hawksbeard, silky lupine, longleaf phlox, and mulesear wyethia. Deer especially use these species in the summer, so maintenance of forb density and composition quality will be important future trend indicators.

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 is 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 in mountain big sagebrush to 50%, while density has declined to 800 plants/acre. However, population 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 and there was no change in composition or appearance of undesirable increasers.

TREND ASSESSMENT

soil - slightly upward

browse - stable

herbaceous understory - upward

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 upward

browse - stable overall, but declining for sagebrush

herbaceous understory - down

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 4

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron spicatum	a1	b29	ab16	1	15	6	.49
G	Agropyron trachycaulum	a8	b61	a6	4	27	2	.06
G	Bromus carinatus	a44	b81	b103	20	42	39	3.81
G	Bromus tectorum (a)	-	-	2	-	-	1	.00
G	Festuca ovina	-	-	3	-	-	1	.03
G	Leucopoa kingii	a41	a61	b114	18	25	39	5.06
G	Melica bulbosa	243	224	179	86	85	62	6.02
G	Poa fendleriana	a16	a28	b46	6	12	22	1.27
G	Poa pratensis	a6	b26	ab20	3	12	8	.26
G	Poa secunda	a2	b26	ab13	1	11	5	.24
G	Stipa columbiana	1	-	1	1	-	1	.00
G	Stipa lettermani	4	6	1	3	2	1	.00
G	Stipa nelsonii	-	11	-	-	4	-	-
Total for Grasses		366	553	504	143	235	187	17.28
F	Agoseris glauca	b15	a2	a-	7	1	-	-
F	Alyssum alyssoides (a)	-	-	19	-	-	10	.07
F	Allium spp.	a87	b124	ab118	40	62	54	.52
F	Arabis spp.	-	-	2	-	-	2	.01
F	Aster chilensis	a20	b84	a7	10	31	2	.03
F	Astragalus cibaricus	b10	ab5	a1	5	5	1	.00
F	Balsamorhiza hookeri	3	-	-	2	-	-	-
F	Calochortus nuttallii	a-	ab3	b7	-	1	4	.02
F	Chaenactis douglasii	-	-	1	-	-	1	.00
F	Cirsium spp.	a-	b12	ab1	-	5	1	.23
F	Collomia linearis (a)	-	-	38	-	-	14	.09
F	Collinsia parviflora (a)	-	-	31	-	-	12	.08
F	Crepis acuminata	a65	b143	a46	35	61	26	.56
F	Cruciferae (a)	-	30	-	-	14	-	-
F	Delphinium bicolor	-	-	4	-	-	2	.01
F	Erigeron pumilus	b22	b16	a-	13	7	-	-
F	Eriogonum racemosum	14	17	20	7	11	8	.55
F	Eriogonum umbellatum	c53	b32	a3	25	14	1	.00
F	Fritillaria pudica	ab5	b7	a-	3	4	-	-
F	Hackelia patens	b5	a-	ab2	5	-	1	.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	Helianthella uniflora	_b 9	_b 9	_a -	4	4	-	-
F	Hydrophyllum capitatum	_b 35	_a 3	_a -	17	2	-	-
F	Lomatium spp.	15	30	27	9	16	11	.18
F	Lupinus sericeus	_b 155	_b 160	_a 68	71	66	36	1.45
F	Machaeranthera canescens	1	8	3	1	3	1	.00
F	Microsteris gracilis (a)	-	-	10	-	-	5	.05
F	Penstemon caespitosus	-	2	3	-	1	1	.00
F	Phlox longifolia	_a 47	_b 87	_a 37	23	37	16	.22
F	Polygonum douglasii (a)	-	-	85	-	-	33	.41
F	Senecio integerrimus	_a -	_b 26	_a -	-	15	-	-
F	Taraxacum officinale	_a -	_b 19	_a 3	-	10	1	.03
F	Veronica biloba (a)	-	-	1	-	-	1	.00
F	Viola spp.	2	3	-	2	2	-	-
F	Wyethia amplexicaulis	_a 49	_b 74	_a 35	23	36	14	2.80
F	Zigadenus paniculatus	7	1	2	4	1	1	.03
Total for Forbs		619	897	574	306	409	259	7.43

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 19B, Study no: 4

Type	Species	Strip Frequency '97	Average Cover % '97
B	Amelanchier alnifolia	21	3.65
B	Artemisia nova	0	.03
B	Artemisia tridentata vaseyana	30	1.87
B	Cercocarpus ledifolius	0	.45
B	Ceanothus martinii	9	.60
B	Chrysothamnus nauseosus albicaulis	3	-
B	Chrysothamnus viscidiflorus viscidiflorus	20	1.19
B	Eriogonum heracleoides	22	1.49
B	Mahonia repens	16	.78
B	Pachistima myrsinites	0	-
B	Rosa woodsii	10	.06
B	Symphoricarpos oreophilus	55	22.89
Total for Browse		186	33.02

CANOPY COVER --

Herd unit 19B, Study no: 4

Species	Percent Cover '97
Cercocarpus ledifolius	1

BASIC COVER --

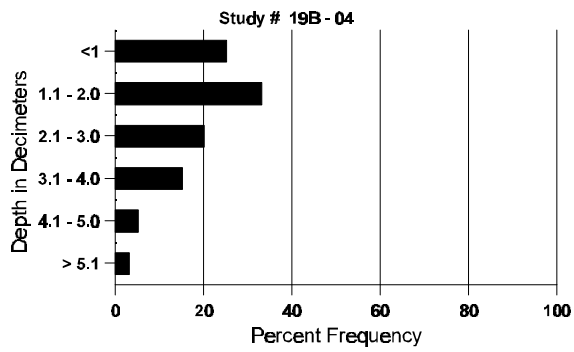
Herd unit 19B, Study no: 4

Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	358	1.75	18.50	61.45
Rock	151	3.50	5.50	4.61
Pavement	160	3.00	4.50	2.66
Litter	393	72.25	61.50	65.00
Cryptogams	5	.25	0	.01
Bare Ground	104	19.25	10.00	2.91

SOIL ANALYSIS DATA --
Herd Unit 19B, Study no: 04

Effective rooting depth (inches)	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	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 19B, Study no: 4

Type	Quadrat Frequency '97
Elk	2
Deer	6

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 4

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 alnifolia																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	83	5	-	-	-	-	-	-	-	-	5	-	-	-	333	39	35	5
	89	12	-	-	-	-	-	-	-	-	12	-	-	-	800	55	31	12
	97	14	7	1	2	-	-	-	-	-	24	-	-	-	480	55	51	24
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	333	Dec:	0%			
												'89	1266		26%			
												'97	560		4%			
Artemisia nova																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	57	62	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			None							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	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				
<i>Artemisia tridentata vaseyana</i>																		
Y	83	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	89	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	97	43	-	-	-	-	-	1	-	-	44	-	-	-	880		44	
M	83	3	9	-	-	-	-	-	-	-	8	2	2	-	800	26 30	12	
	89	4	-	-	-	-	-	-	-	-	3	1	-	-	266	24 39	4	
	97	23	2	1	1	-	-	-	-	-	18	1	8	-	540	27 34	12	
D	83	1	2	-	-	-	-	-	-	-	3	-	-	-	200		3	
	89	6	-	-	-	-	-	-	-	-	4	-	2	-	400		6	
	97	6	-	-	-	-	-	-	-	-	4	-	-	2	120		6	
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	240		12	
% 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%			-45%							
'97		03%			00%			16%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	1066	Dec:	19%				
											'89	799		50%				
											'97	1540		8%				
<i>Cercocarpus ledifolius</i>																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	157 177	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			None							
'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				
Ceanothus martinii																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	12	-	-	1	-	-	-	-	-	13	-	-	-	260		13	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	14	1	-	1	-	-	-	-	-	16	-	-	-	320	8 18	16	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		03%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	580		-			
Chrysothamnus nauseosus albicaulis																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	1	2	-	-	-	-	-	-	1	-	1	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		25%			50%			25%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	80		-			
Chrysothamnus viscidiflorus viscidiflorus																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	97	6	-	-	2	-	-	-	-	-	8	-	-	-	160		8	
M	83	10	-	-	-	-	-	-	-	-	10	-	-	-	666	12 10	10	
	89	8	-	-	-	-	-	-	-	-	8	-	-	-	533	16 14	8	
	97	29	-	-	1	-	-	-	-	-	30	-	-	-	600	16 17	30	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	666	Dec:	-			
												'89	666		-			
												'97	760		-			

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>Eriogonum heracleoides</i>																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	46	-	-	-	-	-	-	-	-	46	-	-	-	920	15	14	46
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%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	920		-			
<i>Mahonia repens</i>																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	15	-	-	-	-	-	-	-	-	15	-	-	-	300			15
M	83	10	-	-	-	-	-	-	-	-	10	-	-	-	666	8	7	10
	89	7	-	-	-	-	-	-	-	-	7	-	-	-	466	3	3	7
	97	72	-	-	-	-	-	22	-	-	94	-	-	-	1880	4	6	94
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%			-20%							
'89		00%			00%			13%			+76%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	666	Dec:	0%			
												'89	532		12%			
												'97	2180		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										
Pachistima myrsinites															
S	83	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	16	-	-	-	-	-	-	16	-	-	-	1066		16
	97	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	83	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	95	2	-	-	-	-	-	97	-	-	-	6466		97
	97	-	-	-	-	-	-	-	-	-	-	-	0		0
M	83	6	-	-	-	-	-	-	6	-	-	-	400	16 49	6
	89	47	25	8	15	4	-	6	105	-	-	-	7000	10 9	105
	97	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
D	83	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	7	3	5	3	1	-	-	16	-	2	1	1266		19
	97	-	-	-	-	-	-	-	-	-	-	-	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%		Died out							
'97		00%		00%		00%									
Total Plants/Acre (excluding Dead & Seedlings)										'83	400	Dec:	0%		
										'89	14732		9%		
										'97	0		0%		
Rosa woodsii															
S	83	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	1	-	-	-	-	-	-	1	-	-	-	20		1
Y	83	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	16	-	-	8	-	-	-	24	-	-	-	480		24
M	83	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	89	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	97	20	-	-	-	-	-	-	20	-	-	-	400	9 8	20
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>							
'83		00%		00%		00%		None							
'89		00%		00%		00%		Appeared							
'97		00%		00%		00%									
Total Plants/Acre (excluding Dead & Seedlings)										'83	0	Dec:	-		
										'89	0		-		
										'97	880		-		

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	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8	
	97	8	-	-	2	-	-	-	-	-	10	-	-	-	200		10	
M	83	15	-	-	-	-	-	-	-	-	15	-	-	-	1000	32	31	15
	89	13	-	-	-	-	-	-	-	-	12	-	1	-	866	27	35	13
	97	94	-	-	24	-	-	-	-	-	118	-	-	-	2360	33	64	118
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	11	-	-	-	-	-	-	-	-	11	-	-	-	733		11	
	97	3	-	-	-	-	-	-	-	-	1	-	-	2	60		3	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	1000	Dec:	0%			
												'89	2132		34%			
												'97	2620		2%			

Trend Study 19B-5-97

Study site name: South of W. Government Creek.

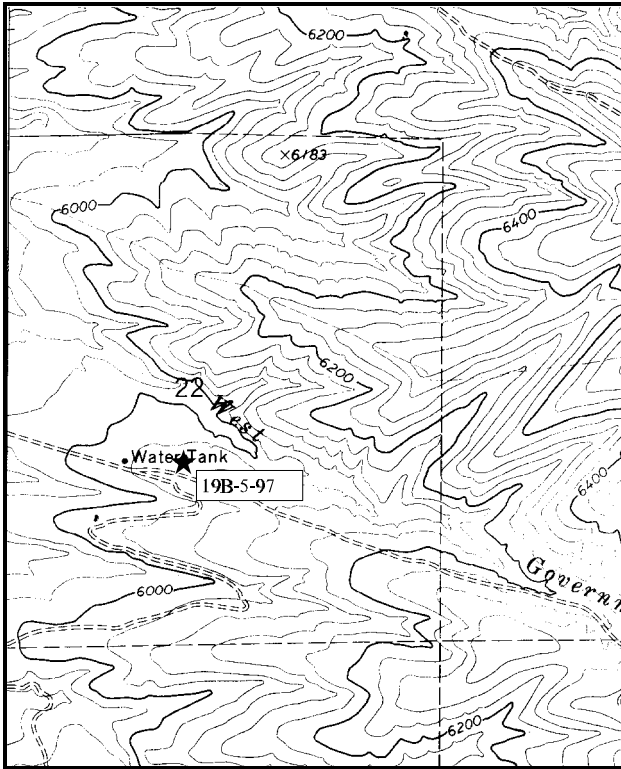
Range Type: Big Sagebrush-Grass

Compass bearing: frequency baseline 357 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11& 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

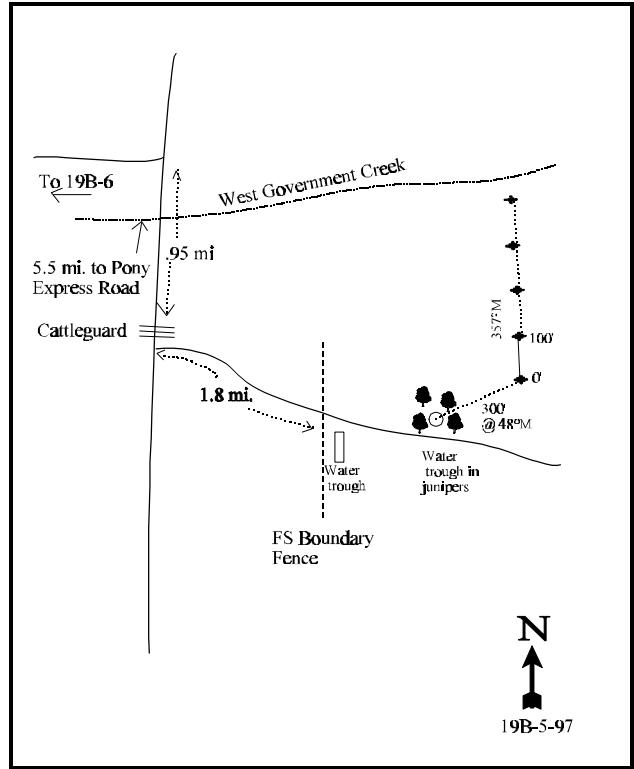
LOCATION DESCRIPTION

Turn south off the Pony Express Road onto the Erickson Pass Road. Go 4.6 miles to the turnoff to study #13-6. 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

Township 9S, Range 7W, Section 22



Diagrammatic Sketch

UTM 4430790.781 N, 361785.753 E

DISCUSSION

Trend Study No. 19B-5 (23/13-5)

The South of West Government Creek study samples deer winter range on Forest Service administered land. The site has a 3-5% slope and a west-northwest aspect. The range type is Wyoming big sagebrush-grass, however, the site 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. It was noted in 1983 that intense heavy cattle use was depressing grass vigor. Remnant tree windrows and drill rows are still partially visible, but are being concealed by a thick canopy cover of Wyoming big sagebrush. Past intense cattle grazing has contributed 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 re-occupying the site in the near future.

Soil is alluvial with a gravelly texture. The soil profile, judging from nearby road and stream cuts, appears relatively unconsolidated. Soil textural analysis indicates a loam with a slightly alkaline pH (7.6). The effective rooting depth (see methods) was estimated to be 12 inches with a soil temperature of 59°F measured at 14 inches. In 1983 and 1989, some soil erosion and plant pedestaling was apparent. Currently, percent bare ground has declined to 16% and there is no sign of excessive soil erosion.

Wyoming big sagebrush is the key dominate browse with an estimated density of 2,300 plants/acre in 1997. In 1983 and 1989 this shrub was identified as basin big sagebrush (*Artemisia tridentata tridentata*), but further scrutiny in 1997 revealed it is actually Wyoming big sagebrush (*Artemisia tridentata wyomingensis*). The decrease in the sagebrush density is the result of the much larger sampling design giving more accurate density estimates for browse species that have clumped and/or discontinuous distributions. Also, percent decadence is low, vigor is good, and there are no dead in the population. Age structure indicates a mature population that does not appear to be expanding. Utilization in 1997 was light to moderate with most plants exhibiting good vigor. An estimated canopy cover of 18% for Wyoming big sagebrush in 1997 will keep the herbaceous understory from reaching maximum production. Antelope bitterbrush was encountered and has an estimated density of 100 plants/acre in 1997. These plants are not fully available to animals and currently appear to be moderately hedged. Utilization was reported as heavy in 1983 and 1989. Broom snakeweed was encountered occasionally and has an estimated density of 240 plants/acre in 1997. Point-centered quarter data indicate 24 juniper trees/acre with an average diameter of 4.6 inches in 1997.

Crested wheatgrass is the most abundant grass contributing almost 9% cover. Crested wheatgrass nested frequency was highest in 1983 at 279 and has slowly declined to 231 in 1997. This decline is significant. Sandberg bluegrass nested frequency has significantly increased since 1989 and is now the second most abundant grass on the site. Conversely, intermediate wheatgrass has significantly declined in frequency since 1989, although it is still moderately abundant. Other grasses in low abundance include bluebunch wheatgrass and cheatgrass. Perennial sum of nested frequency shows a steady increase over all years.

Perennial forb sum of nested frequency is similar to that recorded in 1989. The most abundant forbs are: American vetch, longleaf phlox, Rydberg's sweetpea, silky milkvetch, and alfalfa. Annual forbs are abundant, the most common being pale alyssum and bur buttercup.

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 a stable browse trend. The herbaceous understory trend is stable with a moderately diverse understory.

1989 TREND ASSESSMENT

Although some soil loss appears to have occurred, the soil trend is upward with more protective ground cover now present. The browse trend is stable with little change in the Wyoming big sagebrush community. Although the herbaceous understory is depleted, perennial herbaceous understory sum of nested frequency has increased. This leads to a slightly upward herbaceous understory trend.

TREND ASSESSMENT

soil - upward

browse - stable

herbaceous understory - slightly upward

1997 TREND ASSESSMENT

The soil trend is slightly upward with a decrease in percent bare ground and litter cover. Soil erosion is minimal at this time. The browse trend is stable with similar age structures over all years. 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 upward

browse - stable

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 5

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron cristatum	_b 279	_{ab} 263	_a 231	94	96	85	8.53
G	Agropyron intermedium	_b 154	_c 192	_a 136	69	78	50	3.59
G	Agropyron spicatum	-	-	7	-	-	2	.18
G	Bromus tectorum (a)	-	-	12	-	-	5	.02
G	Oryzopsis hymenoides	1	-	-	1	-	-	-
G	Poa secunda	_a 39	_a 50	_b 168	18	24	70	3.95
G	Sitanion hystrix	3	-	-	1	-	-	-
Total for Grasses		476	505	554	183	198	212	16.29
F	Agoseris glauca	-	-	2	-	-	1	.00
F	Alyssum alyssoides (a)	-	-	249	-	-	87	.63
F	Antennaria rosea	_a -	_b 8	_{ab} 3	-	5	1	.00
F	Arabis spp.	-	-	6	-	-	3	.01
F	Astragalus ciliaris	_a 25	_b 74	_a 21	12	32	10	1.14
F	Astragalus convallarius	3	6	3	1	4	3	.04

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	Astragalus spp.	-	-	4	-	-	1	.00
F	Castilleja chromosa	-	2	1	-	1	1	.03
F	Calochortus nuttallii	1	-	1	1	-	1	.00
F	Chaenactis douglasii	16	9	3	6	3	1	.00
F	Cirsium neomexicanum	1	6	2	1	3	2	.03
F	Comandra pallida	-	-	3	-	-	1	.03
F	Collinsia parviflora (a)	-	-	45	-	-	21	.11
F	Crepis acuminata	14	26	15	6	13	7	.16
F	Cymopterus longipes	_a 11	_b 31	_a 10	6	18	4	.04
F	Erigeron spp.	-	-	3	-	-	1	.00
F	Eriogonum spp.	-	-	1	-	-	1	.03
F	Erigeron pumilus	_{ab} 16	_b 16	_a 6	10	11	3	.01
F	Galium boreale	-	-	4	-	-	3	.18
F	Lathyrus brachycalyx	_a -	_a -	_b 34	-	-	15	.37
F	Medicago sativa	_a 18	_b 38	_a 13	12	17	7	1.72
F	Microsteris gracilis (a)	-	-	23	-	-	8	.04
F	Petroradia pumila	_{ab} 30	_b 37	_a 18	17	17	10	.34
F	Phlox longifolia	55	69	68	26	31	30	.66
F	Ranunculus testiculatus (a)	-	-	200	-	-	67	1.00
F	Tragopogon dubius	-	2	-	-	1	-	-
F	Vicia americana	_a 4	_a -	_b 89	3	-	40	.57
Total for Forbs		194	324	827	101	156	329	7.21

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 19B, Study no: 5

T y p e	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata wyomingensis	73	17.67
B	Gutierrezia sarothrae	10	.03
B	Juniperus osteosperma	1	.85
B	Purshia tridentata	5	.71
Total for Browse		89	19.27

BASIC COVER --

Herd unit 19B, Study no: 5

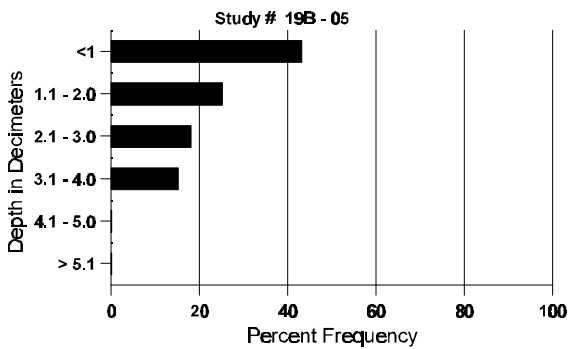
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	361	5.25	10.00	42.08
Rock	134	2.75	2.75	.76
Pavement	254	8.75	22.50	6.08
Litter	388	32.25	38.75	42.22
Cryptogams	190	0	0	4.57
Bare Ground	240	51.00	26.00	16.29

SOIL ANALYSIS DATA --

Herd Unit 19B, Study no: 05

Effective rooting depth (inches)	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	.2

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19B, Study no: 5

Type	Quadrat Frequency '97
Rabbit	21
Deer	3
Cattle	10

BROWSE CHARACTERISTICS --

Herd unit 19B , 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									
<i>Artemisia tridentata wyomingensis</i>														
S	83	35	-	-	-	-	-	-	35	-	-	1166		35
	89	1	-	-	-	-	-	-	1	-	-	33		1
	97	1	-	-	-	-	-	-	1	-	-	20		1
Y	83	21	8	-	-	-	-	-	29	-	-	966		29
	89	36	5	-	-	-	-	-	35	-	6	1366		41
	97	12	6	-	-	-	-	-	17	1	-	360		18
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
D	83	-	1	-	-	-	-	-	-	-	1	33		1
	89	14	-	-	-	-	-	-	9	1	2	466		14
	97	8	1	-	1	-	-	-	6	2	-	200		10
% 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%								
Total Plants/Acre (excluding Dead & Seedlings)										'83	3099	Dec:	1%	
										'89	5298		9%	
										'97	2300		9%	
<i>Gutierrezia sarothrae</i>														
S	83	-	-	-	-	-	-	-	-	-	-	0		0
	89	-	-	-	-	-	-	-	-	-	-	0		0
	97	1	-	-	-	-	-	-	1	-	-	20		1
Y	83	-	-	-	-	-	-	-	-	-	-	0		0
	89	-	-	-	-	-	-	-	-	-	-	0		0
	97	3	-	-	-	-	-	-	3	-	-	60		3
M	83	-	-	-	-	-	-	-	-	-	-	0	- -	0
	89	1	-	-	-	-	-	-	1	-	-	33	7 4	1
	97	9	-	-	-	-	-	-	9	-	-	180	12 11	9
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>				<u>%Change</u>				
'83		00%		00%		00%				Appeared				
'89		00%		00%		00%				+86%				
'97		00%		00%		00%								
Total Plants/Acre (excluding Dead & Seedlings)										'83	0	Dec:	-	
										'89	33		-	
										'97	240		-	

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																	
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%			None						
'89		00%			00%			00%			Appeared						
'97		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-		
												'89	0		-		
												'97	20		-		
Purshia tridentata																	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	-	-	-	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
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	-	-	1	-	-	1	-	-	-	2	-	-	-	66		2
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	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%									
Total Plants/Acre (excluding Dead & Seedlings)												'83	66	Dec:	0%		
												'89	132		50%		
												'97	100		0%		

Trend Study 19B-6-97

Study site name: Lee's Creek .

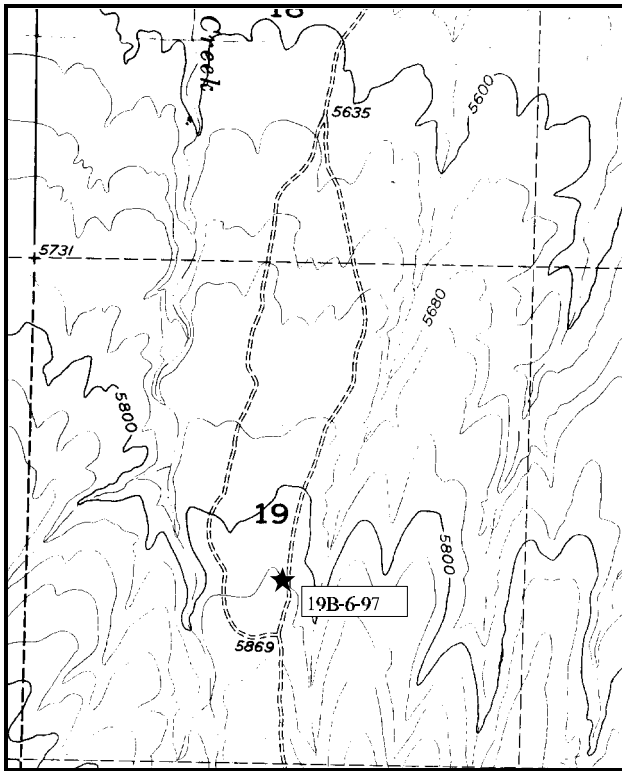
Range type: Chained, Seeded Pinyon-Juniper

Compass bearing: frequency baseline 345 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

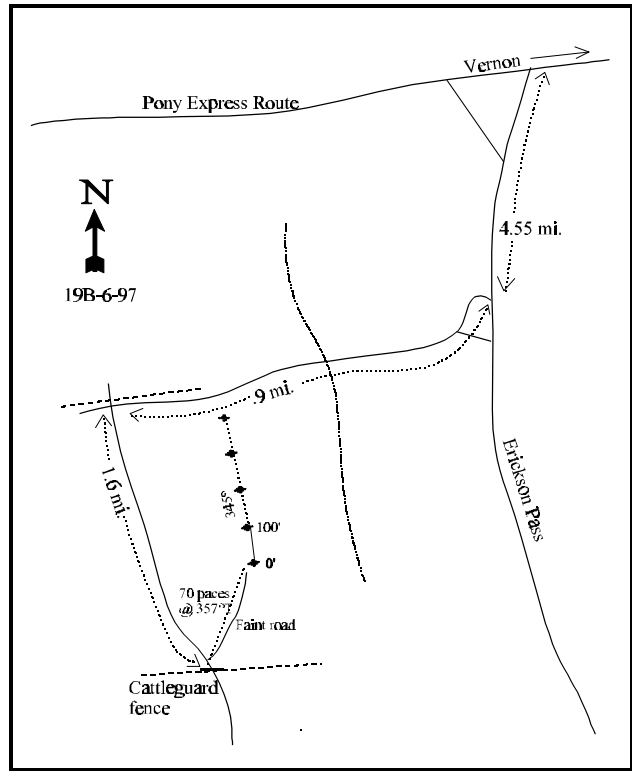
LOCATION DESCRIPTION

Starting at the intersection of the Erickson Pass and Pony Express Roads, proceed south on the Erickson Pass Road for 4.65 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 1.6 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 357 degrees true. The study runs at an azimuth of 345 degrees true. The baseline is marked by green steel "T" fenceposts approximately 12 to 18 inches in height. A red browse tag, number 3973, is attached to the 0-foot marker of the baseline.



Map Name: Indian Peaks, Utah

Township 9 S , Range 7 W , Section 19



Diagrammatic sketch

UTM 4430784.750 N , 357070.969 E

DISCUSSION

Trend Study No. 19B-6 (23/13-6)

The Lee's Creek study is located at an elevation of 5,640 feet in the lower portion of Lee's Creek drainage. The study samples an old BLM juniper-pinyon chaining. The study is situated on a north-south running ridge. Slope is gentle (3%) with a slight north aspect. It was noted in 1983 that the seeded grasses were heavily utilized by cattle causing vigor to be depressed. Later in 1989, their observations indicated that crested wheatgrass had not grown yet from the last grazing due to the exceptionally hot, 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. Currently, the area does not appear to be utilized heavily by deer but signs of cattle and rabbit were abundant. In 1997, cattle were grazing a burned area to the west of the study site. The study site is now a fairly narrow corridor between burned areas of the seeded juniper chaining.

Soil is alluvially deposited with minimal surface rock. Soil analysis indicates a loam texture with a neutral pH of 7.0. Estimated effective rooting depth (see methods) is 10 inches with an average temperature of 63°F measured at 13 inches. Soil phosphorous was measured to be 6.3 ppm which is considered low (10 ppm is considered minimal for normal plant development) and could limit vegetative growth. Erosion is currently minimal due to the mild slope and moderate vegetation and litter cover.

The Wyoming big sagebrush density increased to an estimated 2,260 plants/acre in 1997. In 1983, the age structure showed that the population was principally composed of seedlings and young plants and was expected to expand in the future. Current data indicates the population did expand with many seedling and young plants still being encountered. The biotic potential (78%) in 1997 was enormous with 1,760 seedling plants/acre inventoried. Utilization is light and plants exhibit good vigor. Canopy cover was estimated to be almost 5% in 1997. Antelope bitterbrush is present on the site with an estimated density of 20 plants/acre in 1997. Utilization is heavy, but would be expected with the density so low. The lower population estimate is the result of a much larger sample size giving more accurate estimates for species with clumped and/or discontinuous distributions. Point-centered quarter data indicates little change in Utah juniper density with 95 juniper trees/acre in 1989 and 93 juniper trees/acre in 1997. Other species scattered around the site include: white rubber rabbitbrush, pricklypear cactus, and broom snakeweed.

The herbaceous understory is dominated by crested wheatgrass, although nested frequency has significantly declined since 1989. Sandberg bluegrass is also prevalent on the site and has significantly increased in nested frequency. Cheatgrass is present, but in very low abundance. Other grasses include bottlebrush squirreltail and Letterman's needlegrass. In 1997, grass utilization was estimated to be about 20%. Some of the use may be a result of rabbits, of which there is abundant sign.

As reported in 1983, forbs are distinctly lacking. Three poor value species were encountered which show no evidence of current use. Hoods phlox, Douglas chaenactis, and rock goldenrod provide very little forage or ground cover. Annual species, primarily pale alyssum and bur buttercup dominate the forb component.

1983 APPARENT TRENDS ASSESSMENT

Although soil erosion or sedimentation are not currently serious problems, the 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 is stable. Browse data and visual observations indicate that the rather sparse Wyoming big sagebrush stand may be slowly increasing in density. Antelope bitterbrush, even though heavily hedged, is maintaining its population density. 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. The herbaceous understory trend is slightly upward with an increase in herbaceous understory sum of nested frequency.

TREND ASSESSMENT

soil - slightly downward

browse - stable

herbaceous understory - slightly upward

1997 TREND ASSESSMENT

The soil trend is stable. There is a decrease in percent bare ground (but still relatively high), rock, and pavement cover. 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, but 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

browse - up

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 6

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron cristatum	_b 298	_b 308	_a 277	97	98	93	10.01
G	Agropyron spicatum	_b 25	_a -	_a -	10	-	-	-
G	Bromus tectorum (a)	-	-	21	-	-	8	.21
G	Oryzopsis hymenoides	1	-	-	1	-	-	.00
G	Poa secunda	_a 94	_b 165	_c 215	44	71	79	4.44
G	Sitanion hystrix	_b 28	_a 8	_a 2	16	4	2	.03
G	Stipa lettermani	-	-	1	-	-	1	.03
Total for Grasses		446	481	516	168	173	183	14.74
F	Alyssum alyssoides (a)	-	-	116	-	-	41	.25
F	Astragalus spp.	-	1	8	-	1	4	.20
F	Astragalus utahensis	-	-	-	-	-	-	.00
F	Chaenactis douglasii	1	-	5	1	-	2	.01
F	Crepis acuminata	-	3	4	-	1	3	.01

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	Hymenoxys acaulis	-	4	-	-	2	-	-
F	Microsteris gracilis (a)	-	-	1	-	-	1	.00
F	Petradoria pumila	_a 4	_{ab} 11	_b 28	2	5	12	1.33
F	Phlox hoodii canescens	25	29	23	11	16	9	.31
F	Phlox longifolia	-	1	2	-	1	2	.01
F	Ranunculus testiculatus (a)	-	-	98	-	-	38	.31
F	Townsendia incana	-	2	-	-	1	-	-
F	Zigadenus paniculatus	-	-	-	-	-	-	.03
Total for Forbs		30	51	285	14	27	112	2.49

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 19B , Study no: 6

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata wyomingensis	42	4.61
B	Chrysothamnus nauseosus albicaulis	5	.01
B	Gutierrezia sarothrae	4	.30
B	Juniperus osteosperma	6	9.64
B	Purshia tridentata	1	-
Total for Browse		58	14.57

CANOPY COVER --

Herd unit 19B, Study no: 6

Species	Percent Cover '97
Juniperus osteosperma	6

BASIC COVER --

Herd unit 19B, Study no: 6

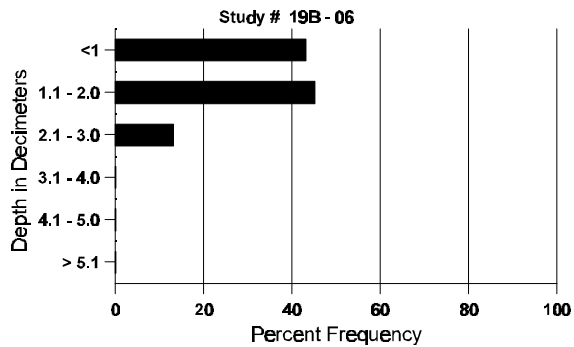
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	337	3.25	7.75	26.29
Rock	167	0	5.00	1.88
Pavement	299	4.50	11.50	11.55
Litter	386	59.75	36.75	32.06
Cryptogams	213	0	0	5.19
Bare Ground	281	32.50	39.00	24.19

SOIL ANALYSIS DATA --

Herd Unit 19B, Study no: 06

Effective rooting depth (inches)	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	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19B, Study no: 6

Type	Quadrat Frequency '97
Rabbit	27
Deer	14
Cattle	22

BROWSE CHARACTERISTICS --

Herd unit 19B, 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 wyomingensis</i>																		
S	83	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	89	-	-	-	3	-	-	-	-	-	3	-	-	-	100		3	
	97	86	-	-	2	-	-	-	-	-	88	-	-	-	1760		88	
Y	83	10	-	-	-	-	-	-	-	-	10	-	-	-	333		10	
	89	6	2	-	-	-	-	-	-	-	7	-	1	-	266		8	
	97	77	4	-	-	-	-	-	-	-	81	-	-	-	1620		81	
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	
D	83	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	89	1	1	-	-	-	-	-	-	-	2	-	-	-	66		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
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		05%			00%			00%			- 0%							
'89		38%			00%			14%			+69%							
'97		06%			.88%			05%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	699	Dec:	14%				
											'89	698		9%				
											'97	2260		0%				
<i>Chrysothamnus nauseosus albicaulis</i>																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	4	1	2	-	-	-	-	-	-	4	-	1	-	140		7	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		14%			29%			14%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	-				
											'89	0		-				
											'97	140		-				

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>Gutierrezia sarothrae</i>																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	10	-	-	-	-	-	-	-	-	10	-	-	-	200	7 10	10	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	240		-			
<i>Juniperus osteosperma</i>																		
M	83	2	-	-	-	-	-	-	-	-	2	-	-	-	66	67 41	2	
	89	3	-	-	-	-	-	-	-	-	3	-	-	-	100	87 52	3	
	97	4	-	-	2	-	-	-	-	-	6	-	-	-	120	- -	6	
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%			+34%							
'89		00%			00%			00%			+17%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	66	Dec:	-			
												'89	100		-			
												'97	120		-			

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				
Leptodactylon pungens																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	83	3	-	-	-	-	-	-	-	-	3	-	-	-	100	8 15	3	
	89	2	-	-	-	-	-	-	-	-	2	-	-	-	66	6 7	2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	2	-	-	-	-	-	-	-	-	-	-	-	2	66		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	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%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	100	Dec:	0%				
											'89	198		33%				
											'97	0		0%				
Opuntia spp.																		
M	83	1	-	-	-	-	-	-	-	-	-	1	-	-	33	6 15	1	
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33	6 15	1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6 21	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%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	33	Dec:	-				
											'89	33		-				
											'97	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				
Purshia tridentata																		
Y	'83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	'97	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1	
M	'83	-	-	4	-	-	-	-	-	-	4	-	-	-	133	13	31	4
	'89	-	-	4	-	-	-	-	-	-	4	-	-	-	133	10	19	4
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	9	24	0
D	'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%			100%			00%			+20%							
'89		00%			80%			20%			-88%							
'97		00%			100%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	133	Dec:	0%			
												'89	166		20%			
												'97	20		0%			

Trend Study 19B-7-97

Study site name: Judd Creek .

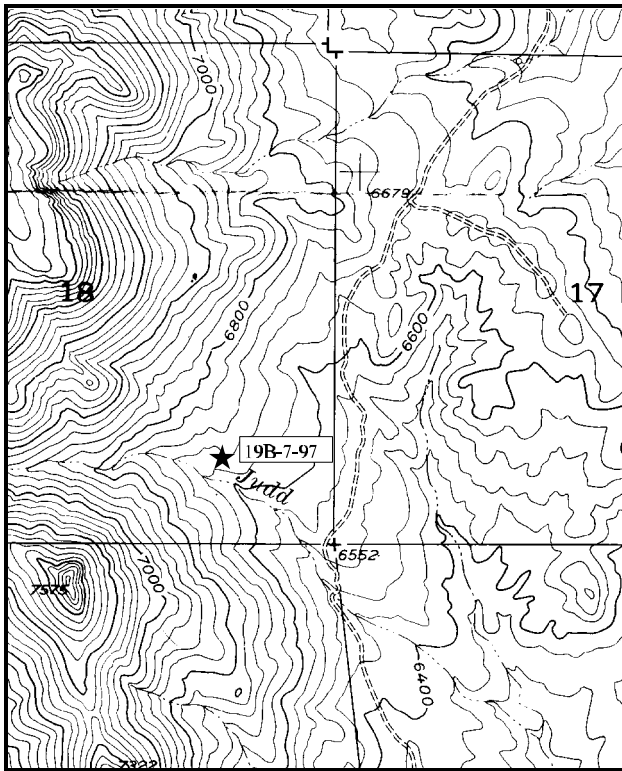
Range type: Mountain Brush

Compass bearing: frequency baseline 115 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

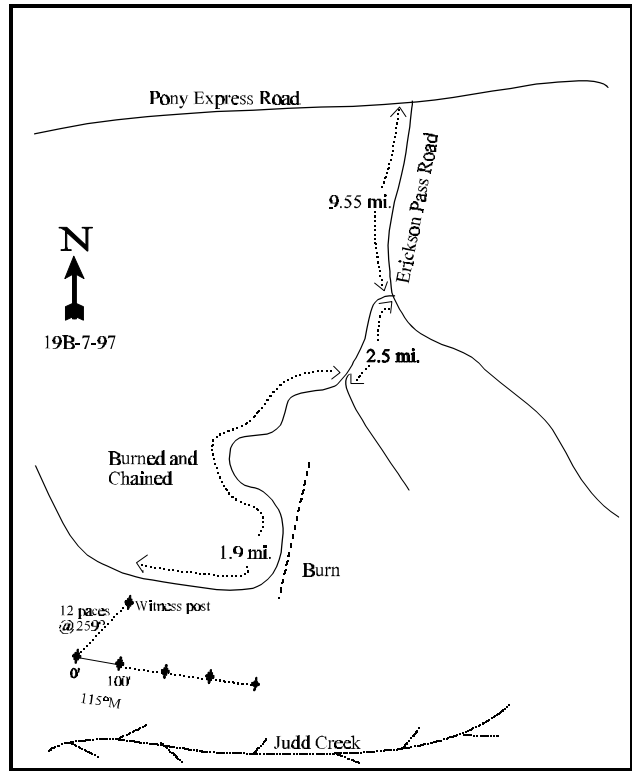
LOCATION DESCRIPTION

Starting at the intersection of the Pony Express and Erickson Pass Roads, proceed south on the 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 259 degrees true. The baseline runs on an azimuth of 136 degrees true. The study is marked by green steel "T" fenceposts approximately 12 to 18 inches in height.



Map Name: Indian Springs, Utah

Township 10 S, Range 7 W, Section 18



Diagrammatic Sketch

UTM 4423214.038 N, 357382.827 E

DISCUSSION

Trend Study No. 19B-7 (23/13-7)

The Judd Creek study is located within a small parcel of private property surrounded by BLM land. The area is winter range for deer and is also used by cattle during the spring-fall period. The study area is on a gentle slope (5%) with a southeast aspect and elevation of 6,200 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 were within the burned areas.

The soil condition is currently good with no apparent erosion occurring. The effective rooting depth is 9 inches with a soil temperature of 67°F measured at 12 inches. Soil textural analysis indicates it to be a clay loam with a neutral pH (6.7). The fire has decreased litter from 61% in 1989 to 29% in 1997. Currently, a majority of the litter is contributed by burned juniper. Percent rock and pavement cover combined have also increased from 18% in 1989 to 24% after the fire. Rocks on the soil surface vary in size from pebbles to large angular rocks several feet in diameter.

Few browse species are found within the burned areas. 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. Plants exhibited light to moderate utilization, yet 86% of the population were reportedly in poor vigor. Currently, the estimated density is 340 plants/acre. Utilization is light and only 18% of the population show poor vigor. The antelope bitterbrush density declined from 2,166 plants/acre in 1989 to 360 plants/acre in 1997. Most of these plants were found in the unburned areas and are lightly utilized and exhibit good vigor. Utah serviceberry density has change very little with an estimated density of 60 plants/acre in 1997. This is a stable population with light apparent use. Utilization was reported as heavy in both 1983 and 1989.

Oregon grape has the highest estimated browse density of 1,480 plants/acre. Even at this density they only provide 4% of the browse cover. However, this estimate is quite a bit lower than the 1989 estimation of 20,099 plants/acre. These plants are extremely small statured averaging 2 inches in height and 4 inches in crown diameter. This small size is probably an indication of the site potential. Broom snakeweed is the second most abundant browse with an estimated density of 1,160 plants/acre, yet they only provide 2% of the browse cover. Average height is 9 inches and average crown diameter is 5 inches in 1997. This population has changed very little over all years. The population appears stable at this time, but could easily increase in the future with the right climatic conditions and disturbance. Other scattered browse species include: stickyleaf low rabbitbrush, pricklypear cactus, Wood's rose, and mountain snowberry.

Bluebunch wheatgrass sum of nested frequency has not significantly changed over any year and currently provides 43% of the grass cover. Cheatgrass is the second most abundant grass by providing 37% of the grass cover. It is scattered throughout the site and not as dense as might be expected following a fire in this area. Indian ricegrass and muttongrass have significantly decreased in nested frequency while Sandberg bluegrass and Kentucky bluegrass have significantly increased in nested frequency. The two seeded grasses (crested wheatgrass and intermediate wheatgrass) only contribute 3% of the grass cover at this time. Other grasses include: crested wheatgrass, intermediate wheatgrass, oniongrass, bottlebrush squirreltail, and Letterman's needlegrass.

Forbs provide the bulk of the vegetative cover and are an important feature of this site. The more preferred and succulent forbs continue to be uncommon, but nonetheless provide some needed forage variety. Overall perennial forb sum of nested frequency is relatively similar to that reported prior to the fire event. Some palatable species; American vetch, wild onion, houndstongue, and Louisiana sage, show significant declines in nested frequency.

1983 APPARENT TREND ASSESSMENT

Soil trend is 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 apparently thickening juniper tree 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 is stable.

1989 TREND ASSESSMENT

Protective ground cover characteristics remain almost unchanged. The soil trend remains 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

browse - slightly downward

herbaceous understory - stable

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 the browse density was decreased by the fire for the key species, the vigor of the populations are good. The populations appear stable at this time, but could increase with the right climatic conditions. Increaser or invader species are in low abundance, but they 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

browse - slightly upward

herbaceous understory - downward

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 7

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	<i>Agropyron cristatum</i>	-	-	1	-	-	1	.15
G	<i>Agropyron intermedium</i>	-	-	7	-	-	3	.09
G	<i>Agropyron smithii</i>	-	-	3	-	-	1	.03
G	<i>Agropyron spicatum</i>	59	72	85	26	28	38	3.92
G	<i>Bromus tectorum</i> (a)	-	-	186	-	-	69	3.39
G	<i>Melica bulbosa</i>	-	-	2	-	-	1	.00
G	<i>Oryzopsis hymenoides</i>	_b 62	_b 62	_a 19	30	28	8	.12
G	<i>Phleum pratense</i>	-	-	1	-	-	1	.00
G	<i>Poa fendleriana</i>	_b 38	_c 95	_a 13	20	43	6	.28
G	<i>Poa pratensis</i>	_a -	_a -	_b 19	-	-	8	.16
G	<i>Poa secunda</i>	_a 12	_b 47	_b 57	4	22	20	.98
G	<i>Sitanion hystrix</i>	6	9	1	4	4	1	.00
G	<i>Stipa lettermani</i>	-	-	2	-	-	1	.03
Total for Grasses		177	285	396	84	125	158	9.18
F	<i>Agoseris glauca</i>	_b 14	_a -	_{ab} 3	5	-	2	.06
F	<i>Alyssum alyssoides</i> (a)	-	-	189	-	-	62	3.73
F	<i>Allium</i> spp.	_b 122	_a 28	_b 105	51	14	38	1.12
F	<i>Antennaria rosea</i>	-	-	3	-	-	1	.15
F	<i>Arabis</i> spp.	-	4	-	-	2	-	-
F	<i>Artemisia ludoviciana</i>	_b 32	_b 23	_a 3	15	13	3	.30
F	<i>Aster chilensis</i>	_b 50	_b 52	_a -	21	25	-	-
F	<i>Astragalus convallarius</i>	5	6	15	3	3	6	.23
F	<i>Astragalus</i> spp.	_a -	_a 3	_b 25	-	1	12	.16
F	<i>Astragalus utahensis</i>	-	2	-	-	1	-	-
F	<i>Balsamorhiza sagittata</i>	5	4	9	3	2	3	.56
F	<i>Castilleja linariaefolia</i>	-	-	1	-	-	1	.00
F	<i>Camelina microcarpa</i> (a)	-	-	21	-	-	12	.63
F	<i>Calochortus nuttallii</i>	12	8	8	7	3	4	.04
F	<i>Cirsium</i> spp.	_b 33	_{ab} 25	_a 10	16	11	5	.29
F	<i>Collomia linearis</i> (a)	-	-	17	-	-	8	.06
F	<i>Comandra pallida</i>	33	27	59	18	13	26	.99
F	<i>Collinsia parviflora</i> (a)	-	-	47	-	-	18	.21
F	<i>Crepis acuminata</i>	_a 18	_b 38	_a 11	10	22	6	.46
F	<i>Cryptantha</i> spp.	13	9	9	6	5	4	.07

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	<i>Delphinium nelsonii</i>	2	-	-	1	-	-	-
F	<i>Descurainia</i> spp. (a)	-	-	3	-	-	1	.18
F	<i>Erodium cicutarium</i> (a)	-	-	1	-	-	1	.00
F	<i>Erigeron</i> spp.	-	-	3	-	-	1	.03
F	<i>Eriogonum racemosum</i>	-	-	3	-	-	1	.00
F	<i>Galium boreale</i>	-	-	5	-	-	2	.18
F	<i>Hackelia patens</i>	_c 61	_b 22	_a 5	30	14	2	.01
F	<i>Lathyrus brachycalyx</i>	_a -	_a -	_b 25	-	-	10	.37
F	<i>Linum lewisii</i>	_b 13	_a -	_a 3	6	-	1	.01
F	<i>Lithospermum ruderales</i>	17	30	16	9	13	8	1.32
F	<i>Lomatium grayi</i>	4	5	11	2	3	5	.05
F	<i>Microsteris gracilis</i> (a)	-	-	26	-	-	12	.08
F	<i>Monolepis nuttalliana</i> (a)	3	-	-	1	-	-	-
F	<i>Oenothera</i> spp.	1	-	-	1	-	-	-
F	<i>Penstemon</i> spp.	-	3	-	-	1	-	-
F	<i>Petrorhiza pumila</i>	_a -	_{ab} 2	_b 8	-	1	4	.24
F	<i>Phlox longifolia</i>	_a 54	_b 172	_b 167	26	71	68	1.27
F	<i>Polygonum douglasii</i> (a)	-	-	14	-	-	7	.18
F	<i>Ranunculus testiculatus</i> (a)	-	-	36	-	-	15	.51
F	<i>Taraxacum officinale</i>	_a -	_a -	_b 7	-	-	4	.05
F	<i>Tragopogon dubius</i>	_b 21	_a -	_b 19	11	-	9	.47
F	<i>Trifolium</i> spp.	-	-	1	-	-	1	.00
F	Unknown forb-perennial	-	1	-	-	1	-	-
F	<i>Veronica biloba</i> (a)	-	-	54	-	-	19	.21
F	<i>Vicia americana</i>	_b 168	_b 188	_a 43	68	74	20	.59
F	<i>Viguiera multiflora</i>	-	-	1	-	-	1	.00
Total for Forbs		681	652	986	310	293	403	14.92

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 19B, Study no: 7

Type	Species	Strip Frequency '97	Average Cover % '97
B	Amelanchier utahensis	3	.63
B	Artemisia tridentata wyomingensis	10	3.13
B	Cercocarpus montanus	1	-
B	Chrysothamnus nauseosus albicaulis	0	-
B	Chrysothamnus viscidiflorus viscidiflorus	5	.18
B	Gutierrezia sarothrae	16	.19
B	Juniperus osteosperma	2	2.92
B	Mahonia repens	20	.41
B	Opuntia spp.	9	.33
B	Purshia tridentata	13	2.36
B	Rosa woodsii	9	.26
B	Symphoricarpos oreophilus	3	.15
B	Tetradymia canescens	5	.03
Total for Browse		96	10.61

CANOPY COVER --

Herd unit 19B, Study no: 7

Species	Percent Cover '97
Juniperus osteosperma	2

BASIC COVER --

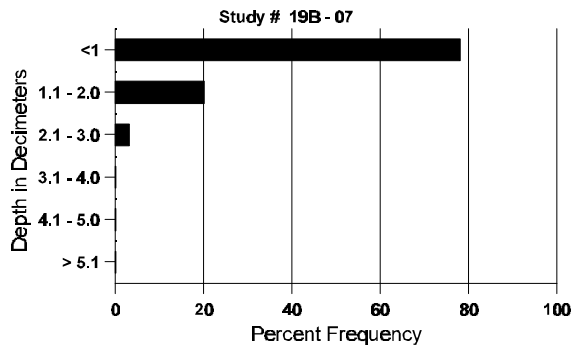
Herd unit 19B, Study no: 7

Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	329	2.25	4.75	34.89
Rock	246	12.50	8.50	8.64
Pavement	334	7.00	9.50	14.81
Litter	355	59.00	60.75	28.76
Cryptogams	41	0	0	.87
Bare Ground	286	19.25	16.50	15.31

SOIL ANALYSIS DATA --
 Herd Unit 19B, Study no: 07

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	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	.8

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 19B, Study no: 7

Type	Quadrat Frequency '97
Rabbit	5
Deer	11
Cattle	5

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 7

Age	Year	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
M	'83	-	-	1	-	-	-	-	-	-	-	-	1	-	33	35	35	1
	'89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	-	-	-	1	-	-	-	-	-	1	-	-	-	20	27	35	1
D	'83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'89	-	-	2	-	-	-	-	-	-	2	-	-	-	66			2
	'97	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
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%			100%			100%			+50%							
'89		00%			100%			00%			- 9%							
'97		00%			00%			33%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	33	Dec:	0%			
												'89	66		100%			
												'97	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				
<i>Artemisia tridentata wyomingensis</i>																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	83	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	89	2	-	-	-	-	-	-	-	-	1	-	1	-	66		2	
	97	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	
D	83	-	7	1	-	-	-	-	-	-	2	5	1	-	266		8	
	89	8	18	-	1	-	-	-	-	-	2	1	24	-	900		27	
	97	5	-	-	-	-	-	-	-	-	3	-	-	2	100		5	
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	260		13	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	1265	Dec:	21%			
												'89	1466		61%			
												'97	340		29%			
<i>Cercocarpus montanus</i>																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
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%			None							
'89		00%			00%			00%			Appeared							
'97		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	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 nauseosus albicaulis</i>																	
D	83	2	-	-	-	-	-	-	-	-	2	-	-	-	66		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%			00%			00%			Died out						
'89		00%			00%			00%			None						
'97		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'83	66	Dec:	100%			
											'89	0		0%			
											'97	0		0%			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																	
M	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33	13 28	1
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33	11 13	1
	97	8	-	-	-	-	-	-	-	-	8	-	-	-	160	14 19	8
% 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%									
Total Plants/Acre (excluding Dead & Seedlings)											'83	33	Dec:	-			
											'89	33		-			
											'97	160		-			
<i>Gutierrezia sarothrae</i>																	
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2
	97	11	-	-	-	-	-	-	-	-	11	-	-	-	220		11
Y	83	12	-	-	-	-	-	-	-	-	12	-	-	-	400		12
	89	10	-	-	4	-	-	-	-	-	14	-	-	-	466		14
	97	18	-	-	-	-	-	-	-	-	18	-	-	-	360		18
M	83	58	-	-	-	-	-	-	-	-	58	-	-	-	1933	9 7	58
	89	169	-	-	8	-	-	-	-	-	177	-	-	-	5900	8 8	177
	97	39	-	-	-	-	-	-	-	-	39	-	-	-	780	9 5	39
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	26	-	-	-	-	-	-	-	-	25	-	1	-	866		26
	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%			+68%						
'89		00%			00%			.46%			-84%						
'97		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'83	2333	Dec:	0%			
											'89	7232		12%			
											'97	1160		2%			

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	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	89	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	83	-	-	-	1	-	-	-	-	-	1	-	-	-	33	67	79	1
	89	-	-	-	1	-	-	-	-	-	1	-	-	-	33	138	118	1
	97	-	-	-	1	-	-	-	-	-	1	-	-	-	20	-	-	1
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%			+50%							
'89		00%			00%			00%			-70%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	66	Dec:	-				
											'89	133		-				
											'97	40		-				
Mahonia repens																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	4	-	-	13	-	-	-	-	-	17	-	-	-	566		17	
	97	17	-	-	-	-	-	-	-	-	17	-	-	-	340		17	
Y	83	24	-	-	-	-	-	-	-	-	24	-	-	-	800		24	
	89	67	-	-	39	-	-	-	-	-	106	-	-	-	3533		106	
	97	21	-	-	-	-	-	-	-	-	19	-	-	-	420		21	
M	83	305	-	-	-	-	-	-	-	-	305	-	-	-	10166	4	6	305
	89	297	-	-	200	-	-	-	-	-	497	-	-	-	16566	3	3	497
	97	53	-	-	-	-	-	-	-	-	53	-	-	-	1060	2	4	53
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	10966	Dec:	-				
											'89	20099		-				
											'97	1480		-				

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	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33	4	16	1
	89	9	-	-	-	-	-	-	-	-	8	-	1	-	300	6	8	9
	97	9	-	-	3	-	-	-	-	-	12	-	-	-	240	6	14	12
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%			+60%							
'89		00%			00%			10%			-16%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	133	Dec:	0%				
											'89	333		0%				
											'97	280		7%				
Purshia tridentata																		
Y	83	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1	
	89	3	3	-	-	-	-	-	-	-	5	-	1	-	200		6	
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
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
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	18	-	-	-	-	-	-	-	18	-	-	-	600		18	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	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		17%			83%			00%			+65%							
'89		65%			29%			02%			-83%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	766	Dec:	0%				
											'89	2166		28%				
											'97	360		11%				

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				
Rhus spp.																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	30	48	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			None							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	0		-			
Rosa woodsii																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	32	-	-	-	-	-	-	-	-	32	-	-	-	640			32
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	10	5	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	660		-			

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				
Symphoricarpos oreophilus																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	1	-	-	-	-	-	1	-	-	-	33		1	
	97	1	-	-	2	-	-	-	-	-	3	-	-	-	60		3	
M	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33	11 18	1	
	89	-	-	-	1	-	-	-	-	-	-	-	1	-	33	13 15	1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	19 32	0	
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	4	-	-	-	-	-	4	-	-	-	80		4	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	33	Dec:	0%				
											'89	66		0%				
											'97	140		57%				
Tetradymia canescens																		
Y	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	89	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	83	4	-	-	-	-	-	-	-	-	4	-	-	-	133	5 10	4	
	89	3	1	-	-	-	-	-	-	-	1	-	3	-	133	7 10	4	
	97	6	-	-	-	-	-	-	-	-	6	-	-	-	120	10 7	6	
D	83	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	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%			-13%							
'89		14%			00%			43%			-31%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	266	Dec:	38%				
											'89	232		14%				
											'97	160		0%				

DISCUSSION

Trend Study No. 19B-8 (23/13-8)

*** This site was not read in 1997.*** Refer to the 1983 and 1989 Utah Range Trend Studies report for maps and data tables. The site burned in 1996, leaving no browse species, creating a poor winter range for deer.

The South Pine Canyon study is located on Forest Service administered land and samples important deer winter range. Elevation is 6,880 feet and exposure is south to southeast with a 30%-35% slope. The range type is mixed mountain brush interspersed with a low to moderate number of Utah juniper trees. The herbaceous understory is sparse.

Soil is rocky, well-drained and there is little evidence of any topsoil development. However, the area shows signs of significant sheet and gully erosion. Litter and vegetative cover are lacking in shrub interspaces and have been replaced by bare ground or erosion pavement. Pedestaling of plants is common.

Browse composition is dominated by three palatable shrubs, which together should be considered the key species. These include: Saskatoon serviceberry, Antelope bitterbrush, and mountain big sagebrush. The percentage of mature bitterbrush plants has declined 33% since 1983. Overall, the populations appear to be stable. Utilization is heavy on the Antelope bitterbrush and moderate on the Saskatoon serviceberry and mountain big sagebrush. The density of junipers encountered in 1989 did not change from 1983.

Grass composition is dominated by bluebunch wheatgrass. Fewer plants were encountered in 1989, but the plants encountered were larger than reported in 1983. Cattle apparently graze the limited wheatgrass heavily. Forbs have a diverse species composition but provide little forage or ground cover. The most common species; American vetch, Sierra onion, spring parsley, longleaf phlox, and thistle, are all poor to medium value forage plants. More desirable species such as redroot eriogonum, tapertip hawksbeard or gray lomatium occur infrequently. Undesirable invaders and/or increasers are rare.

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 seeding establishment of more desirable plants. The browse trend is more stable, however, some discouraging signs are apparent. The most notable is the 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 heavy use and decline of antelope bitterbrush, 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 downward.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - slightly downward

Trend Study 19B-9-97

Study site name: North Oak Brush Canyon .

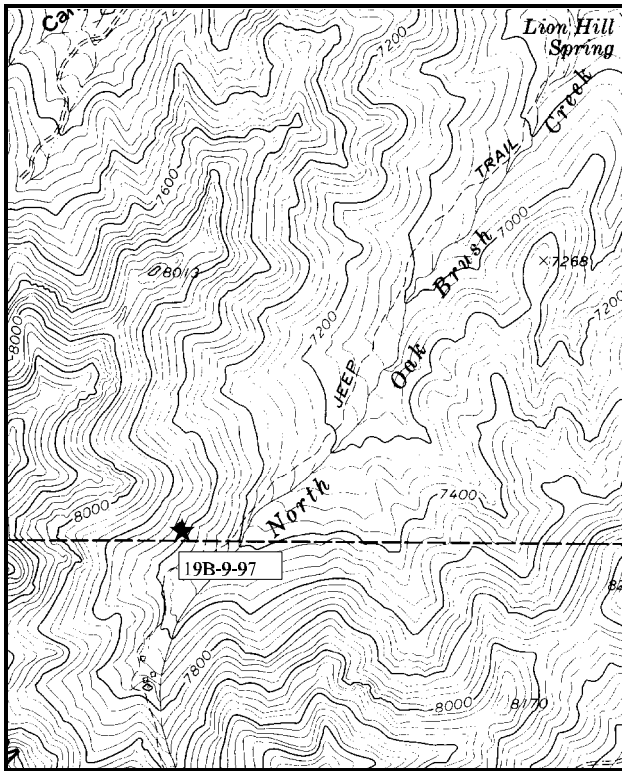
Range Type: Mixed Oak Sagebrush

Compass bearing: frequency baseline 315 degrees. (Line 3 138°M)

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (59ft), line 3 (34 & 71ft).

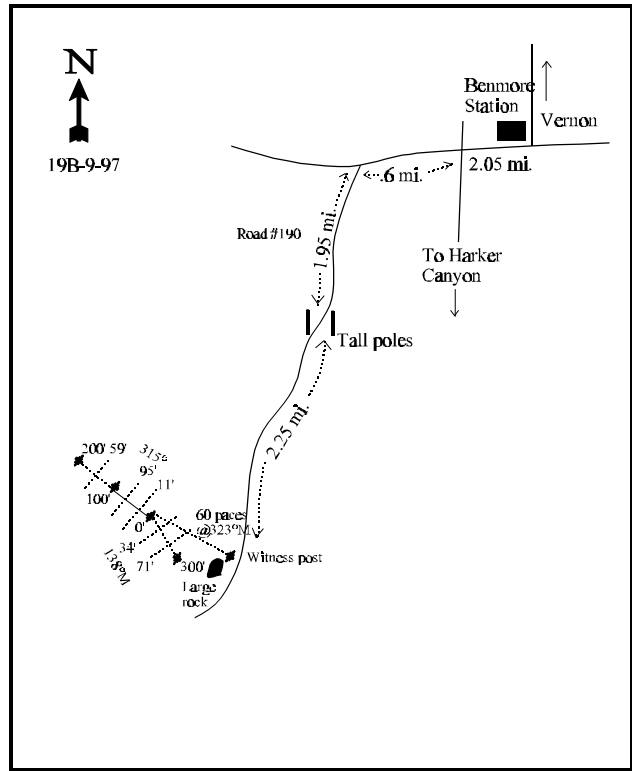
LOCATION DESCRIPTION

From the Forest Service Benmore Work Station, go west 2.65 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 1.95 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 an azimuth of 323 degrees up to the 0-foot baseline stake. This stake is marked by browse tag #3980.



Map Name: Erickson Knoll .

Township 9S , Range 6W , Section unsurveyed



Diagrammatic Sketch

UTM 4426799.580 N, 370299.262 E

DISCUSSION

Trend Study No. 19B-9 (23/13-9)

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 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 visitation 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 was 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 and 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 shrubs averaging just under four feet in height. With the greatly increased sample size used in 1997, the estimated density of Gambel oak is 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 temporary insect damage. Utilization was also reported as moderate at that time. Utilization in 1997 is light and the plants exhibit good vigor. The 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 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 vegetative 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 than 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 is stable. The rate of soil formation currently exceeds the rate of loss. The herbaceous understory and browse trend are 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 dominate 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

browse - stable

herbaceous understory - stable

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 and forb sum of nested frequency slightly decreased.

TREND ASSESSMENT

soil - slightly upward

browse - stable

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 9

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	<i>Bromus tectorum</i> (a)	-	-	11	-	-	4	.02
G	<i>Leucopoa kingii</i>	_a 82	_b 118	_{ab} 113	40	47	46	4.65
G	<i>Melica bulbosa</i>	_b 19	_a -	_a -	8	-	-	-
G	<i>Poa fendleriana</i>	_a 42	_b 80	_b 101	20	33	36	4.19
G	<i>Poa pratensis</i>	-	-	3	-	-	1	.03
G	<i>Poa secunda</i>	-	6	16	-	2	7	.67
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 cibarius</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 bicolor</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

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
Total for Forbs		495	507	572	224	227	263	11.03

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 19B, Study no: 9

Type	Species	Strip Frequency '97	Average Cover % '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	Pachistima myrsinites	0	-
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 --

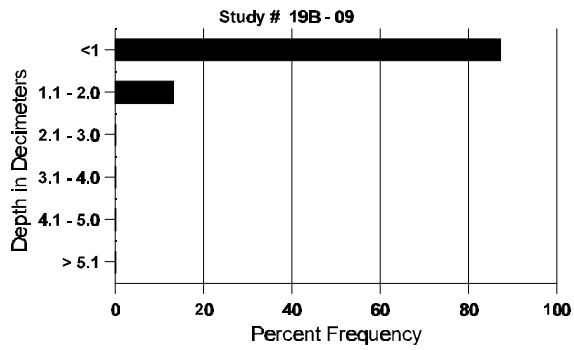
Herd unit 19B, Study no: 9

Cover Type	Nested Frequency '97	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: 09

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	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

Stoniness Index



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 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	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	-	-	-	-	-	-	-	-	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 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	-	-	-	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%		Appeared											
'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%			Appeared							
'89		25%			00%			00%			Died out							
'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%			Died out							
'89		00%			00%			00%			None							
'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%			None							
'89		00%			00%			00%			Appeared							
'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%			None							
'89		00%			00%			00%			Appeared							
'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%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	6466	Dec:	-			
												'89	7733		-			
												'97	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		
Quercus gambelii										
S	83	7	-	-	-	-	-	-	7	7
	89	65	-	-	-	-	-	-	65	65
	97	2	-	-	19	-	-	4	25	25
Y	83	62	1	-	-	-	-	-	62	63
	89	286	1	-	-	-	-	-	287	287
	97	210	6	-	58	-	-	2	263	276
M	83	23	89	81	-	-	-	-	96	193
	89	-	1	-	-	-	-	-	1	1
	97	200	25	-	21	-	-	7	246	253
D	83	-	-	-	-	-	-	-	0	0
	89	18	6	-	-	-	-	-	15	24
	97	8	4	-	1	-	-	2	7	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	3
Y	83	-	-	-	-	-	-	-	0	0
	89	-	-	-	-	-	-	-	0	0
	97	26	-	-	26	-	-	2	52	54
M	83	-	-	-	-	-	-	-	0	0
	89	-	-	-	-	-	-	-	0	0
	97	14	-	-	17	-	-	3	34	34
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>% Change</u>		
'83		00%		00%		00%		None		
'89		00%		00%		00%		Appeared		
'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	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
M	83	-	-	2	-	-	-	-	-	-	-	-	-	-	133	20	13	2
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	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%			Died out							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	133	Dec:	-			
												'89	0		-			
												'97	80		-			

Trend Study 19B-10-97

Study site name: Sioux Pass

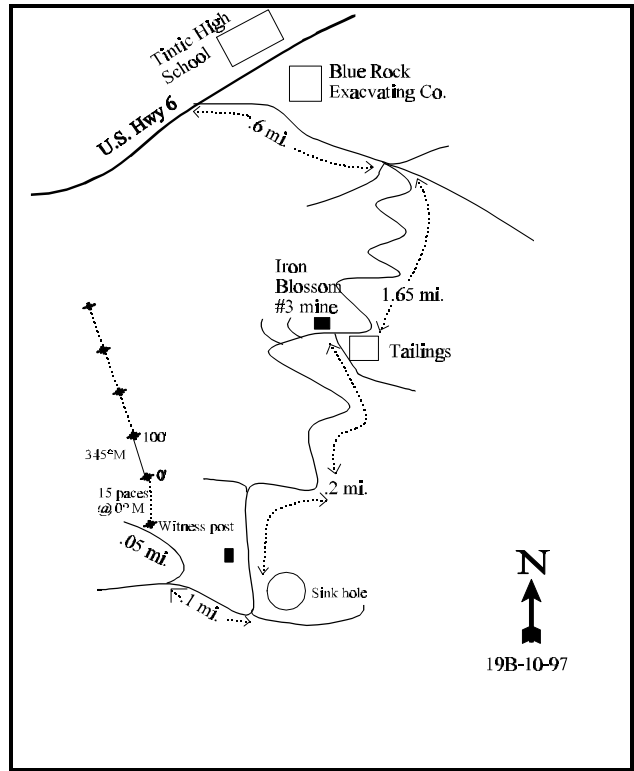
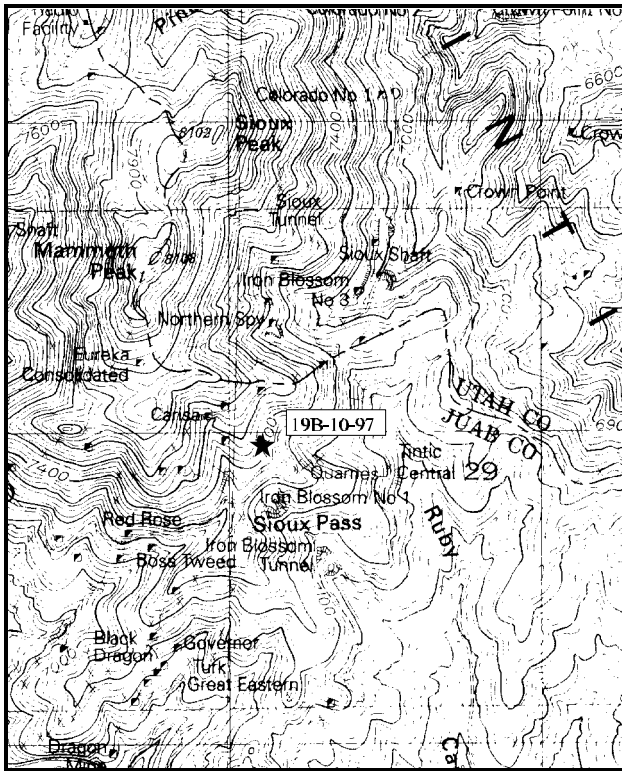
Range type: Mixed Mountain Brush

Compass bearing: frequency baseline 345 degrees. (lines 2-4, 330°M)

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Highway U.S. 50-6 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 (i.e., 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, Utah

Diagrammatic Sketch

Township 10 S, Range 2 W, Section 29

UTM 4419929.159 N, 406107.939 E

DISCUSSION

Trend Study No. 19B-10 (24/14-1)

The Sioux Pass study is located at an elevation of 7,400 feet on a moderately steep (30%) east-northeast facing slope. The study samples deer summer range located on private property. The mixed 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 occupancy was apparent. Currently, the site appears to receive moderate deer use with some sign of elk, rabbit, and sheep.

The soil is rocky on the surface and throughout the profile. Soil textural analysis indicates it to be a sandy loam with a neutral pH (6.7). The effective rooting depth (see methods) is 15 inches with a soil temperature of 43°F measured at almost 17 inches. Erosion continues to occur, but not excessively.

Browse composition includes a wide variety of shrub species. The key browse species are mountain big sagebrush and Antelope bitterbrush. Mountain big sagebrush density was estimated to be 2,399 plants/acre in 1983 and 3,099 plants/acre in 1989. Currently, the mountain big sagebrush density is estimated to be 2,880 plants/acre. Many of the young plants previously encountered are now mature. Percent decadency (19%) is relatively similar to that reported in past years. Utilization remains light while vigor shows an improvement since 1989. The mountain big sagebrush plants had abundant seed production in 1997. Currently, Antelope bitterbrush estimated density is 1,300 plants/acre, and continues to receive the heaviest utilization on the site. This population appears to be stable with good vigor and low percent decadency reported in 1997.

Other preferred shrubs include Saskatoon serviceberry and Martin ceanothus. Saskatoon serviceberry provides very little vegetative cover with an estimated density of 120 plants/acre in 1997. Utilization is moderate. Martin ceanothus density is currently estimated to be 160 plants/acre. This estimated density is quite a bit lower than previous estimates due to the increased sample size used in 1997. Increaser shrubs are primarily stickyleaf low rabbitbrush, white rubber rabbitbrush, broom snakeweed, and pricklypear cactus.

Grass composition consists of three perennial bunch grasses and cheatgrass. Nested frequency is low and relatively little forage is produced. The most abundant species is bluebunch wheatgrass which has slightly increased in nested frequency since 1989, but not significantly. Indian ricegrass is the next most abundant perennial grass with a nested frequency that has changed very little since 1983. Sandberg bluegrass is rarely encountered. Cheatgrass was found in 78% of the quadrats and provides 35% of the grass cover.

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 helps provide some of the succulence forage needed by summering deer.

1983 APPARENT TREND ASSESSMENT

The soil trend is stable. Erosion will continue unless the herbaceous understory thickens. Browse trend is stable, especially 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 stable.

TREND ASSESSMENT

soil - stable

browse - slightly downward

herbaceous understory - stable

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 slightly down. 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, but percent decadency still remains relatively high. Fifty percent 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

browse - stable

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 10

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron spicatum	_a 83	_{ab} 101	_b 123	32	40	49	3.69
G	Bromus tectorum (a)	-	-	224	-	-	78	2.20
G	Oryzopsis hymenoides	19	20	15	10	11	8	.30
G	Poa fendleriana	3	-	-	1	-	-	-
G	Poa secunda	1	2	2	1	1	2	.03
Total for Grasses		106	123	364	44	52	137	6.23
F	Arabis spp.	-	-	1	-	-	1	.03
F	Calochortus nuttallii	4	-	-	2	-	-	-
F	Chenopodium fremontii (a)	-	-	9	-	-	6	.11
F	Chenopodium leptophyllum (a)	-	-	4	-	-	1	.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	Cirsium spp.	_b 10	_{ab} 3	_a -	5	1	-	-
F	Collomia linearis (a)	-	-	1	-	-	1	.00
F	Corallorrhiza maculata	-	1	-	-	1	-	-
F	Crepis acuminata	-	2	1	-	2	1	.03
F	Cryptantha spp.	-	-	1	-	-	1	.00
F	Cynoglossum officinale	-	2	2	-	1	2	.03
F	Epilobium paniculatum (a)	-	-	3	-	-	2	.01
F	Eriogonum racemosum	_a 9	_b 25	_a 4	4	12	3	.01
F	Eriogonum umbellatum	6	16	10	2	6	4	.09
F	Hackelia patens	7	10	5	4	4	2	.04
F	Lappula occidentalis (a)	-	-	5	-	-	2	.01
F	Lactuca serriola	-	6	-	-	2	-	-
F	Lepidium spp. (a)	-	-	5	-	-	2	.01
F	Lomatium spp.	3	1	-	1	1	-	-
F	Lupinus spp.	_a 6	_b 17	_a 4	2	8	2	.15
F	Machaeranthera canescens	_b 27	_a 2	_a 2	14	1	2	.06
F	Mentzelia albicaulis (a)	-	-	18	-	-	9	.11
F	Oenothera pallida	3	-	-	1	-	-	-
F	Penstemon humilis	_b 46	_a -	_b 34	19	-	12	.30
F	Penstemon spp.	-	-	14	-	-	7	.23
F	Phlox longifolia	_a 6	_b 50	_a 25	3	25	12	.11
F	Polygonum douglasii (a)	-	-	9	-	-	5	.02
F	Sisymbrium altissimum (a)	-	-	4	-	-	2	.01
F	Streptanthus cordatus	2	-	-	2	-	-	-
F	Tragopogon dubius	-	-	2	-	-	1	.00
Total for Forbs		129	135	163	59	64	80	1.42

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 19B, Study no: 10

Type	Species	Strip Frequency '97	Average Cover % '97
B	Acer grandidentatum	3	1.26
B	Amelanchier utahensis	6	.15
B	Artemisia tridentata vaseyana	76	15.04
B	Cercocarpus ledifolius	3	.15
B	Ceanothus martinii	4	.74
B	Chrysothamnus nauseosus albicaulis	2	.15
B	Chrysothamnus viscidiflorus viscidiflorus	56	1.73
B	Eriogonum microthecum	27	1.05
B	Gutierrezia sarothrae	0	-
B	Opuntia spp.	22	1.42
B	Pinus monophylla	-	.63
B	Purshia tridentata	44	6.42
B	Symphoricarpos oreophilus	3	.03
Total for Browse		246	28.80

BASIC COVER --

Herd unit 19B, Study no: 10

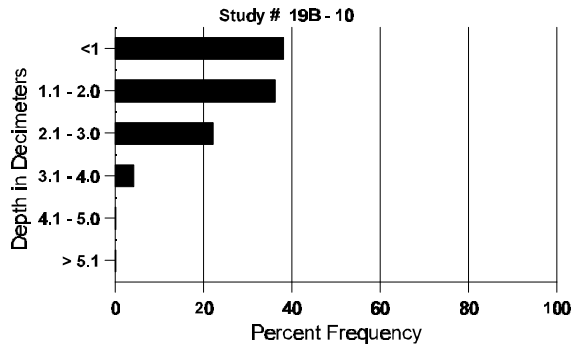
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	308	4.25	12.50	35.70
Rock	268	14.50	14.25	15.34
Pavement	263	2.25	1.25	9.17
Litter	388	48.00	37.75	40.42
Cryptogams	8	0	0	.16
Bare Ground	223	31.00	34.25	11.55

SOIL ANALYSIS DATA --

Herd Unit 19B, Study no: 10

Effective rooting depth (inches)	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	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19B, Study no: 10

Type	Quadrat Frequency '97
Sheep	4
Rabbit	4
Elk	4
Deer	29

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 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				
Acer grandidentatum																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	10	-	-	-	-	-	-	2	-	12	-	-	-	240			12
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	67	36	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>			% Change							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	240		-			

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 utahensis																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	1	-	-	-	-	-	1	-	-	-	33		1	
	97	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	-	1	1	-	-	1	-	-	-	3	-	-	-	60	30	29	3
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%			Appeared							
'89		00%			00%			00%			+73%							
'97		33%			33%			17%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	0%				
											'89	33		0%				
											'97	120		17%				
Artemisia tridentata vaseyana																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	5	-	-	1	-	-	-	-	-	6	-	-	-	200		6	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	83	19	-	-	-	-	-	-	-	-	18	-	1	-	633		19	
	89	33	-	-	1	-	-	-	-	-	22	-	12	-	1133		34	
	97	1	-	-	-	1	-	-	-	-	2	-	-	-	40		2	
M	83	30	8	-	-	-	-	-	-	-	38	-	-	-	1266	20	22	38
	89	38	9	1	-	-	-	-	-	-	24	1	23	-	1600	26	33	48
	97	81	26	6	-	1	-	-	-	-	113	-	-	1	2280	21	37	114
D	83	9	6	-	-	-	-	-	-	-	6	-	9	-	500		15	
	89	9	2	-	-	-	-	-	-	-	2	-	6	3	366		11	
	97	21	6	-	1	-	-	-	-	-	14	-	-	14	560		28	
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	920		46	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	2399	Dec:	21%				
											'89	3099		12%				
											'97	2880		19%				

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				
Cercocarpus ledifolius																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	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%			None							
'89		00%			00%			00%			Appeared							
'97		33%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	60		-			
Ceanothus martinii																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	28	-	-	-	-	-	-	-	-	28	-	-	-	933			28
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	83	-	2	26	-	-	-	-	-	-	18	-	10	-	933	16	20	28
	89	5	-	-	-	-	-	-	-	-	5	-	-	-	166	12	30	5
	97	3	-	-	-	-	-	-	-	-	-	-	-	3	60	13	39	3
D	83	-	-	3	-	-	-	-	-	-	-	-	3	-	100			3
	89	74	-	-	-	-	-	-	-	-	73	-	1	-	2466			74
	97	-	-	-	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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	1033	Dec:	10%			
												'89	3565		69%			
												'97	160		25%			

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 albicaulis													
Y	83	2	-	-	-	-	-	-	2	66		2	
	89	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	0		0	
M	83	3	-	-	-	-	-	-	3	100	11 14	3	
	89	1	1	-	-	-	-	-	1	66	16 18	2	
	97	1	-	-	-	-	-	-	1	20	8 28	1	
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%		-60%			
'89		50%			00%			00%		-39%			
'97		00%			00%			00%					
Total Plants/Acre (excluding Dead & Seedlings)										'83	166	Dec:	0%
										'89	66		0%
										'97	40		50%
Chrysothamnus viscidiflorus viscidiflorus													
S	83	-	-	-	-	-	-	-	-	0		0	
	89	1	-	-	2	-	-	2	-	166		5	
	97	-	-	-	-	-	-	-	-	0		0	
Y	83	11	-	-	-	-	-	-	11	366		11	
	89	10	-	-	-	-	-	-	10	333		10	
	97	2	-	-	1	-	-	-	3	60		3	
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	
D	83	-	-	-	-	-	-	-	-	0		0	
	89	13	1	-	-	-	-	-	12	466		14	
	97	3	-	-	2	-	-	-	4	100		5	
% 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%					
Total Plants/Acre (excluding Dead & Seedlings)										'83	3366	Dec:	0%
										'89	4132		11%
										'97	2140		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>Eriogonum microthecum</i>																
Y	83	2	-	-	-	-	-	-	1	1	-	-	66		2	
	89	1	-	-	-	-	-	-	1	-	-	-	33		1	
	97	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
D	83	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	4	-	-	1	-	-	-	5	-	-	-	166		5	
	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		35%			00%			00%			+46%					
'89		02%			02%			00%			-60%					
'97		00%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)										'83	1032	Dec:	0%			
										'89	1899		9%			
										'97	760		0%			
<i>Gutierrezia sarothrae</i>																
S	83	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	2	-	-	-	-	-	-	2	-	-	-	66		2	
	97	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	83	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	3	-	-	-	-	-	-	3	-	-	-	100		3	
	97	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	83	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	42	-	-	-	-	-	-	42	-	-	-	1400	7	7	42
	97	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	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%			Appeared					
'89		00%			00%			00%			Died out					
'97		00%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)										'83	0	Dec:	0%			
										'89	1533		2%			
										'97	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			
Opuntia spp.																	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	-	-	-	1	-	-	1	-	-	2	-	-	-	66		2
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4
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
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	4	-	-	1	-	-	-	-	-	3	-	-	2	100		5
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%			- 9%						
'89		00%			00%			10%			+55%						
'97		00%			00%			05%									
Total Plants/Acre (excluding Dead & Seedlings)											'83	366	Dec:	0%			
											'89	332		0%			
											'97	740		14%			
Purshia tridentata																	
Y	83	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1
	89	-	-	-	-	-	1	-	-	-	1	-	-	-	33		1
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
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
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	-	1	7	-	-	-	-	-	-	7	-	1	-	266		8
	97	-	-	3	1	-	-	1	-	-	4	-	-	1	100		5
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		04%			96%			61%			+18%						
'89		11%			86%			07%			+28%						
'97		20%			69%			02%									
Total Plants/Acre (excluding Dead & Seedlings)											'83	766	Dec:	0%			
											'89	932		29%			
											'97	1300		8%			

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	-	-	-	2	-	-	-	-	-	-	2	-	-	40	-	-	2
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%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			33%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	0%			
												'89	0		0%			
												'97	60		33%			

Trend Study 19B-11-97

Study site name: Water Canyon.

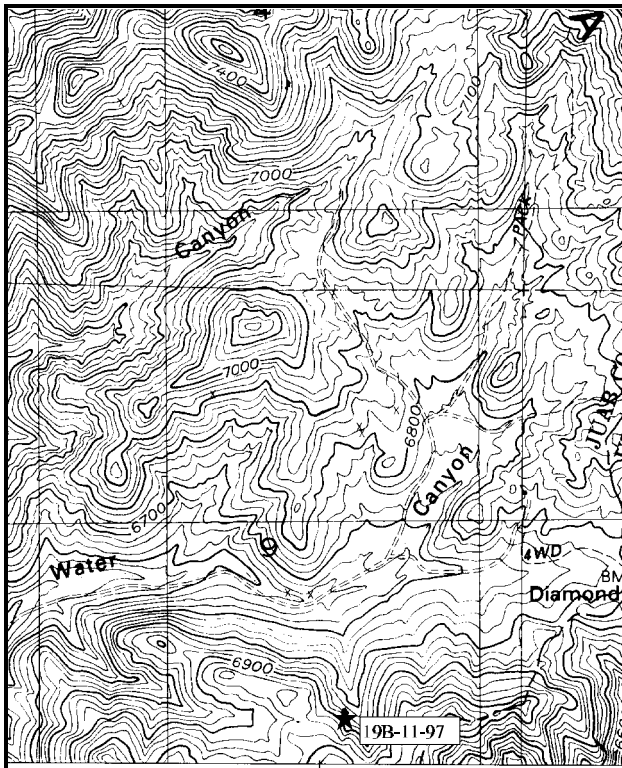
Range type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 197 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

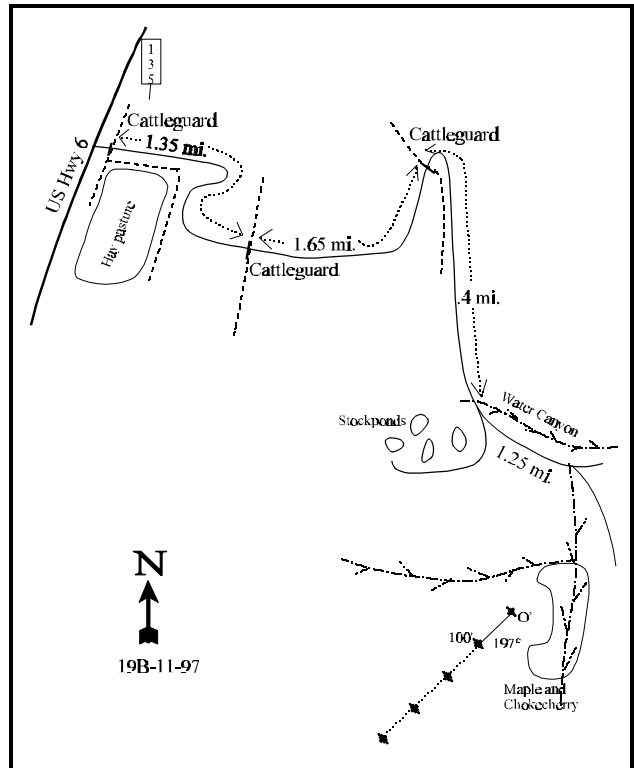
LOCATION DESCRIPTION

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 (i.e., south) up a steep hill. This is just below (i.e., 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 (i.e., 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, Utah .

Township 11S, Range 2W, Section 9



Diagrammatic Sketch

UTM 4414337.498 N, 408587.960 E

DISCUSSION

Trend Study No. 19B-11 (24/14-2)

The Water Canyon study is located on deer summer range at an elevation of 6,900 feet. The site is 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 site. 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 (see methods) 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 pedestaled for the first part of the study.

The key browse species is mountain big sagebrush with an estimated density in 1997 of 3,060 plants/acre. 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-centered 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 from 313 to 190. 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% if 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 overgrazed 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 is 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. The 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

browse - slightly downward

herbaceous understory - upward

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

browse - stable

herbaceous understory - downward

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 11

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
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 inermis</i>	-	-	1	-	-	1	.03
G	<i>Bromus marginatus</i>	_b 8	_a 1	_a -	3	1	-	-
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

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	<i>Stipa nelsonii</i>	a ⁻	b ¹⁰³	b ⁸⁹	-	39	38	1.33
Total for Grasses		243	313	321	105	132	132	4.35
F	<i>Agoseris glauca</i>	3	-	-	1	-	-	-
F	<i>Allium</i> spp.	a ⁻	a ⁻	b ¹⁰	-	-	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 ⁻	b ¹⁴	ab ⁶	-	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>	c ²⁸⁵	b ²²³	a ¹³⁰	93	87	52	6.24
F	<i>Epilobium paniculatum</i> (a)	-	-	16	-	-	7	.03
F	<i>Erigeron</i> spp.	a ⁻	b ¹¹	b ⁸	-	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>	a ³⁷	b ¹⁴³	b ¹³⁵	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>	a ¹⁸	b ⁴⁵	b ⁴⁴	9	22	22	.16
F	<i>Polygonum douglasii</i> (a)	-	-	41	-	-	19	.12
F	<i>Senecio integerrimus</i>	a ⁻	c ¹³⁷	b ³²	-	61	17	.29
F	<i>Taraxacum officinale</i>	a ⁻	b ⁶⁰	b ⁴⁶	-	31	22	.68
F	<i>Tragopogon dubius</i>	3	-	1	1	-	1	.03
F	<i>Verbascum thapsus</i>	a ⁻	a ¹	b ¹⁰	-	1	6	.58
F	<i>Vicia americana</i>	-	-	4	-	-	2	.03
F	<i>Viola</i> spp.	-	3	1	-	1	1	.00

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'83	'89	'97	'83	'89	'97	'97
Total for Forbs		366	673	785	132	294	351	16.89

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 19B, Study no: 11

T y p e	Species	Strip Frequency '97	Average Cover % '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 --

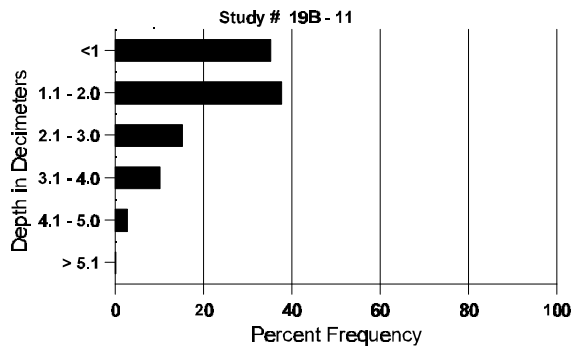
Herd unit 19B, Study no: 11

Cover Type	Nested Frequency '97	Average Cover %		
		'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

Herd Unit 19B, Study no: 11

Effective rooting depth (inches)	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	.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) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
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	15	6	-	1	2	-	-	-	-	7	1	4	12	740		37	
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	2	-	-	4	-	-	-	-	-	2	-	-	4	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 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%			None							
	'89	00%			00%			00%			Appeared							
	'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%			Appeared							
	'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	75	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'83	00%			00%			00%			None							
	'89	00%			00%			00%			Appeared							
	'97	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	1500		-			

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				
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	17
	89	3	-	-	-	-	-	-	-	-	3	-	-	-	200	5	7	3
	97	7	-	2	6	-	-	4	-	-	19	-	-	-	380	4	6	19
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	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100	7	10	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'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-12-97

Study site name: Sunrise Canyon

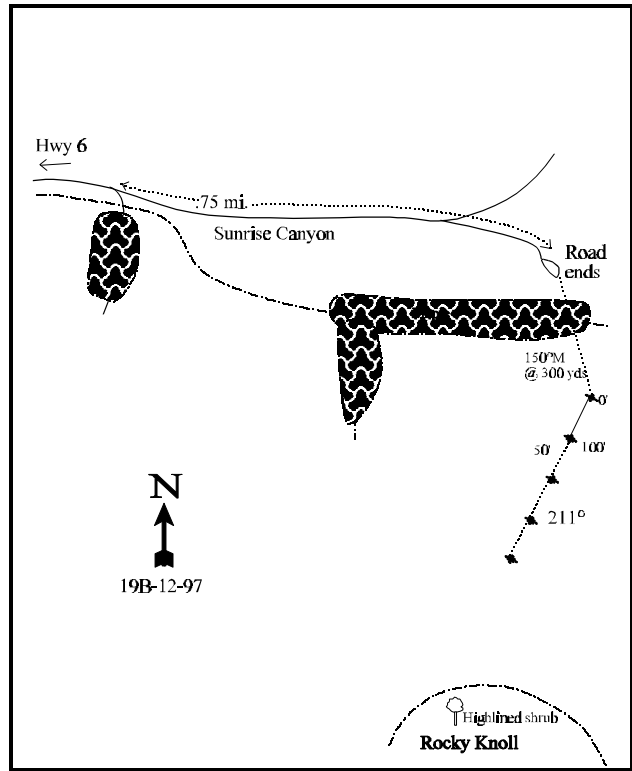
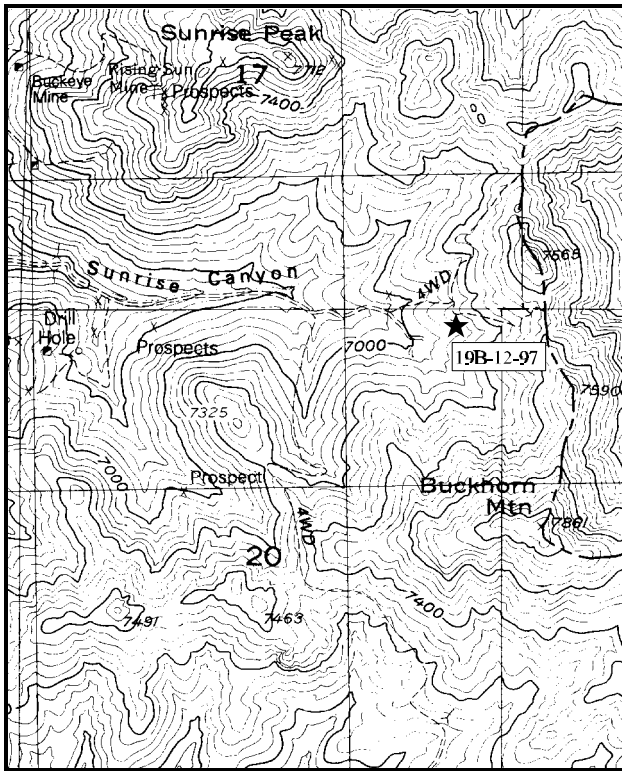
Range type: Big Sagebrush-Grass

Compass bearing: frequency baseline 211 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

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 (i.e., 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 attached, is located approximately midway up the slope and in the middle of the ridge.



Map Name: Tintic Mountain, Utah

Diagrammatic Sketch

Township 11 S, Range 2 W, Section 20

UTM No Data Available

DISCUSSION

Trend Study No. 19B-12 (24/14-3)

The Sunrise Canyon study is located on a northwest facing 35% slope (varies from 30% to 40%) at an elevation of 7,100 feet. The area is deer summer range and is occupied by a sagebrush-grass type. Vegetationally, 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 are concentrated more in the chokecherry and maple bottoms below the site.

The soil is very shallow and rocky. The effective rooting depth (see methods) is just over 7 inches with a soil temperature of 55°F measured at 13 inches. This is the most shallow measurement in subunit 19B. Soil textural analysis indicates it to be a sandy clay loam with a slightly acidic pH (6.1). Vegetative cover is moderate and comes primarily from shrub crowns (61% of the total cover). The slope is terraced by a network of trails, mostly livestock.

Shrub composition is diverse but composed principally of low growing species. The most abundant shrub is low sagebrush which contributes 53% of the browse cover with an estimated density of 6,700 plants/acre in 1997. This is mostly a mature population with light to moderate use. The percentage of the plants classified with poor vigor has declined from 60% in 1989 to 9% in 1997. Mountain big sagebrush is also present, making up 37% of the browse cover, with a current estimated density of 1,720 plants/acre. This estimate is comparable to earlier estimates of 1,665 plants/acre in 1983 and 1,865 plants/acre in 1989. Utilization is mostly light and vigor is improving, where in 1989, 60% were classified with poor vigor. Percent decadency has increased to 30%. For these two key browse species, both are showing increases in percent decadency where 40% to 50% of the decadent plants were classified as dying. Their densities appear to continue to decline. Stickyleaf low rabbitbrush has an estimated density of 2,900 plants/acre in 1997. This is nearly double the 1989 estimate of 1,533 plants/acre. Some light utilization is evident on this mostly mature population. Other browse species are found in low densities and include: Saskatoon serviceberry, true mountain mahogany, white rubber rabbitbrush, slenderbush eriogonum, Oregon grape, pricklypear cactus, mountain lover, mountain snowberry, and grey horsebrush.

Bluebunch wheatgrass nested frequency has significantly increased since 1989. There has been some confusion in the past with the identification of the bluegrasses. In 1997, only two bluegrasses were encountered; mutton and Sandberg bluegrass. The data tables reflect the change accordingly. Cheatgrass and Nelson's needlegrass were also encountered, but in low abundance. Overall perennial sum of nested frequency has declined slightly since 1989.

Nested frequency of perennial forbs is similar to that reported in 1989. The most abundant is lupine, followed by Kings sandwort. Annual forbs occur infrequently.

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, albeit 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%) with 18% bare ground cover. 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 density increase and 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 1989. The herbaceous understory trend is slightly downward.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - slightly downward

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 slightly down because of continued losses to low sagebrush and mountain big sagebrush and that 40% to 50% of the decadent plants are classified as dying. As reported in 1989, there is still little change in the browse composition. Utilization has declined but percent decadency has slightly increased. If grazing pressures are reduced, it will take several years for the community to recover and exhibit improving trends. The herbaceous understory trend is stable. The perennial herbaceous understory sum of nested frequency has declined since 1989, but only slightly. Productivity is low, possibly due to the browse canopy cover.

TREND ASSESSMENT

soil - stable, poor condition

browse - slightly down

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 12

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron spicatum	a103	a64	b138	42	33	56	2.02
G	Bromus tectorum (a)	-	-	15	-	-	8	.04
G	Carex spp.	1	-	-	1	-	-	-
G	Koeleria cristata	3	-	-	1	-	-	-
G	Melica bulbosa	b29	a-	a-	12	-	-	-
G	Poa fendleriana	b237	b254	a157	96	100	55	3.25
G	Poa secunda	a7	ab23	b29	5	12	15	.20

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	<i>Stipa columbiana</i>	3	8	8	1	3	4	.44
Total for Grasses		383	349	347	158	155	138	5.97
F	<i>Antennaria rosea</i>	a-	a-	b10	-	-	4	.04
F	<i>Arabis</i> spp.	13	9	3	7	3	2	.01
F	<i>Arenaria kingii</i>	b174	b153	a91	65	62	38	1.93
F	<i>Astragalus</i> spp.	a-	b11	a3	-	4	2	.01
F	<i>Castilleja chromosa</i>	4	-	-	2	-	-	-
F	<i>Calochortus nuttallii</i>	b6	a-	a-	5	-	-	-
F	<i>Chaenactis douglasii</i>	2	2	-	1	1	-	-
F	<i>Chenopodium</i> spp. (a)	-	-	1	-	-	1	.00
F	<i>Collomia linearis</i> (a)	-	-	2	-	-	1	.00
F	<i>Collinsia parviflora</i> (a)	-	-	27	-	-	12	.06
F	<i>Cynoglossum officinale</i>	a1	a-	b37	1	-	20	1.76
F	<i>Erigeron</i> spp.	b12	c28	a-	7	15	-	-
F	<i>Eriogonum umbellatum</i>	1	4	-	1	2	-	-
F	<i>Heuchera parvifolia</i>	3	-	-	1	-	-	-
F	<i>Lactuca serriola</i>	a-	a-	b7	-	-	5	.02
F	<i>Lithospermum ruderales</i>	3	5	1	2	2	1	.00
F	<i>Lomatium</i> spp.	-	2	-	-	2	-	-
F	<i>Lupinus</i> spp.	a55	b84	b120	25	40	57	6.30
F	<i>Machaeranthera canescens</i>	7	7	3	4	3	1	.00
F	<i>Petroradia pumila</i>	b25	a4	a-	12	2	-	-
F	<i>Phlox hoodii canescens</i>	c91	a16	b47	40	6	25	.82
F	<i>Polygonum douglasii</i> (a)	-	-	21	-	-	10	.07
F	<i>Senecio integerrimus</i>	a-	b11	a2	-	5	1	.00
F	Unknown forb-perennial	10	-	-	4	-	-	-
F	<i>Zigadenus paniculatus</i>	3	8	5	1	4	2	.01
Total for Forbs		410	344	380	178	151	182	11.08

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 19B, Study no: 12

Type	Species	Strip Frequency '97	Average Cover % '97
B	<i>Acer grandidentatum</i>	1	-
B	<i>Amelanchier alnifolia</i>	1	-
B	<i>Artemisia arbuscula</i>	61	14.27
B	<i>Artemisia tridentata vaseyana</i>	48	10.08
B	<i>Cercocarpus montanus</i>	1	-
B	<i>Chrysothamnus nauseosus albicaulis</i>	1	-
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	36	1.12
B	<i>Eriogonum microthecum</i>	27	.49
B	<i>Mahonia repens</i>	8	.48
B	<i>Opuntia</i> spp.	2	.63
B	<i>Pachistima myrsinites</i>	1	-
B	<i>Symphoricarpos oreophilus</i>	10	.06
B	<i>Tetradymia canescens</i>	2	.03
Total for Browse		199	27.18

BASIC COVER --

Herd unit 19B, Study no: 12

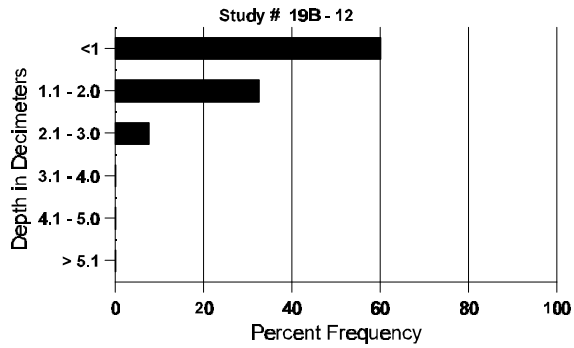
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	302	2.75	9.25	39.82
Rock	301	28.50	24.75	20.16
Pavement	267	4.75	7.25	7.75
Litter	384	48.00	40.50	39.36
Cryptogams	28	0	0	.16
Bare Ground	218	16.00	18.25	13.54

SOIL ANALYSIS DATA --

Herd Unit 19B, Study no: 12

Effective rooting depth (inches)	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	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19B, Study no: 12

Type	Quadrat Frequency '97
Sheep	6
Deer	10

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 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>Acer grandidentatum</i>																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	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%				None						
	'89	00%			00%			00%				Appeared						
	'97	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	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				
Amelanchier alnifolia																		
Y	83	1	-	-	-	-	-	-	-	-	-	-	-	66			1	
	89	1	-	-	-	-	-	-	-	-	-	-	-	66			1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	97	-	-	-	1	-	-	-	-	-	-	-	-	20	25	11	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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	66	Dec:	-			
												'89	66		-			
												'97	20		-			
Artemisia arbuscula																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	89	5	-	-	-	-	-	-	-	-	-	-	-	333			5	
	97	10	-	-	-	-	-	-	-	-	-	-	-	200			10	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	89	7	4	-	-	-	-	-	-	-	-	-	-	733			11	
	97	16	-	-	1	-	-	-	-	-	-	-	-	340			17	
M	83	106	-	-	-	-	-	-	-	-	-	-	-	7066	10	18	106	
	89	50	53	-	-	-	-	-	-	-	-	-	-	6866	15	21	103	
	97	213	60	3	-	-	-	-	-	-	-	-	-	5520	12	22	276	
D	83	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	89	7	6	-	-	-	-	-	-	-	-	-	-	866			13	
	97	33	8	1	-	-	-	-	-	-	-	-	-	840			42	
X	83	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	97	1	-	-	3	-	-	-	-	-	-	-	-	360			18	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	7066	Dec:	0%			
												'89	8465		10%			
												'97	6700		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				
Artemisia tridentata vaseyana																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	97	11	-	-	-	-	-	-	-	-	11	-	-	-	220		11	
Y	83	4	-	-	-	-	-	-	-	-	3	1	-	-	266		4	
	89	2	-	-	-	-	-	-	-	-	1	-	1	-	133		2	
	97	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
M	83	17	-	-	-	-	-	-	-	-	17	-	-	-	1133	24 34	17	
	89	12	9	1	-	-	-	-	-	-	13	-	9	-	1466	22 32	22	
	97	44	5	4	1	-	-	-	-	-	51	-	1	1	1080	24 35	54	
D	83	3	1	-	-	-	-	-	-	-	4	-	-	-	266		4	
	89	4	-	-	-	-	-	-	-	-	1	-	1	2	266		4	
	97	24	2	-	-	-	-	-	-	-	11	-	2	13	520		26	
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	6	-	-	-	-	-	-	-	-	6	840		42	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	1665	Dec:	16%			
												'89	1865		14%			
												'97	1720		30%			
Cercocarpus montanus																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	14 2	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	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 albicaulis																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	38	26	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	20		-			
Chrysothamnus viscidiflorus viscidiflorus																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	11	-	-	-	-	-	-	-	-	10	-	-	1	733			11
	97	15	-	-	7	-	-	1	-	-	23	-	-	-	460			23
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
D	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%			+13%							
'89		04%			00%			09%			+47%							
'97		10%			03%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	1333	Dec:	0%			
												'89	1533		0%			
												'97	2900		1%			

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																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	13	-	-	-	-	-	-	-	-	13	-	-	-	866		13	
	97	4	-	-	1	-	-	-	-	-	5	-	-	-	100		5	
M	83	31	-	-	-	-	-	-	-	-	31	-	-	-	2066	9	8	31
	89	11	1	-	3	-	-	-	-	-	15	-	-	-	1000	7	5	15
	97	36	1	-	6	-	-	3	-	-	46	-	-	-	920	5	7	46
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	2066	Dec:	-				
											'89	1866		-				
											'97	1020		-				
Mahonia repens																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	27	-	-	3	-	-	-	-	-	30	-	-	-	600	5	7	30
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	-				
											'89	0		-				
											'97	660		-				

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	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	9 52	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	60		-			
Pachistima myrsinites																		
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%			None							
'89		00%			00%			00%			Appeared							
'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	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	83	1	1	1	-	-	-	-	-	-	1	2	-	-	200		3	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	89	-	-	-	1	-	-	-	-	-	1	-	-	-	66	6 2	1	
	97	7	1	1	2	-	-	3	-	-	13	-	1	-	280	9 11	14	
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	200	Dec:	-			
												'89	66		-			
												'97	280		-			

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 canescens																			
M	'83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	'89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	'97	3	-	-	-	-	-	-	-	-	-	-	-	-	60	9	9	3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>% Change</u>							
'83		00%			00%			00%				None							
'89		00%			00%			00%				Appeared							
'97		00%			00%			00%											
Total Plants/Acre (excluding Dead & Seedlings)												'83		0		Dec:		-	
												'89		0				-	
												'97		60				-	

Trend Study 19B-13-97

Study site name: Dennis Spring.

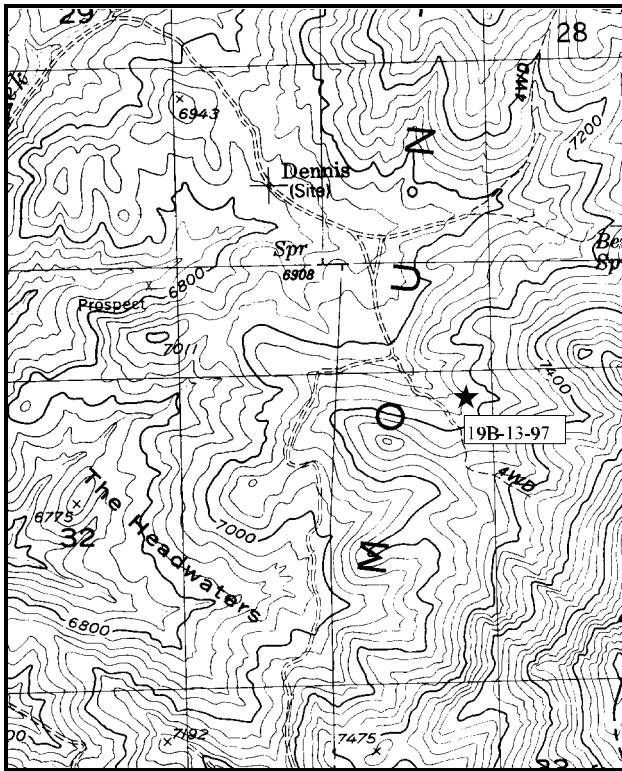
Range type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 117 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

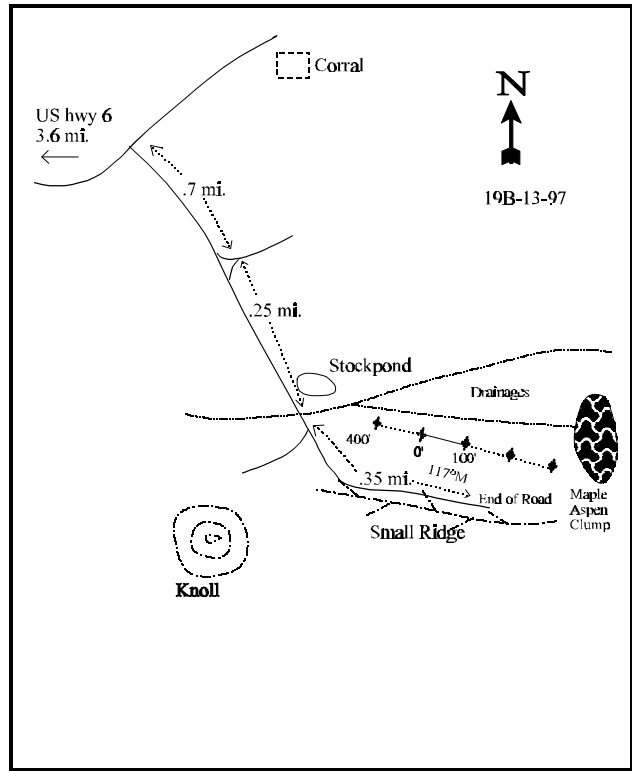
LOCATION DESCRIPTION

From mile marker 130 on Highway U.S. 6, proceed east for 1.6 to a fork and go left. Proceed 2.0 miles on the "Dennis Road" up Copperpolis Creek to a fork. Turn right (i.e., 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 (i.e., on the left fork) for an additional 0.35 miles to where the road ends on top of a small ridge. A 4-wheel drive vehicle may be needed for this last portion. 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. From this plot, the baseline can be found by walking on an azimuth of 297 degrees. 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, Utah .

Township 11 S , Range 2 W , Section 33



Diagrammatic Sketch

UTM No Data Available

DISCUSSION

Trend Study No. 19B-13 (24/14-4)

The Dennis Spring trend study samples a summer range site near the bottom of a gently 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. The plant community is dominated by a moderately tall mountain big sagebrush population with an understory of lower growing shrubs, forbs, and grasses. Estimated mountain big sagebrush cover in 1997 is quite high at 32%. The area apparently receives moderate use by deer and sheep and light use by cattle. Except for a few isolated aspen clones and patches of bigtooth maple, the area is barren of tree cover.

The effective rooting depth (see methods) is almost 12 inches with a soil temperature of 52°F measured almost 14 inches. Soil textural analysis indicates a sandy clay loam with a moderately acidic pH (5.9). Soil erosion is minimal. The rate of sedimentation from the upper slope likely exceeds the rate of erosion. A dense vegetative cover has resulted in high litter on the soil surface and a moderately high organic matter content in the upper soil layer.

Although not the most abundant shrub, mountain big sagebrush provides the area with most of the vegetative cover. It currently contributes almost 80% of the browse cover. This population density was highest in 1989 with an estimated density of 8,532 plants/acre. At that time, the majority of the plants encountered (61%) were classified as young. In 1997, eighty-eight percent of the plants encountered were mature and the estimated density was 4,920 plants/acre. The majority of the losses to the population were reductions in the young age class, about three-fourths of them. Vigor is good and utilization is currently light. The population appears to be stable with few seedling and young plants encountered in 1997. Canopy cover estimates are extremely high at 32%. The mountain big sagebrush population would have to be limiting the production of the herbaceous understory. The most abundant browse is stickyleaf low rabbitbrush, although its density shows a steady decline from 15,226 plants/acre in 1983 to 9,533 plants/acre in 1989 and finally 5,560 plants/acre in 1997. It only makes up 7% of the browse cover. Currently, this is a mostly mature population with only light utilization apparent.

Mountain snowberry had an estimated density of 2,540 plants/acre in 1997. These plants exhibited light utilization and good vigor. Density has slowly increased since the 1983 estimate of 799 plants/acre and the 1989 estimate of 1,265 plants/acre. With the much larger sample size used in 1997, the Oregon grape density increased from 533 plants/acre in 1989 to 4,540 plants/acre in 1997. These plants are very small in stature, averaging 4 inches in height and a crown diameter averaging 5 inches. Other browse species found in low abundance include: Saskatoon serviceberry, white rubber rabbitbrush, Wood's rose, and gray horsebrush.

Although perennial grass sum of nested frequency has increased since 1989, grasses still provide relatively little forage. Total cover value for the grasses is only 3%. Nelson's needlegrass and bottlebrush squirreltail nested frequencies have significantly increased since 1989, while bluebunch wheatgrass has significantly declined. Annual grasses are not abundant and include cheatgrass and Japanese brome. The dense shrub growth continues to be an inhibiting factor. Selective livestock use has also contributed to their decline.

A fair mixture of forb species provides the most important source of summer deer forage. The most abundant and conspicuous species is tailcup lupine, a plant which is toxic to cattle. Many of the forbs on the site are weedy, poisonous and/or unpalatable. Perennial forb sum of nested frequency is relatively similar to that reported in 1989.

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 is stable but in poor condition.

1989 TREND ASSESSMENT

The heavily disturbed soil, lacking stable cover, 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 mountain big sagebrush density has increased from 1,199 plants/acre in 1983 to 8,532 plants/acre in 1989. Many of the plants encountered are young. This population show good vigor and light utilization. The increase in mountain big sagebrush density is a detriment to the herbaceous understory production and diversity. For this reason the browse trend is downward. The herbaceous understory trend is stable. Herbaceous understory sum of nested frequency has increased, but only slightly.

TREND ASSESSMENT

soil - stable

browse - downward, detrimental to the herbaceous understory production

herbaceous understory - stable

1997 TREND ASSESSMENT

The soil trend continues to appear 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

browse - stable, but continues to be detrimental to the herbaceous species

herbaceous understory - stable, but poorly developed and depleted

HERBACEOUS TRENDS --
Herd unit 19B, Study no: 13

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	<i>Agropyron cristatum</i>	-	-	4	-	-	1	.00
G	<i>Agropyron spicatum</i>	_b 72	_b 80	_a 47	33	35	16	.32
G	<i>Bromus inermis</i>	-	-	3	-	-	1	.00
G	<i>Bromus japonicus</i> (a)	-	-	-	-	-	-	.00
G	<i>Bromus tectorum</i> (a)	-	-	26	-	-	10	.41
G	<i>Poa fendleriana</i>	-	3	9	-	1	3	.21
G	<i>Poa secunda</i>	_b 45	_b 32	_a 6	19	13	3	.04
G	<i>Sitanion hystrix</i>	_a 12	_a 23	_b 43	7	10	19	.59
G	<i>Stipa nelsonii</i>	_a -	_b 19	_c 105	-	7	41	1.50
Total for Grasses		129	157	243	59	66	94	3.11
F	<i>Agoseris glauca</i>	5	-	2	2	-	1	.00
F	<i>Arabis</i> spp.	_b 7	_b 9	_a -	4	6	-	-
F	<i>Arenaria</i> spp.	2	1	-	1	1	-	-
F	<i>Astragalus convallarius</i>	_b 18	_{ab} 7	_a 3	10	6	2	.01
F	<i>Aster</i> spp.	_a 2	_b 33	_a -	2	13	-	-
F	<i>Astragalus</i> spp.	-	-	3	-	-	1	.00
F	<i>Calochortus nuttallii</i>	1	-	1	1	-	1	.00
F	<i>Chenopodium</i> spp. (a)	-	-	83	-	-	31	.40
F	<i>Cirsium</i> spp.	3	3	2	3	2	1	.00
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)	-	-	190	-	-	67	1.08
F	<i>Crepis acuminata</i>	_a 23	_b 142	_a 33	13	64	21	.25
F	<i>Cymopterus</i> spp.	-	-	2	-	-	1	.00
F	<i>Cynoglossum officinale</i>	34	32	39	20	16	23	.76
F	<i>Erigeron</i> spp.	-	-	3	-	-	1	.03
F	<i>Eriogonum racemosum</i>	_b 14	_b 10	_a -	8	4	-	-
F	<i>Geranium</i> spp.	3	3	-	2	1	-	-
F	<i>Hackelia patens</i>	_b 7	_a -	_a -	4	-	-	-
F	<i>Lathyrus brachycalyx</i>	18	15	18	9	5	10	.25
F	<i>Lactuca serriola</i>	-	-	4	-	-	2	.01
F	<i>Lupinus caudatus</i>	_b 208	_a 147	_a 140	84	71	63	7.32
F	<i>Machaeranthera canescens</i>	-	2	2	-	1	1	.00
F	<i>Microsteris gracilis</i> (a)	-	-	32	-	-	13	.09

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	Phlox longifolia	79	96	76	40	46	31	.22
F	Polygonum douglasii (a)	-	-	20	-	-	12	.06
F	Senecio multilobatus	-	-	44	-	-	26	.45
F	Solidago spp.	56	-	-	26	-	-	-
F	Streptanthus cordatus	-	-	5	-	-	2	.03
F	Taraxacum officinale	3	6	15	1	3	6	.05
F	Trifolium spp.	_a 14	_{ab} 23	_b 37	6	11	16	.10
F	Viguiera multiflora	-	-	1	-	-	1	.00
F	Viola spp.	-	1	-	-	1	-	-
Total for Forbs		497	532	762	236	252	336	11.21

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 19B, Study no: 13

T y p e	Species	Strip Frequency '97	Average Cover % '97
B	Acer grandidentatum	1	-
B	Amelanchier alnifolia	2	-
B	Artemisia tridentata vaseyana	91	32.23
B	Chrysothamnus nauseosus albicaulis	7	.69
B	Chrysothamnus viscidiflorus viscidiflorus	80	2.67
B	Juniperus osteosperma	2	1.12
B	Mahonia repens	29	1.33
B	Pachistima myrsinites	0	-
B	Purshia tridentata	-	.03
B	Rosa woodsii	5	.06
B	Symphoricarpos oreophilus	55	2.23
B	Tetradymia canescens	6	.21
B	Unknown browse	1	-
Total for Browse		279	40.60

BASIC COVER --

Herd unit 19B, Study no: 13

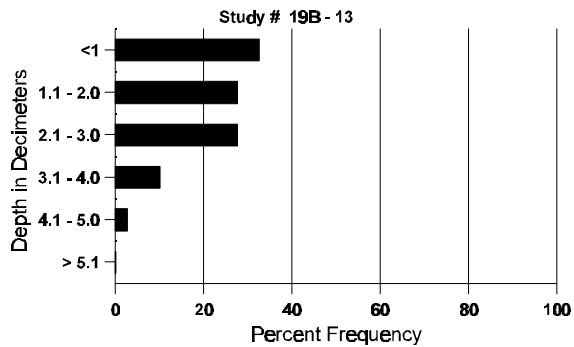
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	327	1.00	10.75	47.86
Rock	114	6.00	7.25	3.45
Pavement	104	.50	0	1.26
Litter	386	68.50	57.50	54.12
Cryptogams	9	0	0	.04
Bare Ground	204	24.00	24.50	17.09

SOIL ANALYSIS DATA --

Herd Unit 19B, Study no: 13

Effective rooting depth (inches)	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	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19B, Study no: 13

Type	Quadrat Frequency '97
Sheep	8
Rabbit	3
Elk	4
Deer	14
Cattle	1

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 13

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			
Acer grandidentatum																	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3
	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%			Appeared						
	'89	00%			00%			00%			-90%						
	'97	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-		
												'89	200		-		
												'97	20		-		
Amelanchier alnifolia																	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2
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%			Appeared						
	'89	00%			100%			00%			-39%						
	'97	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	0%		
												'89	66		100%		
												'97	40		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>Artemisia tridentata vaseyana</i>											
S	83	-	-	-	-	-	-	-	0		0
	89	23	-	-	-	-	-	-	1533		23
	97	1	-	-	1	-	-	-	40		2
Y	83	1	-	-	-	-	-	-	66		1
	89	77	-	-	1	-	-	-	5200		78
	97	2	1	-	-	-	-	-	60		3
M	83	11	3	-	-	-	-	-	933	32 29	14
	89	49	-	-	-	-	-	-	3266	17 20	49
	97	210	1	-	5	-	-	-	4320	34 36	216
D	83	1	2	-	-	-	-	-	200		3
	89	1	-	-	-	-	-	-	66		1
	97	25	-	-	-	-	-	-	540		27
X	83	-	-	-	-	-	-	-	0		0
	89	-	-	-	-	-	-	-	0		0
	97	-	-	-	10	-	-	-	380		19
% 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%					
Total Plants/Acre (excluding Dead & Seedlings)						'83	1199	Dec:	17%		
						'89	8532		1%		
						'97	4920		11%		
<i>Chrysothamnus nauseosus albicaulis</i>											
Y	83	-	-	-	-	-	-	-	0		0
	89	-	-	-	-	-	-	-	0		0
	97	1	-	-	-	-	-	-	20		1
M	83	-	-	-	-	-	-	-	0	- -	0
	89	-	-	-	-	-	-	-	0	- -	0
	97	2	2	-	-	1	-	-	100	44 38	5
D	83	-	-	-	-	-	-	-	0		0
	89	-	-	-	-	-	-	-	0		0
	97	-	4	-	-	-	-	-	80		4
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>% Change</u>			
'83		00%		00%		00%		None			
'89		00%		00%		00%		Appeared			
'97		70%		00%		30%					
Total Plants/Acre (excluding Dead & Seedlings)						'83	0	Dec:	0%		
						'89	0		0%		
						'97	200		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			
Chrysothamnus viscidiflorus viscidiflorus																	
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2
	97	4	-	-	1	-	-	-	-	-	5	-	-	-	100		5
Y	83	27	-	-	-	-	-	-	-	-	27	-	-	-	1800		27
	89	16	2	-	6	-	-	-	-	-	24	-	-	-	1600		24
	97	39	-	-	2	-	-	-	-	-	41	-	-	-	820		41
M	83	202	-	-	-	-	-	-	-	-	202	-	-	-	13466	15 13	202
	89	1	15	10	9	3	-	-	-	-	34	4	-	-	2533	12 8	38
	97	142	32	2	51	-	2	6	-	-	231	4	-	-	4700	10 10	235
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	2	15	55	-	9	-	-	-	-	73	7	-	1	5400		81
	97	1	1	-	-	-	-	-	-	-	-	-	-	2	40		2
X	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%			-38%						
'89		31%			45%			.69%			-42%						
'97		12%			01%			.71%									
Total Plants/Acre (excluding Dead & Seedlings)											'83	15266	Dec:	0%			
											'89	9533		57%			
											'97	5560		1%			
Juniperus osteosperma																	
Y	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%			None						
'89		00%			00%			00%			Appeared						
'97		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	-			
											'89	0		-			
											'97	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				
Mahonia repens																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	6	-	-	-	-	-	-	-	-	6	-	-	-	400		6	
	97	17	-	-	-	-	-	-	-	-	17	-	-	-	340		17	
M	83	5	-	-	-	-	-	-	-	-	5	-	-	-	333	4	6	5
	89	-	2	-	-	-	-	-	-	-	2	-	-	-	133	5	3	2
	97	188	-	-	13	-	-	9	-	-	210	-	-	-	4200	4	5	210
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	333	Dec:	-			
												'89	533		-			
												'97	4540		-			
Pachistima myrsinites																		
Y	83	2	-	-	-	-	-	-	-	-	2	-	-	-	133		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%			00%			00%			Died out							
'89		00%			00%			00%			None							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	133	Dec:	-			
												'89	0		-			
												'97	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									
Rosa woodsii																	
S	83	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	4	-	-	-	-	-	-	-	4	-	-	-	266		4	
	97	6	-	-	1	-	-	-	-	7	-	-	-	140		7	
M	83	8	-	-	-	-	-	-	-	8	-	-	-	533	12	3	8
	89	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	1	-	-	2	-	-	-	40	-	-	2
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		00%		00%		00%		-25%									
'89		17%		17%		00%		-55%									
'97		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'83	533	Dec:	0%				
										'89	399		33%				
										'97	180		0%				
Symphoricarpos oreophilus																	
S	83	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	83	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	89	-	-	2	-	-	-	-	-	2	-	-	-	133		2	
	97	10	3	-	3	-	-	-	-	16	-	-	-	320		16	
M	83	6	3	2	-	-	-	-	-	10	-	1	-	733	23	21	11
	89	-	-	1	-	-	-	-	-	1	-	-	-	66	17	14	1
	97	79	3	-	25	-	-	3	-	109	-	1	-	2200	12	20	110
D	83	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	13	-	3	-	-	-	16	-	-	-	1066		16	
	97	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
% 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%											
Total Plants/Acre (excluding Dead & Seedlings)										'83	799	Dec:	0%				
										'89	1265		84%				
										'97	2540		1%				

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 canescens																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	5	-	-	4	-	-	-	-	-	9	-	-	-	180	15 16	9	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	220		-			
Unknown browse																		
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%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	20		-			

Trend Study 19B-14-97

Study site name: Black Rock Canyon .

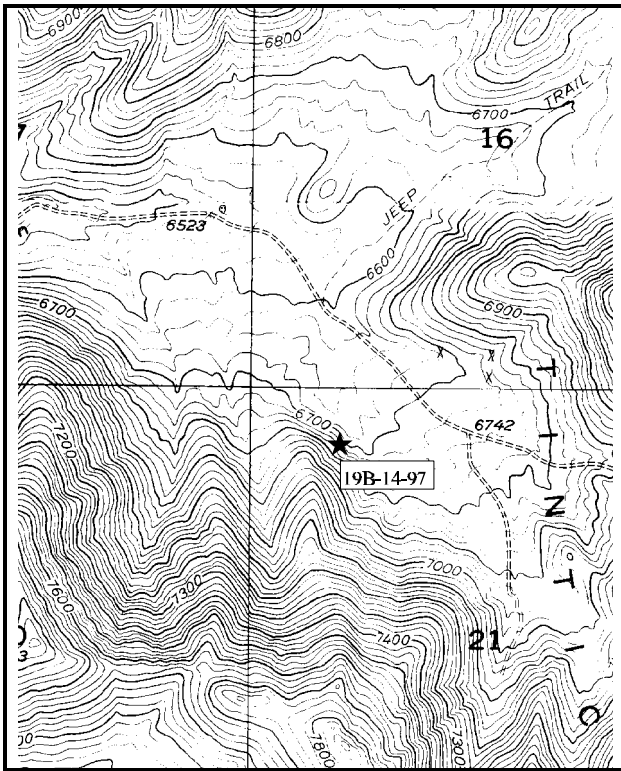
Range type: Mixed Mtn. Brush

Compass bearing: frequency baseline 180 M degrees. (Line 3 172°M)

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34 & 71ft), line 3 (59ft).

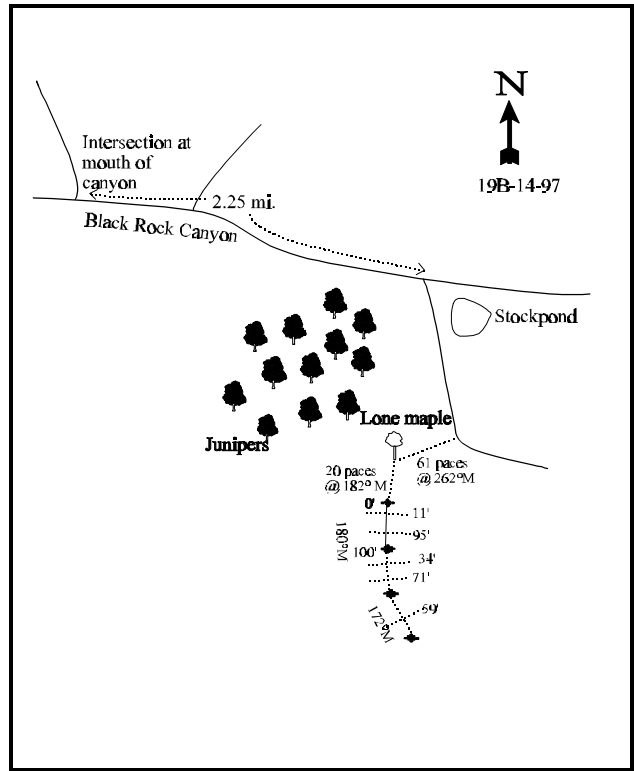
LOCATION DESCRIPTION

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 an azimuth of 200 degrees. The best way to reach it is to drive down the faint road to where it bends. From the bend in the road the 0-foot mark is 61 paces at 262°M . It is marked by a 15 inch high steel fencepost with a red browse tag, number 3940.



Map Name: Boulter Peak, Utah .

Township 9 S , Range 3 W , Section 21



Diagrammatic Sketch

UTM 4431244.920 N , 398400.538 E

DISCUSSION

Trend Study No. 19B-14 (24/14-5)

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 slight curleaf mountain mahogany aspect. Pinyon and juniper are scattered throughout (along with the curleaf mahogany), 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, <1 elk day use/acre, and <1 cow day use/acre. 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 (see methods) of 24 inches and soil temperature of almost 50°F at 18 inches. 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.

Curleaf mountain mahogany provides the most canopy cover (14%) of all browse species. Density shows a slight increase since 1989 and 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 the estimated 19,732 plants/acre in 1983 and 19,666 plants/acre in 1989. This change is from the more accurate estimate from the much 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. The percentage of decadent plants has not changed since 1989, yet their 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. 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 with good vigor and low percent decadency. The Saskatoon serviceberry population shows a steady increase from 598 plants/acre in 1983 to 1,066 plants/acre in 1989 and then 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 finally 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's 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 the 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 populations 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

browse - stable

herbaceous understory - upward

1997 TREND ASSESSMENT

The soil trend continues to be stable. Erosion is only slight due to abundance of protective vegetative and litter cover. The browse trend is stable overall. There are some changes in population densities, however most of the changes were because of the much 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. 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 they (the forbs) only make up 21% of the herbaceous cover.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - downward

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 14

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron trachycaulum	14	36	21	6	13	8	1.08
G	Carex spp.	a177	b213	a127	61	63	33	12.64
G	Leucopoa kingii	a59	b89	a40	26	35	17	1.72
G	Oryzopsis hymenoides	3	-	-	1	-	-	.03
G	Poa fendleriana	a11	ab27	b34	5	11	15	.91
G	Poa pratensis	b24	a7	ab17	12	4	7	.28
G	Poa secunda	a-	b6	c32	-	5	13	.41
G	Stipa nelsonii	12	9	18	6	6	9	.55
Total for Grasses		300	387	289	117	137	102	17.65
F	Agoseris glauca	1	1	9	1	1	4	.02
F	Allium spp.	a16	b35	ab26	7	21	15	.10
F	Arabis spp.	3	1	8	1	1	4	.02
F	Arenaria spp.	-	-	1	-	-	1	.00
F	Aster chilensis	a52	b123	a57	24	46	26	1.79
F	Astragalus convallarius	ab6	b8	a-	3	6	-	-
F	Calochortus nuttallii	a-	a3	b30	-	1	17	.16
F	Comandra pallida	2	-	-	2	-	-	-
F	Collinsia parviflora (a)	-	-	14	-	-	6	.05
F	Crepis acuminata	a-	b23	b18	-	9	10	.44
F	Erigeron spp.	-	-	3	-	-	2	.01
F	Eriogonum spp.	-	-	3	-	-	2	.03
F	Eriogonum racemosum	4	6	1	2	3	1	.03
F	Eriogonum umbellatum	1	3	4	1	2	2	.18
F	Fragaria spp.	ab6	b9	a-	3	4	-	-
F	Geranium spp.	28	24	22	14	14	10	.17
F	Gilia aggregata	2	6	-	2	2	-	-
F	Helianthus annuus (a)	-	15	-	-	7	-	-
F	Helianthella uniflora	5	-	-	2	-	-	-
F	Lathyrus brachycalyx	a18	b154	a27	10	60	16	.47
F	Lithospermum ruderales	a7	ab20	b18	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

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
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 Forbs		172	463	299	85	202	150	4.70

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 19B, Study no: 14

Type	Species	Strip Frequency '97	Average Cover % '97
B	Acer grandidentatum	4	.96
B	Amelanchier alnifolia	41	1.85
B	Arenaria macradenia	11	1.61
B	Artemisia tridentata vaseyana	63	7.31
B	Cercocarpus ledifolius	12	14.10
B	Cercocarpus montanus	10	1.02
B	Ceanothus martinii	13	.21
B	Chrysothamnus viscidiflorus viscidiflorus	11	.48
B	Pachistima myrsinites	66	3.04
B	Pinus edulis	2	2.32
B	Pinus monophylla	7	2.33
B	Prunus virginiana	65	2.87
B	Rosa woodsii	33	1.77
B	Symphoricarpos oreophilus	63	12.44
Total for Browse		401	52.39

CANOPY COVER --

Herd unit 19B, Study no: 14

Species	Percent Cover '97
Amelanchier alnifolia	1
Cercocarpus ledifolius	29
Pinus edulis	3
Pinus monophylla	1

BASIC COVER --

Herd unit 19B, Study no: 14

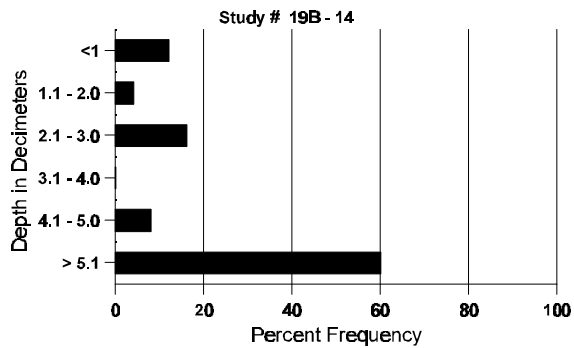
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	343	5.75	27.25	61.04
Rock	121	8.00	7.50	9.61
Pavement	13	0	0	.19
Litter	390	74.50	57.75	63.36
Cryptogams	13	1.75	.25	.48
Bare Ground	86	10.00	7.25	4.92

SOIL ANALYSIS DATA --

Herd Unit 19B, Study no: 14

Effective rooting depth (inches)	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	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19B, Study no: 14

Type	Quadrat Frequency '97
Deer	4

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 14

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>Acer grandidentatum</i>																		
	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 Appeared</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		-			
<i>Amelanchier alnifolia</i>																		
	83	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	89	4	4	-	-	1	-	3	-	-	11	1	-	-	800			12
	97	5	-	-	3	-	-	-	-	-	7	-	-	-	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%			

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>Arenaria macradenia</i>																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	42	-	-	2	-	-	-	-	-	44	-	-	-	880	10	14	44
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	880		-			
<i>Artemisia tridentata vaseyana</i>																		
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	-	-	69	-	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 Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total								
		1	2	3	4											
Cercocarpus ledifolius																
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	89	1	-	-	-	-	-	-	-	1	-	-	-	66		1
	97	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	83	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	97	1	-	-	1	-	-	2	8	12	-	-	-	240	172 186	12
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%		Appeared								
'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	6
	89	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	97	12	1	-	3	-	-	-	-	15	-	1	-	320	14 26	16
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 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 montanus																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	6	7	3	1	-	-	-	1	-	18	-	-	-	360	65 54	18	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		35%			15%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	400		-			
Chrysothamnus viscidiflorus viscidiflorus																		
Y	83	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	89	6	-	-	3	-	-	-	-	-	9	-	-	-	600		9	
	97	-	-	-	2	-	-	-	-	-	2	-	-	-	40		2	
M	83	28	-	-	-	-	-	-	-	-	28	-	-	-	1866	16 15	28	
	89	4	-	-	-	-	-	1	-	-	5	-	-	-	333	16 14	5	
	97	6	-	-	4	-	-	1	-	-	11	-	-	-	220	18 16	11	
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%			
Cowania mexicana stansburiana																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	82 159	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			None							
'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%			Died out							
'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 edulis																		
Y	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%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	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				
Pinus monophylla																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	5	-	-	2	-	-	2	-	-	10	-	-	-	200		10	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	1	-	-	-	-	-	1	-	-	-	66		1	
	97	6	-	-	-	-	-	-	-	-	5	-	1	-	120		6	
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%			Appeared							
'89		00%			00%			00%			+59%							
'97		00%			00%			13%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	0	Dec:	-				
											'89	66		-				
											'97	160		-				
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%				

A Y G R E	Form Class (No. of Plants)	Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total					
		1	2	3	4								
Rosa woodsii													
S	83	-	-	-	-	-	-	-	-	0		0	
	89	1	-	-	-	-	2	-	-	3	-	3	
	97	1	-	-	1	-	-	-	-	2	-	2	
Y	83	-	-	-	-	-	-	-	-	0		0	
	89	61	-	-	2	-	6	-	-	68	1	69	
	97	10	-	-	4	-	1	-	-	15	-	15	
M	83	22	-	-	-	-	-	-	-	-	22	22	
	89	7	5	-	-	-	-	-	-	10	2	12	
	97	74	-	4	19	-	-	4	-	94	-	105	
D	83	-	-	-	-	-	-	-	-	0		0	
	89	2	1	-	-	-	-	-	-	-	1	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%
Symphoricarpos oreophilus													
S	83	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	0		0	
	97	-	6	-	-	-	-	-	-	6	-	6	
Y	83	52	-	-	-	-	-	-	-	31	21	52	
	89	114	-	-	-	-	17	-	-	131	-	131	
	97	2	-	2	27	-	-	-	-	31	-	31	
M	83	174	70	-	-	-	-	-	-	82	162	244	
	89	156	-	-	5	-	3	-	-	164	-	164	
	97	131	38	4	29	-	1	-	-	191	6	203	
X	83	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	2	-	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		-

Trend Study 19B-15-97

Study site name: Upper Broad Canyon .

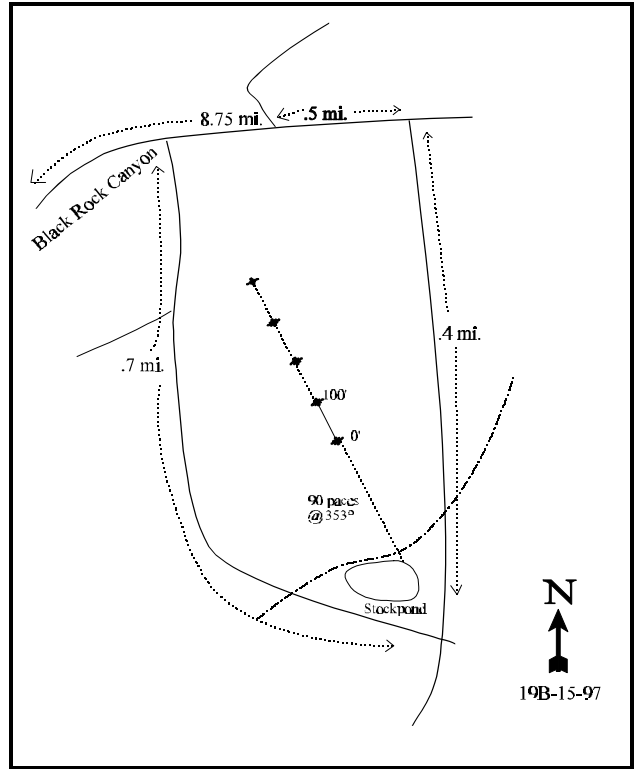
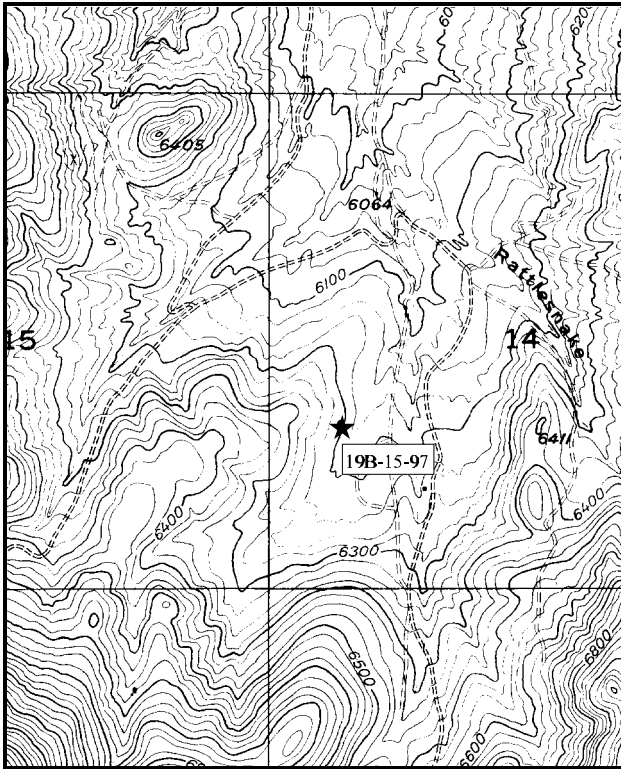
Range type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 331 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

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 (i.e., east) for an additional 0.50 miles to another fork. Turn right for 0.40 miles to another fork. Turn left for 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 azimuth 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: Boulter Peak, Utah .

Diagrammatic Sketch

Township 9 S , Range 3 W , Section 14

UTM 4431765.405 N , 401666.422 E

DISCUSSION

Trend Study No. 19B-15 (24/14-6)

The Upper Broad Canyon trend study is located on a 15%-20% slope with a south-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. Pellet groups are frequent and the principal browse plants are moderately to heavily hedged. In 1983, the presence of two dropped antlers 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, which contains water year round. It is located about 200 yards south of the study.

Soil is fine textured, but contains many variable sized granite rocks, both on and below the soil surface. Soil textural analysis indicates it to be a clay loam with a neutral pH (7.1). The effective rooting depth (see methods) is almost 10 inches with a soil temperature of 64°F at 11 inches. Soil phosphorous was measured to be only 7.1 ppm which is considered low and could limit vegetative growth and development. Vegetation cover is fair, but litter cover is fairly poor. There are significant amounts of surface rock, erosion pavement and bare soil that contributes to a noticeable, but not excessive rate of erosion.

The key browse species is mountain big sagebrush which currently contributes 68% of the browse cover. In the past, this population had experienced moderate to heavy hedging, with poor vigor and high rates of decadency. After years of drought, these values were at their highest in 1989. Currently, utilization is light to moderate, with the percentage of plants reported with poor vigor and decadence declining. Estimated density in 1997 was 4,260 plants/acre, 82% of which were classified as mature. As explained on other sites, the greatly increased sample size gives much more accurate density estimates for shrubs with population distributions that are clumped and/or discontinuous. Mountain big sagebrush canopy cover is currently estimated to be almost 9%. Antelope bitterbrush currently has an estimated density of 380 plants/acre, but more importantly it produces 15% of the browse cover. These plants are heavily hedged yet exhibit good vigor. The broom snakeweed density has fluctuated from 5,166 plants/acre in 1983 to 7,999 plants/acre in 1989 and 6,760 plants/acre in 1997. Broom snakeweed populations are known to fluctuate with annual precipitation patterns, as this population appears to be doing. Point-centered quarter data indicates 26 pinyon trees/acre and 14 juniper trees/acre in 1997.

Grasses continue to be productive with a significant increase in nested frequency for bluebunch wheatgrass and a significant decreases in crested wheatgrass and bottlebrush squirreltail since 1989. Sandberg bluegrass nested frequency is not much different from 1989. Bluebunch wheatgrass provides the most grass cover followed by Sandberg bluegrass. Perennial grass sum of nested frequency has remained fairly constant over all years. Cheatgrass is present on the site, but does not currently pose a threat to the herbaceous community.

Annuals dominate the forb component of the herbaceous understory and are of little value. They currently make up almost 90% of the forb cover. Pale alyssum is the dominate forb, followed by bur buttercup. Perennial forb sum of nested frequency has slightly declined since 1989, but perennials add very little to the understory.

1983 APPARENT TREND ASSESSMENT

Soil trend is 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 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 from 1983.

TREND ASSESSMENT

soil - stable

browse - downward

herbaceous understory - stable

1997 TREND ASSESSMENT

The soil trend now 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, but has remained relatively constant. The browse trend (for the key browse) is slightly downward for mountain big sagebrush even though vigor has improved and there has been a decline in percentage of decadent plants. It is slightly down because percentage of young plants has steadily declined to only 4%, the percentage of mature plants has steadily increased to a high of 82%, the dead to live ratio is almost 1:5, and finally, 70% of the decadent plants were classified as dying. There is obviously going to be further losses to the sagebrush population in the future. It should be understood that the increase in density is not indicating a true increase, rather this number is just more reflective of the much larger sample size giving more accurate density estimates for this browse species. The Antelope bitterbrush population is still heavily utilized, but not detrimentally so. 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

browse - slightly down

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 15

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron cristatum	_a 12	_b 83	_a 40	9	33	16	.79
G	Agropyron spicatum	_{ab} 189	_a 147	_b 202	70	60	79	14.03
G	Bromus tectorum (a)	-	-	212	-	-	76	1.23
G	Oryzopsis hymenoides	_b 30	_a 10	_a 1	14	6	1	.00
G	Poa fendleriana	-	-	4	-	-	2	.01
G	Poa secunda	_a 212	_b 259	_b 261	84	91	94	5.13
G	Sitanion hystrix	_b 34	_b 17	_a 3	16	8	1	.03
Total for Grasses		477	516	723	193	198	269	21.23

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	<i>Agoseris glauca</i>	-	-	2	-	-	1	.00
F	<i>Alyssum alyssoides</i> (a)	-	-	328	-	-	99	1.34
F	<i>Antennaria rosea</i>	13	33	19	6	15	9	.12
F	<i>Arabis</i> spp.	4	3	5	2	1	3	.01
F	<i>Calochortus nuttallii</i>	_b 11	_b 7	_a -	5	5	-	-
F	<i>Chaenactis douglasii</i>	_b 12	_{ab} 6	_a -	4	2	-	-
F	<i>Cirsium</i> spp.	-	-	1	-	-	1	.00
F	<i>Collinsia parviflora</i> (a)	-	-	16	-	-	7	.03
F	<i>Delphinium nelsonii</i>	4	-	-	2	-	-	-
F	<i>Epilobium paniculatum</i> (a)	-	-	14	-	-	6	.03
F	<i>Lomatium</i> spp.	_a -	_a -	_b 12	-	-	6	.03
F	<i>Microsteris gracilis</i> (a)	-	-	59	-	-	25	.12
F	<i>Ranunculus testiculatus</i> (a)	-	-	135	-	-	51	.70
F	<i>Tragopogon dubius</i>	6	1	-	3	1	-	-
F	Unknown forb-perennial	4	-	-	1	-	-	-
F	<i>Zigadenus paniculatus</i>	3	13	6	2	5	2	.01
Total for Forbs		57	63	597	25	29	210	2.42

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 19B, Study no: 15

T y p e	Species	Strip Frequency '97	Average Cover % '97
B	<i>Amelanchier alnifolia</i>	2	-
B	<i>Artemisia arbuscula</i>	0	-
B	<i>Artemisia tridentata vaseyana</i>	69	8.61
B	<i>Eriogonum microthecum</i>	1	-
B	<i>Gutierrezia sarothrae</i>	86	1.20
B	<i>Pinus edulis</i>	-	.85
B	<i>Purshia tridentata</i>	12	1.91
Total for Browse		170	12.58

BASIC COVER --

Herd unit 19B, Study no: 15

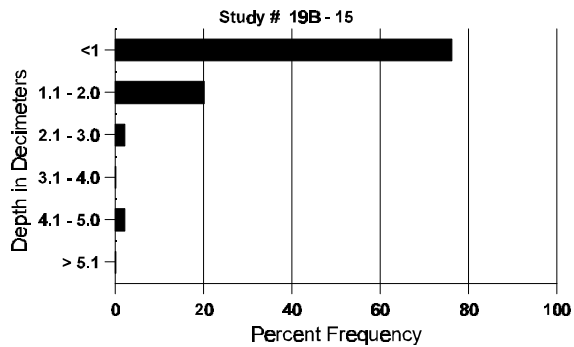
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	359	0	5.25	34.31
Rock	293	11.75	17.25	19.31
Pavement	272	28.00	24.75	12.09
Litter	370	49.50	38.50	28.56
Cryptogams	158	.50	2.50	3.05
Bare Ground	290	10.25	11.75	14.59

SOIL ANALYSIS DATA --

Herd Unit 19B, Study no: 15

Effective rooting depth (inches)	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	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19B, Study no: 15

Type	Quadrat Frequency '97
Sheep	12
Rabbit	7
Deer	17

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				
Amelanchier alnifolia												
M	83	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	0	-	-	0
	97	-	1	-	-	-	1	-	40	12	12	2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'83		00%		00%		00%		None				
'89		00%		00%		00%		Appeared				
'97		50%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'83	0	Dec:	-			
						'89	0		-			
						'97	40		-			
Artemisia arbuscula												
M	83	1	-	-	-	-	-	-	33	10	20	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%		Died out				
'89		00%		00%		00%		None				
'97		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'83	33	Dec:	-			
						'89	0		-			
						'97	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>Artemisia tridentata vaseyana</i>													
S	83	-	-	-	-	-	-	-	0		0		
	89	3	-	-	-	-	-	-	100		3		
	97	1	-	-	-	-	-	-	20		1		
Y	83	5	3	-	-	-	-	-	266		8		
	89	3	1	-	-	-	-	-	133		4		
	97	7	-	-	-	-	-	1	160		8		
M	83	7	4	29	-	-	-	-	1333	24	23	40	
	89	13	12	12	-	-	-	-	1233	16	23	37	
	97	30	26	8	-	-	-	-	3500	23	37	175	
D	83	1	-	17	-	-	-	-	600			18	
	89	10	15	7	-	-	-	-	1066			32	
	97	9	17	1	3	-	-	-	600			30	
X	83	-	-	-	-	-	-	-	0			0	
	89	-	-	-	-	-	-	-	0			0	
	97	10	-	-	36	-	-	-	920			46	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>% Change</u>					
'83		11%		70%		26%		+10%					
'89		38%		26%		93%		+43%					
'97		20%		04%		16%							
Total Plants/Acre (excluding Dead & Seedlings)										'83	2199	Dec:	27%
										'89	2432		44%
										'97	4260		14%
<i>Eriogonum microthecum</i>													
M	83	-	-	-	-	-	-	-	0	-	-	0	
	89	-	-	-	-	-	-	-	0	-	-	0	
	97	1	-	-	-	-	-	-	20	5	8	1	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>% Change</u>					
'83		00%		00%		00%		None					
'89		00%		00%		00%		Appeared					
'97		00%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'83	0	Dec:	-
										'89	0		-
										'97	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				
<i>Gutierrezia sarothrae</i>												
S	83	62	-	-	-	-	-	-	62	-	62	
	89	24	-	-	-	-	-	-	24	-	24	
	97	1	-	-	-	-	-	-	1	-	1	
Y	83	37	-	-	-	-	-	-	37	-	37	
	89	66	-	-	-	-	-	-	66	-	66	
	97	65	-	-	2	-	-	-	67	-	67	
M	83	118	-	-	-	-	-	-	118	8	8	118
	89	167	-	-	-	-	-	-	167	8	12	167
	97	266	-	-	3	-	-	-	269	7	6	269
D	83	-	-	-	-	-	-	-	0	-	-	0
	89	7	-	-	-	-	-	-	7	-	-	7
	97	2	-	-	-	-	-	-	2	-	-	2
% 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%								
Total Plants/Acre (excluding Dead & Seedlings)					'83	5166	Dec:	0%				
					'89	7999		3%				
					'97	6760		1%				
<i>Purshia tridentata</i>												
Y	83	-	-	-	-	-	-	-	0	-	0	
	89	2	2	-	-	-	-	-	4	-	4	
	97	-	1	-	-	-	-	-	1	-	1	
M	83	-	-	8	-	-	-	-	8	11	29	8
	89	-	-	5	-	-	-	-	5	10	18	5
	97	3	1	12	-	-	-	-	16	18	34	16
D	83	-	-	1	-	-	-	-	1	-	-	1
	89	-	-	1	-	-	-	-	1	-	-	1
	97	-	-	-	1	-	-	1	2	-	-	2
X	83	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	2	-	-	-	2	-	-	2
% 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%								
Total Plants/Acre (excluding Dead & Seedlings)					'83	299	Dec:	11%				
					'89	332		10%				
					'97	380		11%				

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
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>% Change</u>						
	'83	00%			00%			00%				None						
	'89	00%			00%			00%				None						
	'97	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	0		-			

Trend Study 19B-16-97

Study site name: Nephi Dump.

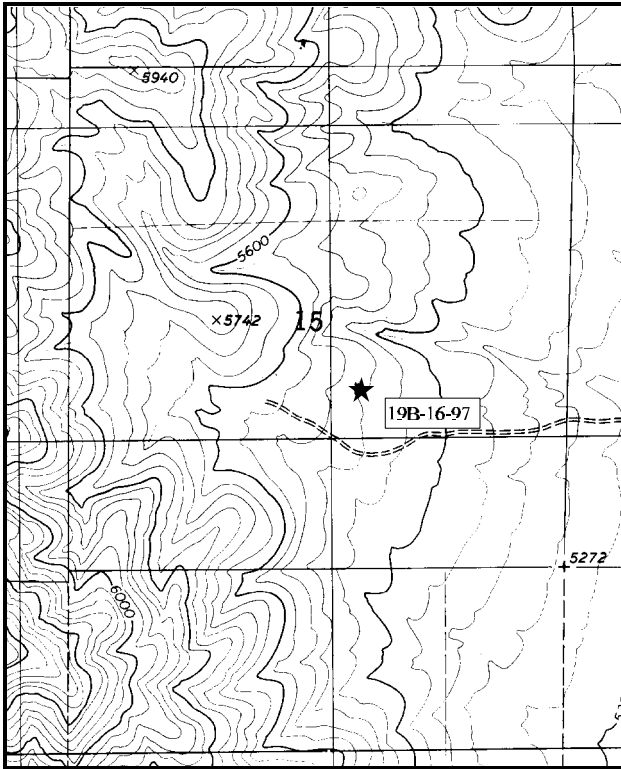
Range type: Stansbury Cliffrose.

Compass bearing: frequency baseline 344 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

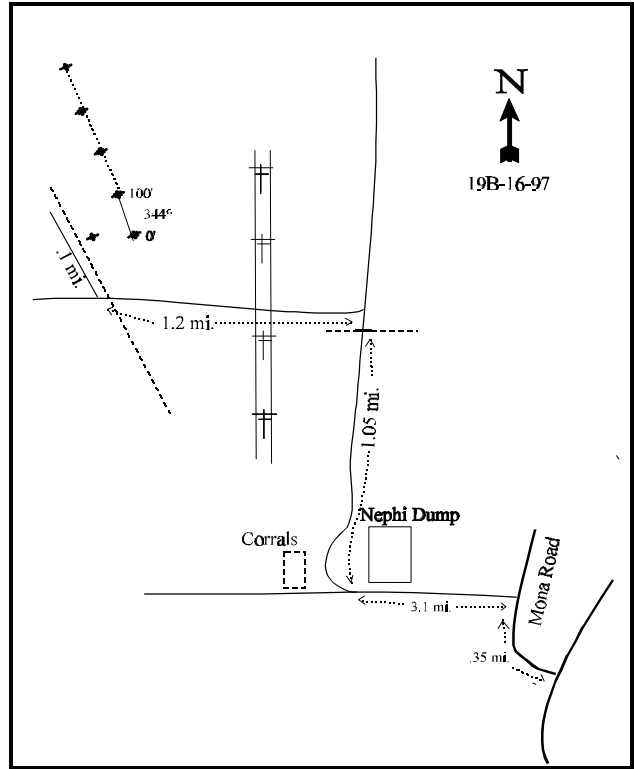
LOCATION DESCRIPTION

From the Nephi City Dump, travel north on a gravel road for 1.05 miles and then turn left (i.e., west) just after passing through a cattle guard. Travel west for 1.25 miles and turn right (i.e., north) along a fence line for 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, Utah .

Township 12 S, Range 1 W, Section 15



Diagrammatic Sketch

UTM 4402116.377 N, 421043.170 E

DISCUSSION

Trend Study No. 19B-16 (24/14-7)

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% with an aspect to the south-southeast and an elevation of 5,600 feet. The range type is Wyoming 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 both 1986 and 1996. This may concentrate use in this unburned area in the future. Currently, deer use appears moderate with a pellet group quadrat frequency of 17%. Cattle also use the area, but at reduced rates compared to wildlife.

The soil is light brown in color with rock and pavement scattered on the surface. Soil textural analysis indicates a clay loam with a neutral pH (6.9). The effective rooting depth (see methods) is 9 inches with an average temperature of 71°F measured at 11 inches. Vegetation and litter cover are currently adequate to protect against erosion, although the major deterrent to erosion on this site is the gentle slope.

The key browse species is Wyoming big sagebrush, which now makes up 42% of the browse cover. Identification of this species has been problematic in the past. It was initially identified as *Artemisia tridentata vaseyana* in 1983 and then *Artemisia tridentata tridentata* in 1989. In 1997, it was determined that the majority of the population was actually *Artemisia tridentata wyomingensis* with some scattered *Artemisia tridentata tridentata* present. Currently, the estimated density is 1,800 plants/acre. There appears to be steady decline from the 3,400 plants/acre encountered in 1983 to 2,766 plants/acre inventoried in 1989. Utilization continues to be light to moderate. The percentage of plants classified with poor vigor has increased steadily and is currently at its highest value, an estimated 30%. Percent decadency has declined from 39% in 1989 to 19% in 1997. However, 47% of the decadent plants have been classified as dying, indicating that there will be further declines in the sagebrush population in the future. It was reported in 1983 that the age structure was typical of a declining population. This has held true with a current dead to live ratio of approximately 1:3, or about 23% of the population are dead. Stansbury cliffrose is more preferred than Wyoming big sagebrush, but it occurs infrequently with an estimated density of only 40 plants/acre in 1997. Utilization is heavy, yet expected. None are classified with poor vigor. The stickyleaf low rabbitbrush density is currently 1,780 plants/acre and should be monitored for further increase. Currently it contributes to 25% of the browse cover. Other increaser shrubs include white rubber rabbitbrush and broom snakeweed. Point-centered quarter data indicates 40 juniper trees/acre and 29 Stansbury cliffrose/acre.

Perennial herbaceous understory sum of nested frequency has greatly increased every year since 1983. Crested wheatgrass nested frequency has significantly increased since 1989 and it currently provides 47% of the grass cover. Cheatgrass and Japanese brome are scattered throughout the site and likely will not present a problem unless the area is disturbed. Forbs contribute little to forage or ground cover. Forbs only make up 19% of the herbaceous cover. Pale alyssum and bur buttercup are currently the most abundant forbs. Together they contribute to 91% of the forb cover.

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 Wyoming 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 vegetative 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. Wyoming big sagebrush shows a decline in density, increased percent of plants in poor vigor, and an increase in percent of decadent plants. Biotic potential 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 downward. 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

browse - downward

herbaceous understory - slightly upward

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 Wyoming 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

browse - slightly downward

herbaceous understory - upward

HERBACEOUS TRENDS --

Herd unit 19B, Study no: 16

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	Agropyron cristatum	a7	a17	b143	3	7	51	9.05
G	Agropyron spicatum	a10	b30	b33	4	15	13	1.42
G	Bromus japonicus (a)	-	-	22	-	-	8	.12
G	Bromus tectorum (a)	-	-	183	-	-	63	4.46
G	Oryzopsis hymenoides	1	5	-	1	2	-	-
G	Poa pratensis	3	-	-	1	-	-	-
G	Poa secunda	a103	b149	b161	42	51	57	4.20
G	Sitanion hystrix	9	8	8	5	5	4	.07
Total for Grasses		133	209	550	56	80	196	19.34

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	<i>Alyssum alyssoides</i> (a)	-	-	264	-	-	90	3.04
F	<i>Astragalus calycosus</i>	-	3	-	-	1	-	-
F	<i>Astragalus eurekaensis</i>	-	2	-	-	1	-	-
F	<i>Astragalus</i> spp.	-	-	5	-	-	3	.04
F	<i>Astragalus utahensis</i>	-	-	5	-	-	2	.03
F	<i>Camelina microcarpa</i> (a)	-	-	10	-	-	4	.02
F	<i>Calochortus nuttallii</i>	_a 2	_a 6	_b 18	1	2	10	.10
F	<i>Castilleja</i> spp.	-	1	1	-	1	1	.01
F	<i>Chorispora tenella</i> (a)	-	-	4	-	-	1	.03
F	<i>Comandra pallida</i>	2	1	-	1	1	-	-
F	<i>Lactuca serriola</i>	_a -	_{ab} 2	_b 9	-	1	5	.02
F	<i>Microsteris gracilis</i> (a)	-	-	3	-	-	1	.00
F	<i>Phlox austromontana</i>	-	2	1	-	1	1	.00
F	<i>Phlox longifolia</i>	_a -	_b 13	_b 17	-	7	9	.04
F	<i>Ranunculus testiculatus</i> (a)	-	-	189	-	-	65	1.19
F	<i>Senecio multilobatus</i>	-	-	5	-	-	2	.01
F	<i>Sphaeralcea coccinea</i>	-	1	1	-	1	1	.00
F	<i>Tragopogon dubius</i>	-	3	2	-	1	1	.03
F	Unknown forb-annual	-	-	4	-	-	2	.01
F	Unknown forb-perennial	2	-	-	1	-	-	-
F	<i>Vicia americana</i>	-	-	2	-	-	1	.03
F	<i>Zigadenus paniculatus</i>	-	1	4	-	1	2	.01
Total for Forbs		6	35	544	3	18	201	4.65

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 19B, Study no: 16

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata tridentata	5	.81
B	Artemisia tridentata wyomingensis	60	10.11
B	Chrysothamnus nauseosus	2	.79
B	Chrysothamnus viscidiflorus stenophyllus	40	5.49
B	Cowania mexicana stansburiana	2	.78
B	Gutierrezia sarothrae	34	.69
B	Juniperus osteosperma	1	3.40
Total for Browse		144	22.08

BASIC COVER --

Herd unit 19B, Study no: 16

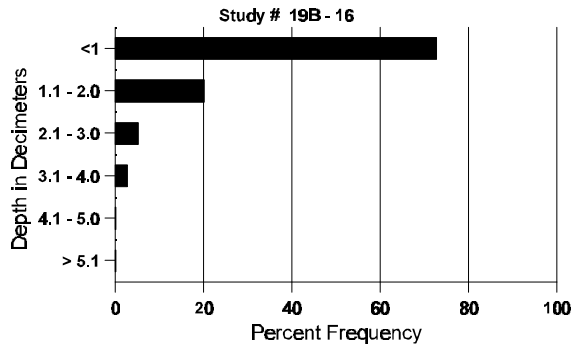
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	372	.25	5.00	38.75
Rock	247	13.25	13.00	9.50
Pavement	287	10.00	16.75	18.19
Litter	374	59.00	50.75	39.46
Cryptogams	135	4.00	4.50	3.96
Bare Ground	247	13.50	10.00	7.75

SOIL ANALYSIS DATA --

Herd Unit 19B, Study no: 16

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	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	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 19B, Study no: 16

Type	Quadrat Frequency '97
Rabbit	22
Deer	17
Cattle	8

BROWSE CHARACTERISTICS --

Herd unit 19B, Study no: 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				
<i>Artemisia tridentata tridentata</i>																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	41	61	2
D	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%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	0%			
												'89	0		0%			
												'97	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				
<i>Artemisia tridentata wyomingensis</i>																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	83	9	-	-	-	-	-	-	-	-	9	-	-	-	300		9	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	83	39	27	-	-	-	-	-	-	-	66	-	-	-	2200	22	24	66
	89	28	18	5	-	-	-	-	-	-	47	1	3	-	1700	34	30	51
	97	43	27	-	-	-	-	-	-	-	52	-	18	-	1400	25	36	70
D	83	17	10	-	-	-	-	-	-	-	19	-	8	-	900		27	
	89	14	11	7	-	-	-	-	-	-	19	1	9	3	1066		32	
	97	7	9	-	1	-	-	-	-	-	8	-	1	8	340		17	
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	2	-	-	-	-	-	-	-	-	2	540		27	
% 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%			-35%							
'97		40%			00%			30%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	3400	Dec:	26%			
												'89	2766		39%			
												'97	1800		19%			
<i>Chrysothamnus nauseosus</i>																		
M	83	3	-	-	-	-	-	-	-	-	3	-	-	-	100	26	27	3
	89	2	1	-	-	-	-	-	-	-	3	-	-	-	100	19	22	3
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	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%			+ 0%							
'89		33%			00%			00%			-60%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	100	Dec:	0%			
												'89	100		0%			
												'97	40		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				
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	83	9	-	-	-	-	-	-	-	-	9	-	-	-	300	18	20	9
	89	21	-	-	-	-	-	-	-	-	21	-	-	-	700	13	14	21
	97	79	-	-	-	-	-	-	-	-	78	-	1	-	1580	17	18	79
D	83	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	89	1	-	-	-	-	-	-	-	-	-	-	1	-	33			1
	97	8	-	-	-	-	-	-	-	-	7	-	-	1	160			8
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%			+46%							
'89		00%			00%			05%			+59%							
'97		00%			00%			02%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	399	Dec:	17%				
											'89	733		5%				
											'97	1780		9%				
<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	65	64	1
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	1	-	-	-	-	-	-	-	-	-	1	33			1
	97	-	-	-	-	-	1	-	-	-	1	-	-	-	20			1
% 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%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	166	Dec:	0%				
											'89	133		25%				
											'97	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				
<i>Gutierrezia sarothrae</i>																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
Y	83	10	-	-	-	-	-	-	-	-	10	-	-	-	333		10	
	89	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	97	20	-	-	-	-	-	-	-	-	20	-	-	-	400		20	
M	83	25	-	-	-	-	-	-	-	-	25	-	-	-	833	15	15	25
	89	68	-	-	-	-	-	-	-	-	68	-	-	-	2266	10	9	68
	97	75	-	-	-	-	-	-	-	-	70	-	-	-	1500	11	11	75
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	4	-	-	-	-	-	-	-	-	2	-	-	2	133		4	
	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%			+54%							
'89		00%			00%			03%			-24%							
'97		00%			00%			01%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	1166	Dec:	0%			
												'89	2532		5%			
												'97	1920		1%			
<i>Juniperus osteosperma</i>																		
Y	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	89	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
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%			+50%							
'89		00%			00%			00%			-70%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	33	Dec:	-			
												'89	66		-			
												'97	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					
Purshia tridentata																			
M	'83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	'89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	11	16	0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>% Change</u>							
'83		00%			00%			00%				None							
'89		00%			00%			00%				None							
'97		00%			00%			00%											
Total Plants/Acre (excluding Dead & Seedlings)												'83		0		Dec:		-	
												'89		0				-	
												'97		0				-	

DISCUSSION

Trend Study No. 19B-17 (24/14-8)

*** This site was not read in 1997 but text from the 1983 and 1989 report has been retained.*** Refer to the 1983 and 1989 Utah Range Trend Studies report for maps and data tables. The wildlife biologist for this area suggested dropping this site due to lack of deer use on the site. Site reconnaissance in 1997 showed very little use of the browse and only a few deer pellet groups.

The Old Canyon samples severe deer winter range on a steep (70%) south facing slope in Old Canyon. The study area is a dry, depleted Stansbury cliffrose site. Elevation is 5,600 feet. Deer use is low, in spite of abundant and available cliffrose and mountain big sagebrush forage.

Soil is light colored, shallow and very rocky. Signs of active erosion are easily discerned. Litter and vegetative cover are very poor and downhill movement of soil is obvious. Almost 70% of cover is contributed by rock, erosion pavement, or bare soil.

The key browse species are Stansbury cliffrose, followed by mountain big sagebrush. The Stansbury cliffrose population is comprised of large, mature plants with smaller, but nearly equal numbers of decadent and young. The level of utilization is light to moderate. Density has slightly increased to an estimated 532 plants/acre but so has percent decadency from 29% in 1983 to 38% in 1989. Mountain big sagebrush density is identical to that estimated in 1983. Since 1983, percent decadency has increased while utilization has decreased. Vigor is high for both Stansbury cliffrose and mountain big sagebrush. Other shrubs include: white rubber rabbitbrush, broom snakeweed, green ephedra, an Utah juniper. None of these occur more than occasionally nor do they appear to be increasing or decreasing in density.

Perennial understory plants continue to be nearly absent. Aside from annual cheatgrass brome which is abundant enough to constitute a fire hazard, bluebunch wheatgrass, Indian ricegrass, and cryptantha are the only perennial plants present. These occur only rarely and provide almost no forage or soil protection.

1983 APPARENT TREND ASSESSMENT

Soil trend is definitely declining. An almost complete lack of perennial ground cover has resulted in accelerated erosion. Vegetative diversity is poor but fairly stable. Stansbury cliffrose and big sagebrush comprise the bulk of vegetation growing on the site. Both are relatively long-lived species, that at least temporarily, seem stable. Apart from these two plants, vegetative condition can do little else but improve.

1989 TREND ASSESSMENT

The soil trend is stable and in poor condition. Erosion is still apparent and will continue unless the herbaceous understory is established to hold the soil in place. The browse trend is slightly downward with an increase in decadence of both key species. The herbaceous understory trend is stable and in poor condition with only 3 species encountered in 1989.

TREND ASSESSMENT

soil - stable

browse - slightly downward

herbaceous understory - stable

Trend Study 19B-18-97

Study site name: Furner Valley.

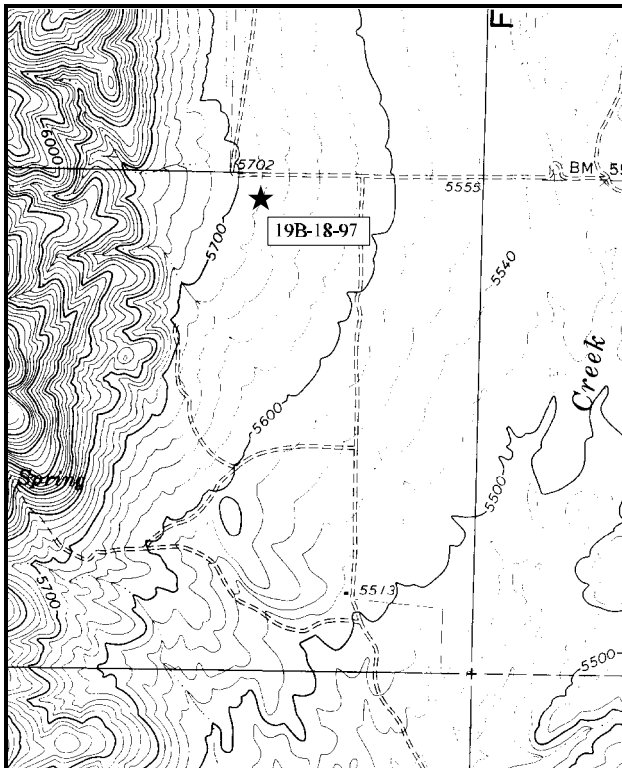
Range type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 188 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

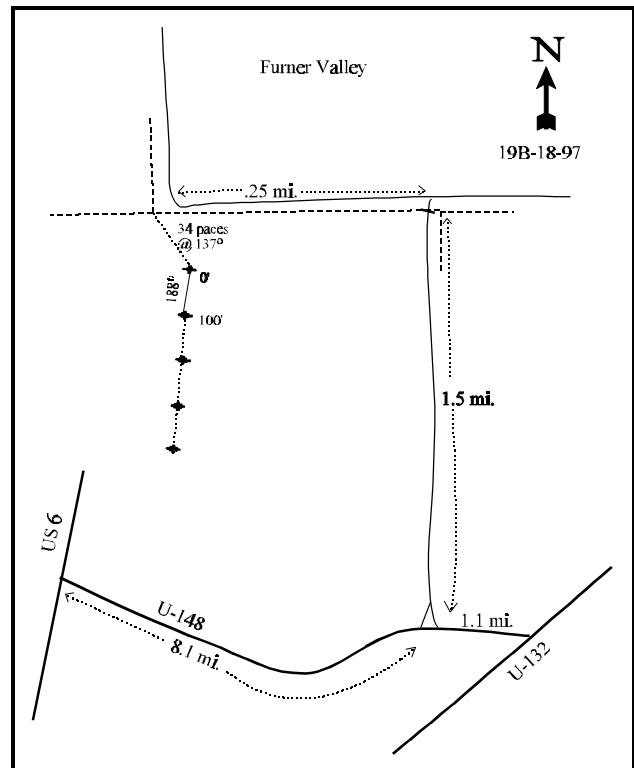
LOCATION DESCRIPTION

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 (i.e., west) for 0.25 miles, to where the road turns north again at a right angle. Stop! From the cornerspot of the fence, walk 34 paces at an azimuth of 137 degrees 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, Utah.

Township 13 S, Range 2 W, Section 18



Diagrammatic Sketch

UTM 4393401.051 N, 4044710.621 E

DISCUSSION

Trend Study No. 19B-18 (24/14-9)

The Furner Valley trend study samples deer winter range on the west side of Furner Valley. The study site is nearly level with perhaps a slight east aspect and 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 is moderate to heavy 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.

The soil is light in color with rock and pavement scattered across the soil surface and throughout the profile. Soil textural analysis indicates that it is a sandy clay loam with a neutral pH (7.1). The effective rooting depth (see methods) is almost 11 inches with a temperature of 67°F measured about 14 inches. Although a large expanse of bare soil is exposed, erosion is light because of the nearly level terrain. Vegetative cover comes mostly from shrub crowns, and a few perennial grasses and cheatgrass brome.

Mountain big sagebrush and antelope bitterbrush comprise the key browse species. Together they currently make up 84% of the browse cover. Mountain big sagebrush density is currently estimated to be 2,100 plants/acre where it contributes 60% of the browse cover. The population has shown a steady decline since 1983 even though use has been declining each sampling date. Some of the health may be improving since the high rate of decadence which occurred in 1989 (75%) is now down to 27%. Utilization is currently light and canopy cover is estimated to be 11%. However, the trend for sagebrush is slightly down because the proportion of the decadent plants classified as dying has been steadily increasing since 1983. Currently, 57% of the decadent plants are classified as dying. This would mean that about another 15% of the population would die, where at this time there is already a live to dead ratio of about 1:6, or about 15% are dead. The die-off appears to continue for sagebrush. Antelope bitterbrush currently has an estimated density of 580 plants/acre, most of which (86%) are classified as mature. Utilization continues to be moderate to heavy, yet the plants show good vigor. Percent decadency has dropped from 33% on 1989 to only 10% on 1997.

Broom snakeweed is also present with an increased estimated density of 5,000 plants/acre in 1997. This is a mostly mature population, but may have the ability to continue to increase with suitable climatic conditions. Stickyleaf low rabbitbrush and pricklypear cactus were encountered on the site, but in low abundance. Point-centered quarter data shows that the juniper density is 29 trees/acre in 1997.

Perennial grasses are common and currently provide 37% of the total vegetative cover, or makes up 77% of the herbaceous cover. Since 1989, Indian ricegrass and needle-and-thread grass have decreased in nested frequency but they still make up almost 50% of the grass cover, while Sandberg bluegrass is the only grass to show a significant increase. However, this increase of Sandberg bluegrass contributes an almost insignificant 3% of the grass cover. Cheatgrass was present in 69% of the quadrats and forms a dense carpet in localized patches and makes up 37% of the grass cover. Other grass species encountered in 1997 include: bottlebrush squirreltail, crested wheatgrass, bluebunch wheatgrass, and sand dropseed. Overall, perennial grass sum of nested frequency has declined, but only slightly, since 1989.

Forbs are diverse in species composition, but very scattered in their distribution. They provide only a minimal amount of forage with pale alyssum contributing 55% of the forb cover in 1997. Perennial forb nested frequency is down slightly from 1989.

1983 APPARENT TREND ASSESSMENT

Soil trend is stable due to the gentle terrain. Perennial cover is lacking and soil is 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 or 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 downward. Both mountain big sagebrush and Antelope bitterbrush show increased percent decadency since 1983. Mountain big sagebrush also shows an increase in the percentage of plants in poor vigor. The herbaceous understory trend is slightly upward with an increase in herbaceous understory sum of nested frequency.

TREND ASSESSMENT

soil - slightly upward

browse - downward

herbaceous understory - slightly upward

1997 TREND ASSESSMENT

The soil trend is stable with only slight erosion apparent. Percent bare ground is similar to that of 1989 and percent pavement has declined. The browse trend is slightly downward. Mountain big sagebrush percent decadency and the percentage with poor vigor has improved, however the proportion of decadent plants that are classified as dying is increasing. There will be further die-off (about 15%) of sagebrush 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

browse - slightly downward

herbaceous understory - stable to slightly down

HERBACEOUS TRENDS --
Herd unit 19B, Study no: 18

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
G	<i>Agropyron cristatum</i>	-	-	2	-	-	2	.15
G	<i>Agropyron spicatum</i>	10	12	4	4	5	2	.06
G	<i>Bromus tectorum</i> (a)	-	-	219	-	-	69	5.28
G	<i>Oryzopsis hymenoides</i>	_{ab} 40	_b 58	_a 20	20	27	10	.82
G	<i>Poa fendleriana</i>	-	2	-	-	1	-	-
G	<i>Poa pratensis</i>	3	4	-	1	2	-	-
G	<i>Poa secunda</i>	_a 7	_a 6	_b 37	3	3	17	.47
G	<i>Sitanion hystrix</i>	_b 107	_a 70	_{ab} 82	48	31	38	1.28
G	<i>Sporobolus cryptandrus</i>	-	-	4	-	-	1	.15
G	<i>Stipa comata</i>	_a 111	_c 178	_b 172	47	71	69	5.96
G	Unknown Grass	-	-	3	-	-	1	.15
Total for Grasses		278	330	543	123	140	209	14.34
F	<i>Alyssum alyssoides</i> (a)	-	-	305	-	-	93	2.28
F	<i>Antennaria rosea</i>	-	-	2	-	-	1	.00
F	<i>Arabis</i> spp.	5	-	-	3	-	-	-
F	<i>Astragalus</i> spp.	-	-	7	-	-	3	.09
F	<i>Astragalus utahensis</i>	_a 5	_a 13	_b 30	3	8	17	.40
F	<i>Caulanthus crassicaulis</i>	_b 34	_b 20	_a -	15	10	-	-
F	<i>Carduus nutans</i> (a)	-	-	2	-	-	1	.00
F	<i>Calochortus nuttallii</i>	6	-	3	3	-	2	.04
F	<i>Castilleja</i> spp.	_a -	_a -	_b 9	-	-	4	.17
F	<i>Chaenactis douglasii</i>	2	4	10	1	3	4	.04
F	<i>Crepis acuminata</i>	-	-	2	-	-	1	.03
F	<i>Gilia aggregata</i>	2	-	-	2	-	-	-
F	<i>Lithospermum incisum</i>	11	8	1	6	5	1	.01
F	<i>Linum lewisii</i>	33	52	31	19	25	15	.16
F	<i>Lygodesmia grandiflora</i>	_{ab} 5	_b 8	_a -	3	4	-	-
F	<i>Machaeranthera canescens</i>	-	1	-	-	1	-	-
F	<i>Oenothera</i> spp.	1	5	6	1	2	2	.01
F	<i>Phlox austromontana</i>	_a 3	_b 19	_a 6	2	9	3	.19
F	<i>Phlox longifolia</i>	_a 10	_b 36	_{ab} 36	4	18	16	.13
F	<i>Senecio multilobatus</i>	_a 4	_a 16	_b 44	3	9	22	.39
F	<i>Streptanthus cordatus</i>	_a -	_b 13	_b 14	-	6	7	.11
F	<i>Tragopogon dubius</i>	17	7	7	9	3	4	.09

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'83	'89	'97	'83	'89	'97	
F	Unknown forb-perennial	-	3	-	-	1	-	-
F	Zigadenus paniculatus	_a -	_b 21	_a 3	-	13	1	.00
Total for Forbs		138	226	518	74	117	197	4.18

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 19B, Study no: 18

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata vaseyana	67	11.04
B	Chrysothamnus viscidiflorus	1	-
B	Gutierrezia sarothrae	59	1.29
B	Juniperus osteosperma	4	2.74
B	Opuntia spp.	1	.00
B	Purshia tridentata	25	4.83
Total for Browse		157	19.93

BASIC COVER --

Herd unit 19B, Study no: 18

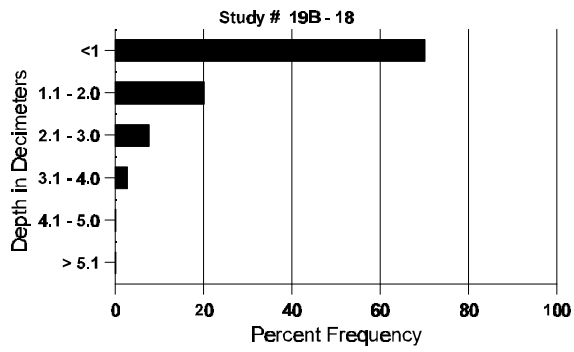
Cover Type	Nested Frequency '97	Average Cover %		
		'83	'89	'97
Vegetation	354	2.00	7.25	34.52
Rock	121	1.75	1.50	1.52
Pavement	267	1.00	20.50	8.73
Litter	379	52.25	41.25	40.31
Cryptogams	79	0	3.75	1.25
Bare Ground	266	43.00	25.75	22.77

SOIL ANALYSIS DATA --

Herd Unit 19B, Study no: 18

Effective rooting depth (inches)	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	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 19B, Study no: 18

Type	Quadrat Frequency '97
Sheep	2
Rabbit	12
Elk	1
Deer	11
Cattle	2

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								
<i>Artemisia tridentata vaseyana</i>													
S	83	-	-	-	-	-	-	-	0		0		
	89	10	-	-	-	-	-	-	333		10		
	97	3	-	-	-	-	-	-	60		3		
Y	83	3	-	-	-	-	-	-	100		3		
	89	2	-	-	1	-	-	-	100		3		
	97	17	-	-	-	-	-	-	340		17		
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	
D	83	-	12	28	-	-	-	-	1333			40	
	89	46	12	-	-	-	-	-	1933			58	
	97	16	5	-	3	-	-	-	560			28	
X	83	-	-	-	-	-	-	-	0			0	
	89	-	-	-	-	-	-	-	0			0	
	97	-	-	-	4	-	-	-	380			19	
% 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%							
Total Plants/Acre (excluding Dead & Seedlings)										'83	2799	Dec:	48%
										'89	2566		75%
										'97	2100		27%
<i>Chrysothamnus viscidiflorus</i>													
M	83	-	-	-	-	-	-	-	0	-	-	0	
	89	-	-	-	-	-	-	-	0	-	-	0	
	97	1	-	-	-	-	-	-	20	16	26	1	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'83		00%		00%		00%		None					
'89		00%		00%		00%		Appeared					
'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				
<i>Gutierrezia sarothrae</i>																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	89	3	-	-	2	-	-	-	-	-	5	-	-	-	166		5	
	97	54	-	-	7	-	-	-	-	-	61	-	-	-	1220		61	
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
D	83	2	-	-	-	-	-	-	-	-	-	-	2	-	66		2	
	89	4	-	-	-	-	-	-	-	-	3	-	1	-	133		4	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'83		10%			10%			52%			+55%							
'89		00%			00%			02%			+69%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	699	Dec:	9%				
											'89	1565		8%				
											'97	5000		0%				
<i>Juniperus osteosperma</i>																		
Y	83	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	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%			+ 0%							
'89		00%			00%			00%			+59%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'83	33	Dec:	-				
											'89	33		-				
											'97	80		-				

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	3	3	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'83		00%			00%			00%			None							
'89		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	0	Dec:	-			
												'89	0		-			
												'97	20		-			
Purshia tridentata																		
Y	'83	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	'89	-	1	-	-	-	-	-	-	-	1	-	-	-	33			1
	'97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
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
D	'83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'89	1	1	1	-	-	-	-	-	-	3	-	-	-	100			3
	'97	-	2	-	-	1	-	-	-	-	2	-	-	1	60			3
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		50%			00%			00%			-25%							
'89		67%			22%			00%			+48%							
'97		59%			17%			03%										
Total Plants/Acre (excluding Dead & Seedlings)												'83	399	Dec:	0%			
												'89	299		33%			
												'97	580		10%			

SUMMARY

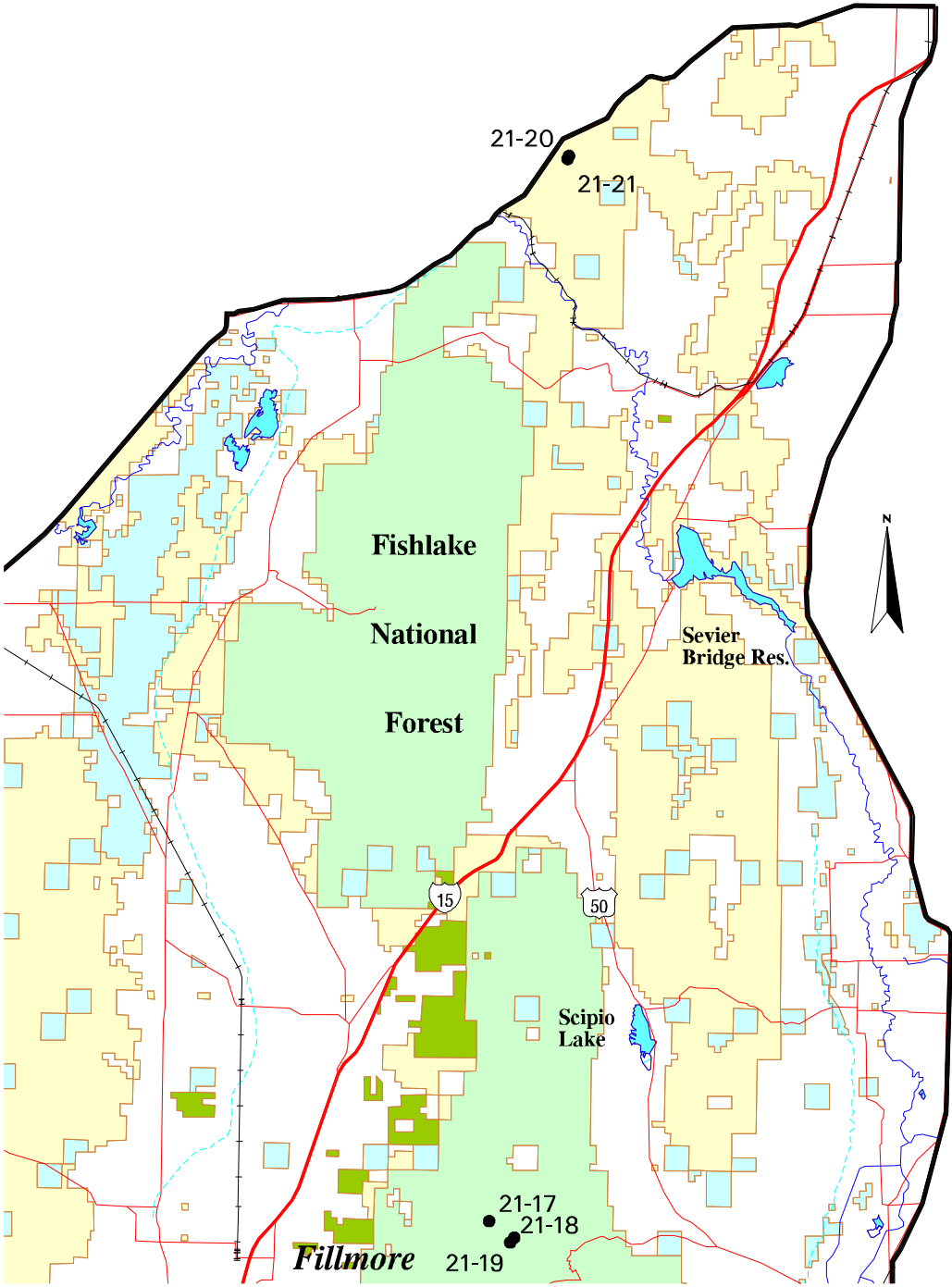
WILDLIFE MANAGEMENT UNIT - 19B (23,24) - WEST DESERT

Overall, soil trends are stable to improving with little soil erosion apparent on most of the sites. Many of the sites with improved soil trends show increased percent vegetation cover and decreased percent bare ground. Lee's Creek (19B-6) is the only site that had downward soil trend in 1989. It appears to have stabilized. Although the herbaceous understory trends on most of the summer range sites are stable, the herbaceous understory on many of these sites are seriously lacking. Sabie Mountain (19B-1), Harker Canyon (19B-4), and Black Rock Canyon (19B-14) have downward herbaceous understory trends due to a great decrease in perennial grass sum of nested frequency since 1989. Water Canyon (19B-11) has a downward herbaceous trend due to a great decrease in perennial grass sum of nested frequency since 1989 and poor composition. Browse trends for winter range sites are highly variable. The browse populations on Judd Creek (19B-7) are improving with improved vigor and a decline in percent decadency. Nephi Dump has a slightly downward browse trend with a declining sagebrush population and an increase in percentage of plants classified with poor vigor.

Site	1989			1997		
	Soil	Browse	Grass & Forb	Soil	Browse	Grass & Forb
19B-1 Sabie Mountain	+	0	0	+	-	-
19B-2 Upper Little Valley	0	0	0	+	0/-	0
19B-3 Bennion Creek	0	0	0	+	-	0
19B-4 Harker Canyon	+	0	+	+	0	-
19B-5 South of West Government Creek	+	0	+	+	0	0
19B-6 Lee's Creek	-	0	+	0	+	0
19B-7 Judd Creek	0	-	0	0	+	-
19B-8 South Pine Canyon	0	0	-	NOT READ IN 1997		
19B-9 North Oak Brush Canyon	0	0	0	+	0	0
19B-10 Sioux Pass	0	-	0	0	0	0
19B-11 Water Canyon	0	-	+	0	0	-
19B-12 Sunrise Canyon	0	0	-	0	-	0
19B-13 Dennis Spring	0	-	0	0	0	0
19B-14 Black Rock Canyon	0	0	+	0	0	-
19B-15 Upper Broad Canyon	0	-	0	-	-	0
19B-16 Nephi Dump	0	-	+	0	-	+
19B-17 Old Canyon	0	-	0	NOT READ IN 1997		
19B-18 Furner Valley	+	-	+	0	-	0/-












(0) = stable, (+) = upward, (-) = downward, (0/-) = stable to slightly downward

Management Unit 21

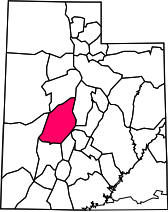


Map Scale 1:456,192 (1" = 7.2 miles)

Legend

- | | | |
|---|---|--|
|  Forest Service |  Water Body |  Ditch, Canal, Aqueduct |
|  BLM |  Transect Location |  Primary Road |
|  State of Utah |  Secondary Road |  Perennial Stream |
|  Private Land | | |
|  State Wildlife Res. | | |

Unit Location



WILDLIFE MANAGEMENT UNIT - 21 (54) - FILLMORE

Boundary Description

Millard, Sevier, Sanpete and Juab counties - Boundary begins at Interstate 70 and Interstate 15; then north on I-15 to Black Rock Road; then west on Black Rock Road to Highway SR-257; then north on SR-257 to Highway US-50 & 6; then east on US-50 & 6 to US-6, then north on US-6 to Highway SR-132; then east on SR-132 to Highway SR-28; then south on SR-28 to Highway US-89; then south on US-89 to I-70; then southwest on I-70 to I-15 and beginning point.

In 1997, three summer range sites were established on the Pahvant Plateau to monitor perceived areas of conflict between elk and livestock. The preliminary findings of these studies are contained in this report. Also, paired study sites were placed on a site within the 1996 Leamington Burn complex to monitor secondary succession and seed establishment on a burned and seeded area and a burned, seeded and chained area. The rest of the herd unit's trend study sites will be contained within the 1998 Utah Range Trend Studies report.

Unit Description

The Fillmore unit includes the Canyon Mountains northeast of Scipio, the Valley Mountains east of Scipio and the Pahvant Range east of Fillmore. Elevation ranges from approximately 5,000 feet near Fillmore to 10,129 feet on Pioneer Peak, 9,711 feet at Fool Creek Peak in the Canyon Mountains, and 8,240 in the Valley Mountains. The Valley Mountains are relatively dry and have no continuous flow drainages. The major Pahvant drainages are Chalk Creek, Pioneer Creek, Maple Hollow, and Wild Goose Creek on the west side, and only Maple Creek on the east side.

Most of the unit's summer range is located above 7,000 feet on the Pahvant Range. Coles and Pederson (1970) identified mountain brush, conifer, aspen, and dry meadow to be the major vegetation types found on the summer range, which was reported to cover 31% of the unit. A history of severe overgrazing of these steep mountain ranges has resulted in poor ground cover and related soil disturbance. This in turn resulted in problems of periodic flash flooding and soil erosion which necessitated a great deal of costly watershed work by the U.S. Forest Service. Contour trenching, seeding, grazing reductions and other management practices have largely eliminated the flash flooding problems, but the land will still take a long time to recover. Meanwhile, production rates of desirable forage, especially forbs, remains low.

Current management objectives for wildlife are to achieve a target population of 13,500 wintering deer with a post season buck to doe ratio of 15:100. Thirty percent of these bucks are to be three point or better. The target winter herd size for elk is to be 1,400 with a post season composition of 20 bulls to 100 cows. Ten of these bulls are to be 2 ½ years of age or older. Buck harvests have ranged between 2,000 and 1,500 between 1988 and 1992. Numbers dropped in 1992 to only 630, but by 1995, the harvest had rebounded to 773 bucks. The elk herd on the Pahvant elk unit was estimated at 400 to 500 animals in 1993. The winter count of 1996 estimated 625 elk, still well below the objective. Between 1988 and 1994, an average of 14 bulls were harvested from the unit, 91% to 100% of which were mature bulls. Antlerless permits were first issued in 1990 and have steadily increased from 9 in 1990 to 49 in 1993.

Trend Study 21-17-97

Study site name: Pioneer Peak

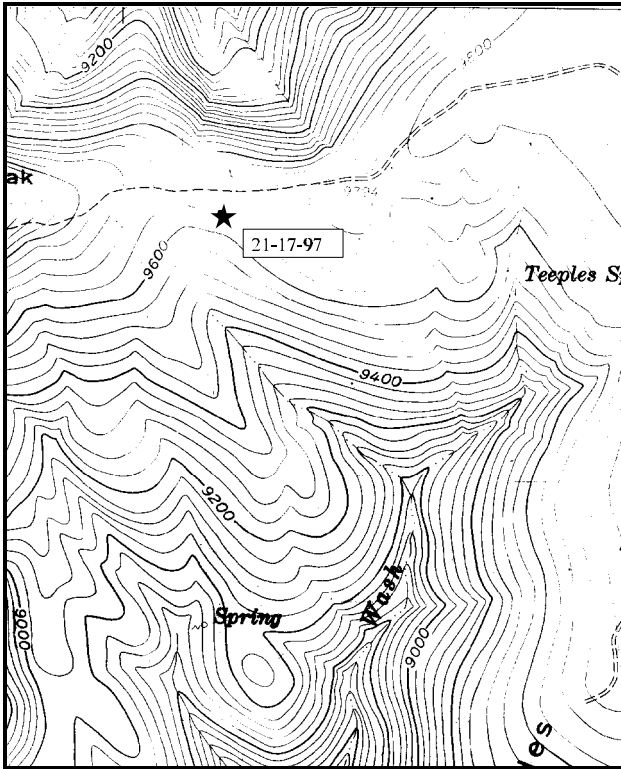
Range type: Perennial Grass/Forb

Compass bearing: frequency baseline 281 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

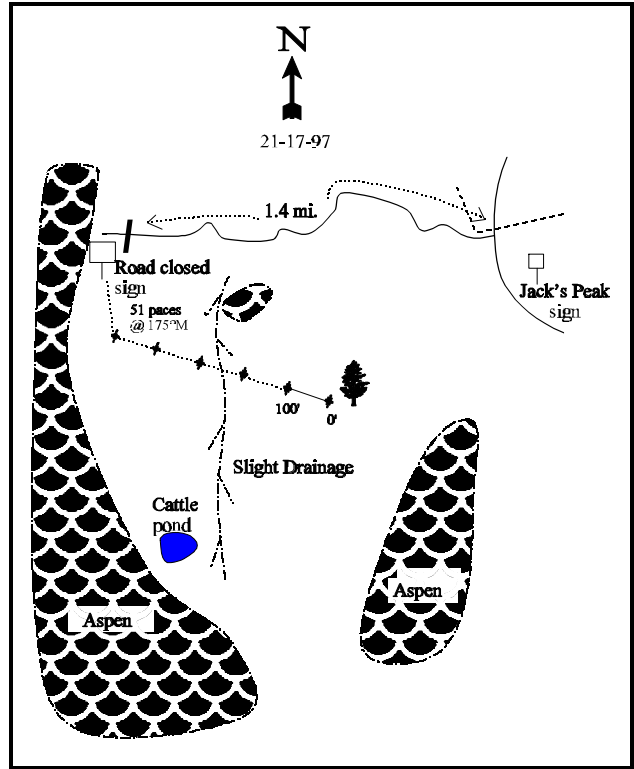
LOCATION DESCRIPTION

From Highway 50 drive 0.75 miles south of mile marker 71 to a road on the right. Drive west 3.7 miles to a cattlegaurd. Go another 0.75 miles across a stream to a gate. Go through the gate and drive 5.55 miles past the weather gauging station to a right turn. Turn right onto road # 096 and go 4.1 miles to a "road closed" sign on the left, just before Jack's Peak. Drive 0.2 miles to Jack's Peak. From here drive 1.4 miles to the end of the road and a "road closed" sign. From this sign walk 51 paces at 175° M to the 500-foot stake. The 0-foot stake is 500 feet away at 101° M, next to a big fir tree.



Map name: Mt. Catherine .

Township 21 S, Range 3 W, Section 11



Diagrammatic Sketch

UTM 4316481.322 N, 399262.664 E

DISCUSSION

Study Site No. 21-17

Pioneer Peak is a new site located on the east side of the Pahvant Plateau near Pioneer Peak. The study site samples dry meadow type bordered on two sides by aspen at an elevation of 9,600 feet. It is located on a saddle that was contour furrowed and seeded in the past. Aspect is south-southeast with a slope of 20% to 25%. Cattle and elk use the area during the summer. Pellet group data estimate 1 deer, 22 elk, and 33 cattle use days/acre. Cattle were present on the site during study establishment and had utilized much of the grasses on the site especially orchard grass. Many of the contour furrows had been grazed with cattle trails on the banks of the furrows. A cattle pond is located about 200 yards down slope from the study site. Soil on the site is deep with an estimated effective rooting depth (see methods) of nearly 24 inches. Textural analysis indicated it to be a clay loam with a moderately acid pH (6.0). There are some large boulders on the surface and in the profile, but the soil is mostly rock free. Vegetation cover is abundant and consists totally of grasses and forbs. Litter cover is also fairly abundant. Although bare ground cover is common at 31%, erosion is not a problem on this site.

The plant composition is made up of grasses and forbs. No browse species were encountered. Mature aspen clones border the site and mature trees appear highlined. There are no young trees along the clone borders.

The herbaceous understory is abundant and diverse. Eight perennial grasses combine to produce nearly 20% cover. Seeded species include: intermediate wheatgrass, mountain brome, smooth brome, and orchard grass. These species dominate the herbaceous understory and account for 84% of the grass cover. The only common native species is Letterman needlegrass.

Twenty-three species of forbs are found on the site. They produce nearly 19% cover. There are some useful species along with several increasers and undesirable species, including tarweed which accounts for 12% of the ground cover. The tarweed occurs in scattered clumps and is not widespread on the site. Its presence along with the high numbers of larkspur, sticky geranium, slenderleaf collomia, hoary aster, and sandwort indicate continued disturbance and past site degradation. Initially this area was most likely a tall forb community that, after being historically overgrazed by livestock, lost some of its site potential due to soil loss.

1997 APPARENT TREND ASSESSMENT

The soil trend appears stable even though percent bare ground is relatively high at 31%. Contour furrows along with the abundant herbaceous vegetation cover effectively limit erosion, however litter cover is relatively low for a high elevation site like this one. There are no browse species on the site but aspen clones nearby appear to have been impacted by grazing. Mature trees are highlined and no reproduction is evident. The herbaceous understory is abundant with about half of the cover coming from grasses and the other half coming from forbs. Composition is poor for forbs however, due to the abundance of less desirable species such as tarweed and larkspur. The site potential has obviously been reduced in the past due to overgrazing and soil erosion. It is not currently known what this site can support, but future trends for the herbaceous understory will depend on changes in nested frequency of larkspur, tarweed, and some of the other increasers.

HERBACEOUS TRENDS --

Herd unit 21 , Study no: 17

Type	Species	Nested Frequency '97	Quadrat Frequency '97	Average Cover % '97
G	Agropyron intermedium	201	64	8.41
G	Agropyron trachycaulum	7	3	.04
G	Bromus carinatus	173	59	5.08
G	Bromus inermis	63	22	2.18
G	Dactylis glomerata	72	27	.87
G	Melica bulbosa	2	2	.01
G	Stipa columbiana	1	1	.00
G	Stipa lettermani	125	41	3.05
Total for Grasses		644	219	19.66
F	Achillea millefolium	1	1	.03
F	Agoseris glauca	23	11	.18
F	Arabis spp.	16	10	.08
F	Artemisia dracunculus	2	1	.03
F	Aster chilensis	6	2	.01
F	Collomia linearis (a)	223	73	2.25
F	Delphinium nuttallianum	30	17	3.72
F	Epilobium paniculatum (a)	25	8	.16
F	Erigeron spp.	4	1	.00
F	Geranium viscosissimum	5	3	.39
F	Lupinus argenteus	46	18	1.98
F	Machaeranthera canescens	150	66	2.51
F	Madia glomerata (a)	80	23	2.22
F	Mentha arvensis	18	8	.38
F	Orthocarpus tolmiei (a)	5	3	.18
F	Polygonum douglasii (a)	181	55	1.00
F	Ranunculus spp.	13	4	.19
F	Stellaria jamesiana	119	46	1.00
F	Taraxacum officinale	12	5	.08
F	Tragopogon dubius	2	1	.03
F	Vicia americana	50	26	.61
F	Viguiera multiflora	120	49	1.39
F	Viola spp.	8	4	.09
Total for Forbs		1139	435	18.56

BASIC COVER --

Herd unit 21 , Study no: 17

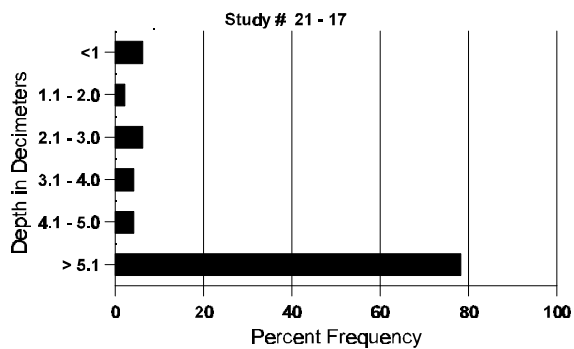
Cover Type	Nested Frequency '97	Average Cover % '97
Vegetation	466	50.70
Rock	86	3.24
Pavement	117	.43
Litter	466	29.64
Bare Ground	402	30.77

SOIL ANALYSIS DATA --

Herd Unit 21, Study no: 17

Effective rooting depth (inches)	Temp °F (depth)	PH	% sand	% silt	% clay	%OM	PPM P	PPM K	dS/m
23.9	47.6 (17.7)	6.0	42.7	26.7	30.6	3.3	18.4	188.8	.2

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 17

Type	Quadrat Frequency '97
Elk	5
Cattle	9

Trend Study 21-18-97

Study site name: Teeples Ridge

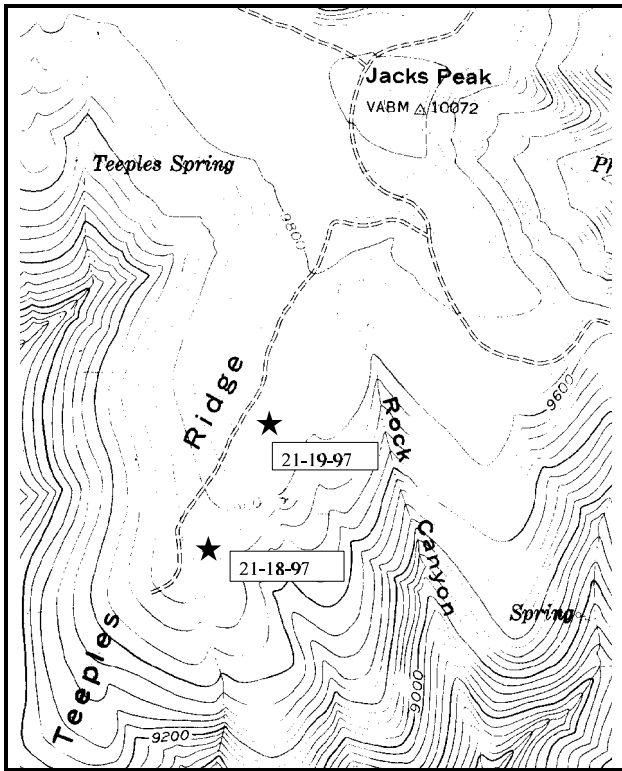
Range type: Perennial Grass/Forb

Compass bearing: frequency baseline 170 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

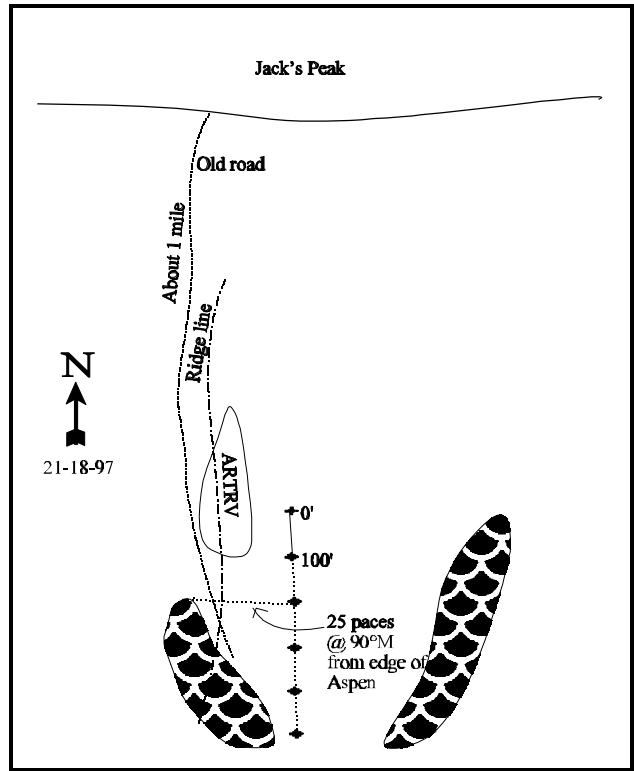
LOCATION DESCRIPTION

From Highway 50 drive 0.75 miles south of mile marker 71 to a road on the right. Drive west 3.7 miles to a cattlegaurd. Go another 0.75 miles across a stream to a gate. Go through the gate and drive 5.55 miles past the weather gauging station to a right turn. Turn right onto road # 096 and go 4.1 miles to a "road closed" sign on the left, just before Jack's Peak. Walk down the old road on the left (which is basically a trail now) for about 3/4 miles to the edge of an aspen clone and a clearing on the left. The study is in the clearing. From the north end of the aspen clone walk 25 paces at 90° M to the 200-foot stake. The 0-foot stake is 200 feet north.



Map name: Mount Catherine

Township 21 S, Range 3 W, Section 13



Diagrammatic Sketch

UTM 4315091.151 N, 400637.974 E

DISCUSSION

Study Site No. 21-18

Teeples Ridge is a new site established to monitor cattle and elk competition along Teeples Ridge about a half mile south of Jack's Peak. The site samples a dry meadow type bordered by aspen which provides excellent escape cover for deer and elk. Slope varies from 8% to 15% with a south, southeast aspect. Elevation is approximately 9,500 feet. This area is used by deer, elk, and cattle during the summer. Cattle were grazing on the area when the study was established (8/21/97). Pellet group data show heavy elk and cow use with 61 elk and 50 cow use days/acre estimated. Deer use is estimated at only 2 deer use days/acre. Aspen stands near the site were mostly mature highlined trees with little or no reproduction evident.

Soil on the site is deep and rock free with an effective rooting depth (see methods) estimated at nearly 17 inches. Soil texture is a clay loam with a slightly acid pH (6.4). Soil organic matter is moderate at 3.8%. There is a considerable amount of bare soil estimated at nearly 39%. Herbaceous vegetation and litter cover provide an estimated 72% ground cover. However, erosion is not serious due to the gentle terrain.

Like Pioneer Peak, this site is dominated by grasses and forbs. Sagebrush is found to the north and aspen clones border the site to the east and west. Due to the apparent deep, rock free soil and lack of shrubs, this site also probably once supported a tall forb community. The area was seeded as part of the same watershed protection project that was done at Pioneer Peak. Although browse is not an important aspect of this summer range, a small number of sagebrush were encountered near the start of the baseline. Only 80 plants/acre were estimated.

The herbaceous understory is relatively abundant with seven grasses and 18 forbs producing nearly 31% cover. This kind of site should be producing at least 50% vegetative cover, and it is far below its potential. Smooth brome is the most common grass species providing 71% of the grass cover. The only other common grass is intermediate wheatgrass. Several forbs are abundant including: western yarrow, larkspur, hoary aster, and tuber starwort. These species provide 78% of the forb cover on the site and dominance of these species suggests disturbance caused by heavy grazing.

1997 APPARENT TREND ASSESSMENT

The soil trend appears stable although there is a considerable amount of bare ground. Erosion is not severe due to the lack of slope. Browse is not an important aspect of this summer range and there are only a few sagebrush and low rabbitbrush along the beginning of the baseline. The herbaceous understory is fairly abundant but the composition is poor, especially for forbs. The grass component is dominated by smooth brome and intermediate wheatgrass which account for 98% of the grass cover. Forb composition is dominated by increasers and poisonous species including: western yarrow, larkspur, hoary aster, and tuber starwort. These species occur at high densities and account for 78% of the forb cover. Future herbaceous trends will depend on changes in nested frequency for these increaser species.

HERBACEOUS TRENDS --

Herd unit 21 , Study no: 18

Type	Species	Nested Frequency '97	Quadrat Frequency '97	Average Cover % '97
G	Agropyron intermedium	166	55	4.40
G	Agropyron trachycaulum	2	1	.00
G	Bromus carinatus	1	1	.01
G	Bromus inermis	235	63	11.68
G	Dactylis glomerata	20	7	.27
G	Poa pratensis	2	1	.00
G	Stipa lettermani	11	6	.13
Total for Grasses		437	134	16.52
F	Achillea millefolium	36	11	1.09
F	Agoseris glauca	56	24	.49
F	Arabis spp.	12	5	.05
F	Artemisia dracunculus	4	3	.05
F	Aster chilensis	2	1	.00
F	Cirsium spp.	1	1	.03
F	Collomia linearis (a)	52	24	.14
F	Delphinium nuttallianum	67	27	5.99
F	Epilobium paniculatum (a)	8	2	.06
F	Lomatium dissectum	4	2	.01
F	Machaeranthera canescens	166	68	2.81
F	Mentha arvensis	63	25	.80
F	Polygonum douglasii (a)	136	41	.55
F	Rumex crispus	3	2	.18
F	Stellaria jamesiana	174	64	1.00
F	Taraxacum officinale	25	10	.17
F	Vicia americana	32	13	.15
F	Viguiera multiflora	30	9	.41
Total for Forbs		871	332	14.01

BROWSE TRENDS --

Herd unit 21 , Study no: 18

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata vaseyana	4	-
Total for Browse		4	-

BASIC COVER --

Herd unit 21 , Study no: 18

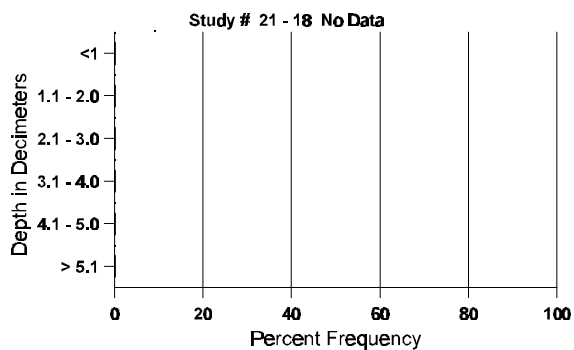
Cover Type	Nested Frequency '97	Average Cover % '97
Vegetation	431	34.36
Rock	19	.08
Pavement	78	.69
Litter	491	32.06
Bare Ground	460	38.51

SOIL ANALYSIS DATA --

Herd Unit 21, Study no: 18

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
16.9	47.6 (17.6)	6.4	32.7	28.7	38.6	3.8	18.2	252.8	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 18

Type	Quadrat Frequency '97
Elk	9
Deer	2
Cattle	11

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 18

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	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	10	9	2
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% 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	80	Dec:	-				

Trend Study 21-19-97

Study site name: Teeples Terrace .

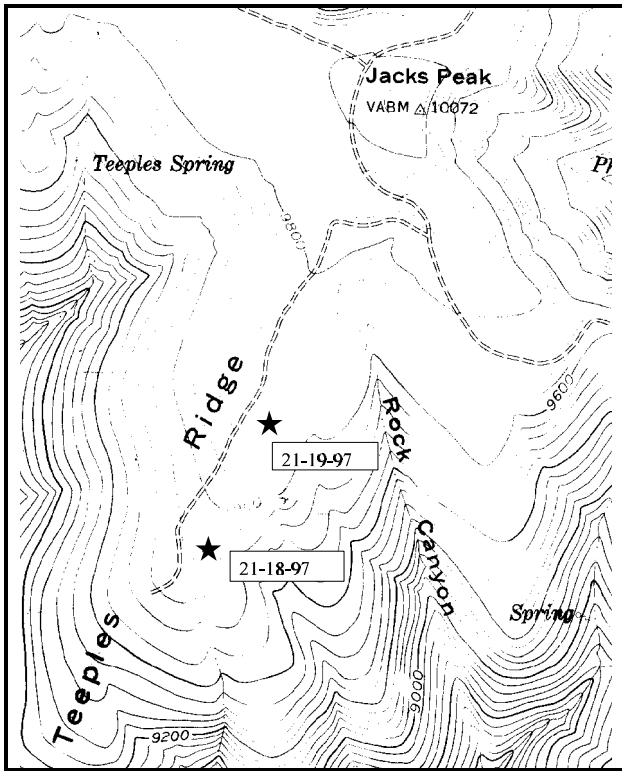
Range Type: Perennial Grass/Forb

Compass bearing: frequency baseline approximately north (following terrace).

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

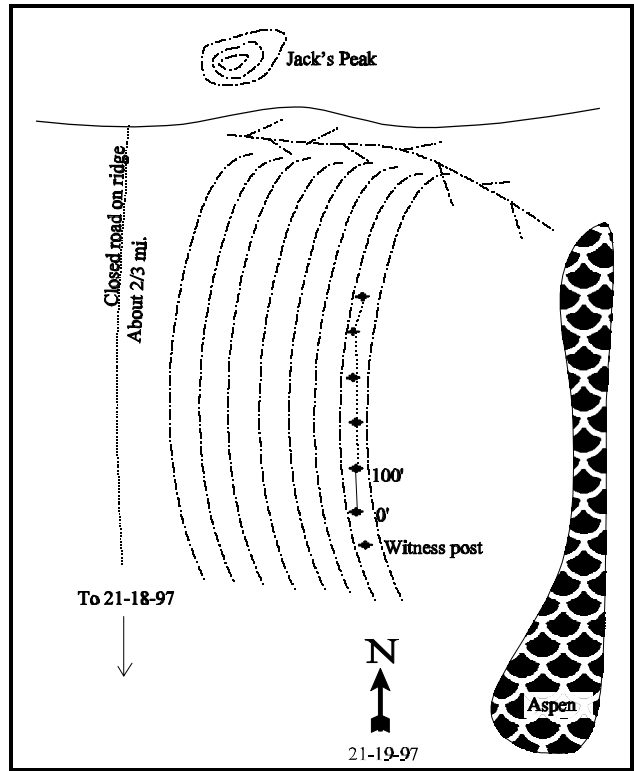
LOCATION DESCRIPTION

From Highway 50 drive 0.75 miles south of mile marker 71 to a road on the right. Drive west 3.7 miles to a cattergaurd. Go another 0.75 miles across a stream to a gate. Go through the gate and drive 5.55 miles past the weather gauging station to a right turn. Turn right onto road # 096 and go 4.1 miles to a "road closed" sign on the left, just before Jack's Peak. Walk down the closed road about 2/3 mile to a cluster of *Ribes*. Walk down eight terraces to a witness post. The 0-foot stake is just north of the witness post. The baseline runs along the terrace.



Map name: Mt. Catherine .

Township 21 S, Range 3 W, Section 13



Diagrammatic Sketch

UTM 4315405.882 N, 400908.170 E

DISCUSSION

Study Site No. 21-19

The Teeples Terrace study was established just north of the Teeples Ridge study site. It samples one of the watershed protection terraces on the east side of Teeples Ridge. There was concern voiced by permittees that elk were causing degradation along these terraces. The site has a slope that ranges from 20% to 30%, an aspect to the east-southeast, and an elevation of 9,650 feet. The transect samples one of the terraces which are about 8 to 10 feet wide and follow the contour of the slope. Quadrats were placed along the baseline tape which extends 500 feet along the terrace. Cattle and wildlife use the terraces as trails to travel through the area. Cattle were on the area during site establishment (Aug 21, 1997). Pellet group data estimate 44 cow and 19 elk days use/acre.

Soil on the site is deep with an effective rooting depth (see methods) estimated at nearly 21 inches. Soil temperature is a relatively cool 44°F at 18 inches in depth. Rocks are rare on the surface and in the profile. Soil texture is a sandy clay loam. There is a considerable amount of bare ground for a productive high elevation site averaging nearly 47%. Litter cover is also limited because of excessive grazing at only 14%. However, there is little erosion because of the effect of the contoured terraces.

Shrubs are not an important aspect of this site. Some mountain big sagebrush and stickyleaf low rabbitbrush occur along the terraces but only in relatively small numbers. There are some aspen clones in the area which provide cover but little forage. These trees are all mature and unavailable to browsing.

The herbaceous understory provides a total of 37% cover, 56% of which comes from grasses. Grasses are diverse, yet 72% of the grass cover comes from smooth brome. Mountain brome and Letterman needlegrass are also fairly abundant. Forbs are also diverse but composed almost entirely of increasers and weeds. The most common species, western yarrow, silvery lupine, curly dock, and dandelion, account for 79% of the forb cover.

1997 APPARENT TREND ASSESSMENT

Overall, the soil on the site appears stable due to the contoured terraces, however many of the terraces have cattle trails along the outer edge which leaves a considerable amount of bare ground exposed. The ratio of bare soil to protective ground cover is very poor for such a productive high elevation site. Browse are a minor aspect on this site and not important on a summer range. The herbaceous understory is abundant and diverse. Grasses consist mostly of smooth brome which provides 72% of the grass cover. Forb composition is poor and composed almost totally of increasers and weeds, a symptom of heavy grazing. Another indication of excessive grazing is the lack of any significant litter cover, which currently is only at 14%. Future improvements in the herbaceous understory will depend on reductions in nested frequency of these weedy species and increased frequency of more preferred forbs like Penstemon and American vetch.

HERBACEOUS TRENDS --

Herd unit 21 , Study no: 19

Type	Species	Nested Frequency '97	Quadrat Frequency '97	Average Cover % '97
G	Agropyron intermedium	20	8	.51
G	Bromus carinatus	55	16	2.73
G	Bromus inermis	292	71	15.16
G	Carex spp.	3	1	.03
G	Dactylis glomerata	9	2	.18
G	Poa pratensis	14	5	.59
G	Stipa lettermani	87	42	1.74
Total for Grasses		480	145	20.95
F	Achillea millefolium	62	29	1.27
F	Agoseris glauca	32	16	.26
F	Arabis spp.	7	5	.02
F	Artemisia dracunculus	1	1	.00
F	Collomia linearis (a)	103	39	.61
F	Epilobium paniculatum (a)	17	6	.13
F	Erigeron flagellaris	5	2	.06
F	Erigeron spp.	7	4	.02
F	Gayophytum ramosissimum (a)	15	7	.11
F	Lupinus argenteus	94	44	5.46
F	Machaeranthera canescens	53	25	.70
F	Microsteris gracilis (a)	3	1	.00
F	Penstemon spp.	1	1	.00
F	Polygonum douglasii (a)	126	49	.95
F	Ranunculus spp.	3	1	.15
F	Rumex crispus	60	17	3.57
F	Stellaria jamesiana	44	19	.27
F	Taraxacum officinale	109	45	2.55
F	Vicia americana	20	8	.14
F	Viguiera multiflora	3	2	.03
Total for Forbs		765	321	16.37

BROWSE TRENDS --

Herd unit 21 , Study no: 19

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata vaseyana	1	.03
B	Chrysothamnus viscidiflorus viscidiflorus	2	-
Total for Browse		3	0.03

BASIC COVER --

Herd unit 21 , Study no: 19

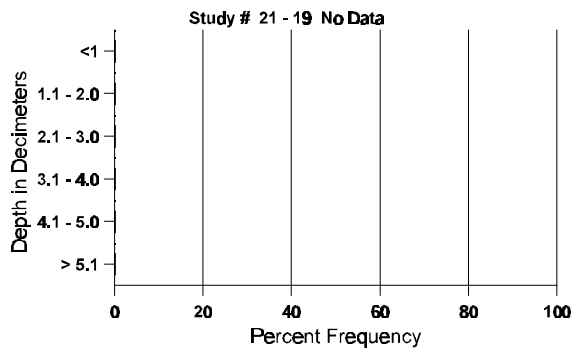
Cover Type	Nested Frequency '97	Average Cover % '97
Vegetation	440	40.19
Rock	99	2.25
Pavement	98	.47
Litter	443	14.41
Bare Ground	459	46.70

SOIL ANALYSIS DATA --

Herd Unit 21, Study no: 19

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
20.7	44.4 (17.7)	5.0	48.0	26.7	25.3	2.5	52.1	227.2	.2

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 19

Type	Quadrat Frequency '97
Elk	4
Deer	1
Cattle	7

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 19

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	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	19	47	0
% Plants Showing '97		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)													'97	20	Dec:	-		
Chrysothamnus viscidiflorus viscidiflorus																		
M	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	7	9	2
% Plants Showing '97		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)													'97	40	Dec:	-		

Trend Study 21-20-97

Study site name: Lemington Burn .

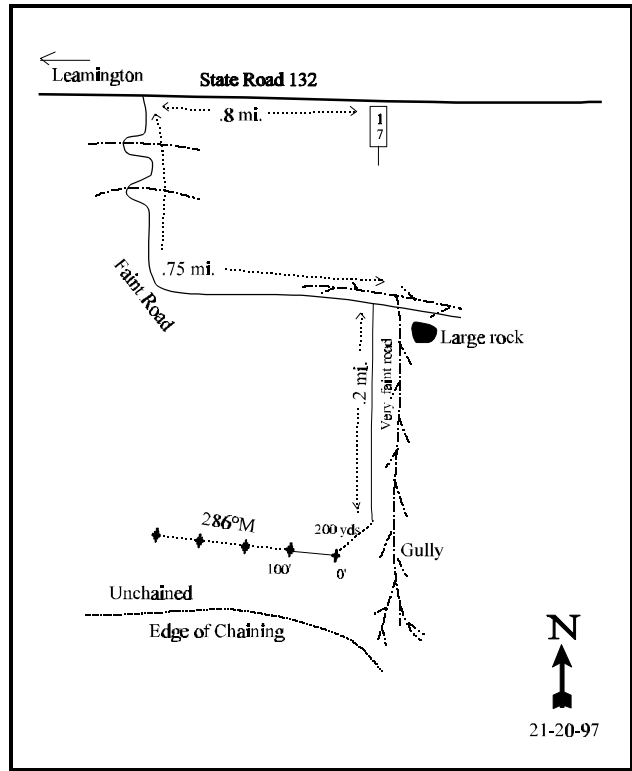
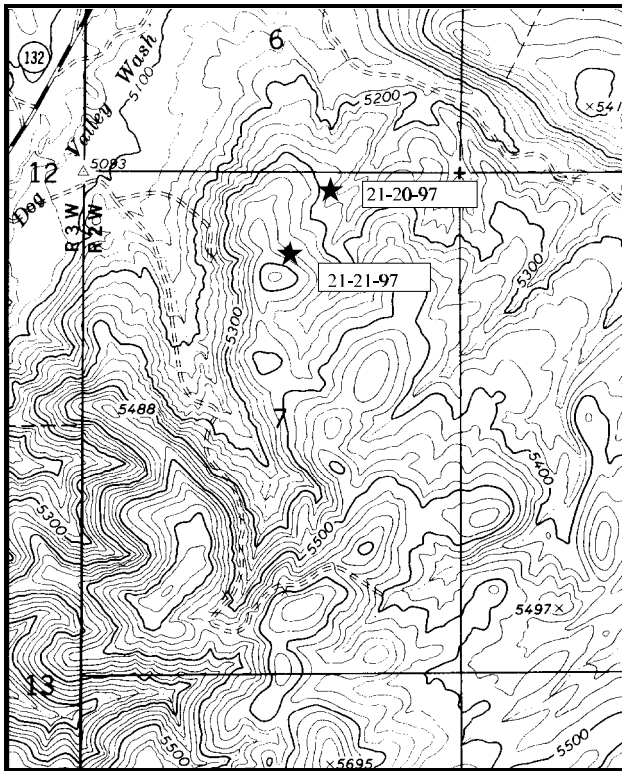
Range type: Burned Pinyon-Juniper .

Compass bearing: Frequency baseline 286 M degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

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 14 S, Range 2 W, Section 7 .

UTM 4385967.903 N, 404471.621 E

DISCUSSION

Study No. 21-20

The Leamington Burn is a new study placed on a burned and seeded pinyon-juniper area. The area 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. The fire involved approximately 138,340 acres of dry rangelands. Rehabilitation efforts were started during the fall of 1996 and included drilling, chaining, and seeding. About 6,100 acres were treated with a rangeland drill, 10,736 acres were aerial seeded and followed by a one-way chaining with an Ely chain to help cover the seed, and 8,308 acres were aerially seeded only. This site samples a burned site that was aerially seeded and not chained. A nearby burned area that was aerially seeded then chained is sampled by study no. 21-21 to contrast the difference between the two treatments.

This site is 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 through the profile. Some rocks under the surface have deposits of white calcium carbonate. Phosphorus in the soil may be limiting to plant growth and development at 8.0 ppm, where 10 ppm are thought to be the minimum necessary for proper growth.

Prior to the fire, the site was dominated by pinyon and juniper woodland, now few remain alive. There are a few young green ephedra on the site along with some broom snakeweed. The majority of the vegetation cover comes from grasses and forbs which combine to produce a total of almost 13% cover. Common grasses include: bluebunch wheatgrass, cheatgrass, Indian ricegrass, and Sandberg bluegrass. The only seeded grass the commonly occurs is crested wheatgrass, which has a quadrat frequency of only 4%. Cheatgrass is abundant and widespread. It currently accounts for 33% of the grass cover. Forbs are diverse but only the native Douglass chaenactis, an annual Gilia, longleaf phlox, and bur buttercup are common. Seeded forbs consisting of alfalfa and small burnet were found on the site, however only in one of the 100 quadrats.

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 re-sprouting Green Ephedra and some broom snakeweed. This trend will likely improve as more shrubs establish on the burn in the future. 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.

HERBACEOUS TRENDS --

Herd unit 21 , Study no: 20

Type	Species	Nested Frequency '97	Quadrat Frequency '97	Average Cover % '97
G	<i>Agropyron cristatum</i>	6	4	.27
G	<i>Agropyron spicatum</i>	60	26	2.20
G	<i>Bromus tectorum</i> (a)	153	54	2.34
G	<i>Oryzopsis hymenoides</i>	68	30	1.26
G	<i>Poa secunda</i>	63	25	.87
G	<i>Sitanion hystrix</i>	16	9	.17
Total for Grasses		366	148	7.13
F	<i>Alyssum alyssoides</i> (a)	1	1	.00
F	<i>Arabis</i> spp.	3	1	.00
F	<i>Astragalus beckwithii</i>	4	2	.06
F	<i>Calochortus nuttallii</i>	3	2	.01
F	<i>Chaenactis douglasii</i>	52	23	.97
F	<i>Descurainia</i> spp. (a)	14	8	.13
F	<i>Eriogonum cernuum</i> (a)	6	2	.30
F	<i>Gilia</i> spp. (a)	77	37	1.64
F	<i>Lactuca serriola</i>	6	3	.61
F	<i>Lesquerella</i> spp.	38	19	.19
F	<i>Medicago sativa</i>	1	1	.00
F	<i>Phlox longifolia</i>	46	22	.36
F	<i>Ranunculus testiculatus</i> (a)	112	34	.76
F	<i>Sanguisorba minor</i>	1	1	.15
F	<i>Streptanthus cordatus</i>	7	3	.04
F	<i>Tragopogon dubius</i>	3	1	.03
Total for Forbs		374	160	5.28

BROWSE TRENDS --

Herd unit 21 , Study no: 20

Type	Species	Strip Frequency '97	Average Cover % '97
B	Chrysothamnus viscidiflorus	-	.03
B	Ephedra viridis	1	-
B	Gutierrezia sarothrae	2	.18
Total for Browse		3	0.22

BASIC COVER --

Herd unit 21 , Study no: 20

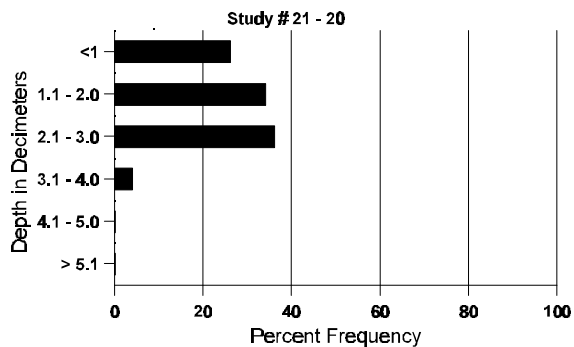
Cover Type	Nested Frequency '97	Average Cover % '97
Vegetation	303	13.11
Rock	314	11.08
Pavement	451	20.50
Litter	383	7.05
Cryptogams	108	2.08
Bare Ground	424	32.10

SOIL ANALYSIS DATA --

Herd Unit 21, Study no: 20

Effective rooting depth (inches)	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	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 20

Type	Quadrat Frequency '97
Rabbit	15
Deer	1
Cattle	1

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 20

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 tridentata vaseyana</i>																		
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	0	Dec:	-
<i>Ephedra viridis</i>																		
Y	97	3	-	-	-	-	-	-	-	-	-	-	-	60			3	
% 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	60	Dec:	-
<i>Gutierrezia sarothrae</i>																		
Y	97	1	-	-	-	-	-	-	-	-	-	-	-	20			1	
M	97	3	-	-	-	-	-	-	-	-	-	-	-	60	6	4	3	
% 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	80	Dec:	-
<i>Juniperus osteosperma</i>																		
X	97	-	-	-	-	-	-	-	-	-	-	-	-	40			2	
% 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:	-

Trend Study 21-21-97

Study site name: Lemington Burn and Chain.

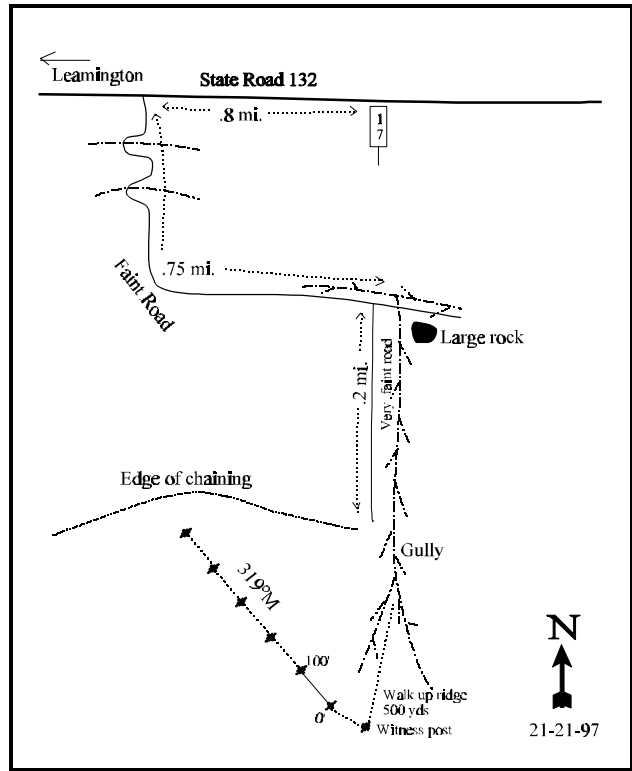
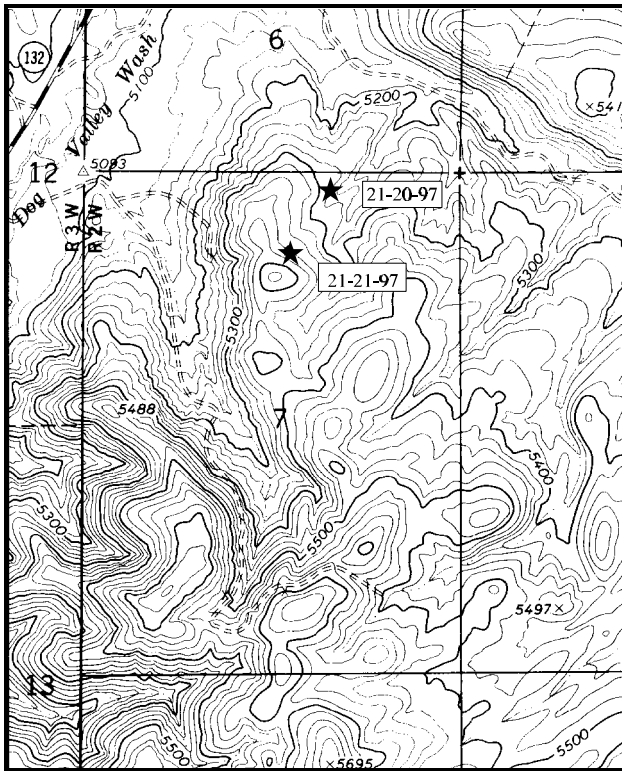
Range Type: Chained and Burned Pinyon-Juniper .

Compass bearing: frequency baseline 319 M degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

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° M to a witness post. The 0-foot stake is 20 feet from the witness post at about 319°M. The study is marked by 12-18 inch, green, steel fencposts.



Map name: Sage Valley .

Diagrammatic Sketch

Township 14 S, Range 2 W, Section 7

UTM 4385761.607 N, 404379.844 E

DISCUSSION

Study No. 21-21

The Leamington Burn and Chain study is a new trend study which samples a burned, seeded and then chained area about 1,000 feet west of the Leamington Burn site no. 21-20. It was placed here 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 about 5,300 feet. The area burned during the summer of 1996 and is part of the previously mentioned Leamington Burn Complex (see 21-10). Seed was aerially applied and then the site was chained one-way with an Ely chain to cover the seed and enhance establishment of seeded species. The area is currently used lightly by deer and elk. Pellet group data indicate <1 deer and 1 elk use day/acre in 1997. Cattle grazed the area prior to the burn but are currently kept off to allow rehabilitated areas to recover.

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 averaging nearly 30% cover. Rock is also common through the soil profile. Soil texture is a sandy clay loam with a neutral pH (7.0). Percent organic matter is higher compared to the burn and seeded site (3% vs 2.4%). Phosphorus is also higher at 12.3 ppm compared to 8 ppm. Percent bare ground is quite high at nearly 40%, but herbaceous vegetation and litter are well dispersed and erosion is not currently a problem.

Browse is limited to some seeded fourwing saltbush and broom snakeweed. Broom snakeweed is abundant. However, it consists of only small, mature plants that measure only 6 inches in height with a 6 inch crown. All plants are mature and the population will likely decline as perennial grasses and forbs become established in greater numbers. Fourwing saltbush was applied with a seed dribbler over the bulldozer tracks during the chaining. Density is currently estimated at 20 seedlings/acre.

Grasses and forbs combine to produce 11% cover. The most common grass is crested wheatgrass which provides 43% of the grass cover. Intermediate wheatgrass, bluebunch wheatgrass, orchard grass, and Indian ricegrass are also fairly common. Cheatgrass occurs on the site and accounts for 15% of the grass cover. However, it is much smaller in stature and less vigorous here compared to the burn and seeded site. Another important quantitative feature is that quadrat frequency is much lower on this site than on the site that was not chained, 54% vs 15%. Another important difference between this site that was chained with the previous site that was not chained is that bur buttercup only occurs with a quadrat frequency of 4% on this site, while on the unchained site it occurs with a quadrat frequency of 34%. This weedy species has strong allelopathic effects on both seeded and native species. Forbs are diverse but only produce 2% total cover. There are several annual and native perennial species encountered. Seeded forbs, alfalfa and small burnet occur in small numbers.

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 the relatively high population of broom snakeweed responds in the next few years. The current population of 8,820 plants/acre consists entirely of mature, low growing plants and does not appear to be increasing. Some seeded fourwing saltbush has become established. These vigorous shrubs will increase in the future. The herbaceous understory is diverse with eight perennial grasses and 11 perennial forbs encountered. There are less 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.

HERBACEOUS TRENDS --

Herd unit 21 , Study no: 21

Type	Species	Nested Frequency '97	Quadrat Frequency '97	Average Cover % '97
G	<i>Agropyron cristatum</i>	144	57	3.69
G	<i>Agropyron intermedium</i>	39	16	.98
G	<i>Agropyron spicatum</i>	27	15	1.25
G	<i>Bromus inermis</i>	9	3	.22
G	<i>Bromus japonicus</i> (a)	2	1	.03
G	<i>Bromus tectorum</i> (a)	96	37	1.33
G	<i>Dactylis glomerata</i>	18	8	.70
G	<i>Oryzopsis hymenoides</i>	26	10	.37
G	<i>Poa fendleriana</i>	4	2	.01
G	<i>Poa secunda</i>	4	3	.06
Total for Grasses		369	152	8.66
F	<i>Astragalus beckwithii</i>	3	1	.00
F	<i>Astragalus calycosus</i>	12	4	.12
F	<i>Astragalus</i> spp.	6	2	.18
F	<i>Carduus nutans</i> (a)	16	8	.04
F	<i>Calochortus nuttallii</i>	-	-	.00
F	<i>Chaenactis douglasii</i>	10	6	.32
F	<i>Cryptantha</i> spp.	1	1	.00
F	<i>Descurainia</i> spp. (a)	15	8	.10
F	<i>Gilia</i> spp. (a)	23	13	.92
F	<i>Lesquerella</i> spp.	5	3	.01
F	<i>Medicago sativa</i>	1	1	.11
F	<i>Nicotiana attenuata</i> (a)	1	1	.00
F	<i>Phlox longifolia</i>	4	2	.01
F	<i>Ranunculus testiculatus</i> (a)	7	4	.02
F	<i>Sanguisorba minor</i>	2	1	.15
F	<i>Streptanthus cordatus</i>	8	5	.02
Total for Forbs		114	60	2.05

BROWSE TRENDS --

Herd unit 21 , Study no: 21

Type	Species	Strip Frequency '97	Average Cover % '97
B	Atriplex canescens	0	.03
B	Gutierrezia sarothrae	14	.07
Total for Browse		14	0.10

BASIC COVER --

Herd unit 21 , Study no: 21

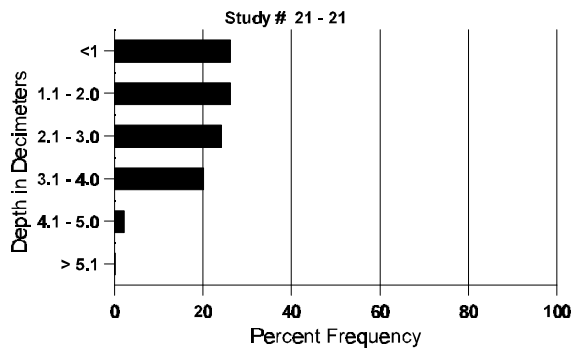
Cover Type	Nested Frequency '97	Average Cover % '97
Vegetation	257	10.43
Rock	372	16.54
Pavement	444	13.43
Litter	393	9.57
Cryptogams	40	1.81
Bare Ground	454	39.57

SOIL ANALYSIS DATA --

Herd Unit 21, Study no: 21

Effective rooting depth (inches)	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	.9

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 21 , Study no: 21

Type	Quadrat Frequency '97
Rabbit	2
Elk	1
Deer	3

BROWSE CHARACTERISTICS --

Herd unit 21 , Study no: 21

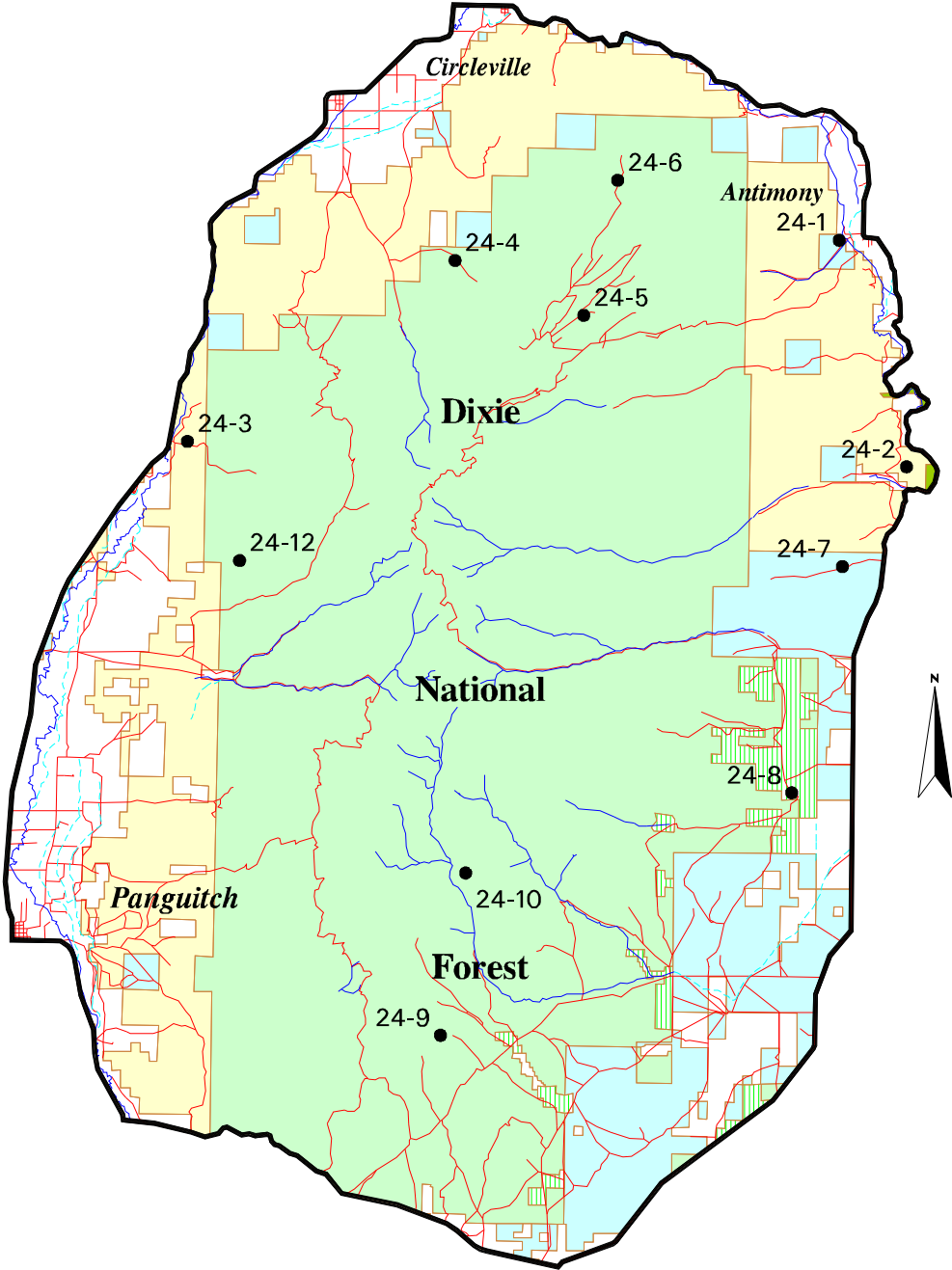
A G R E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.	Total	
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Atriplex canescens																		
S	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing '97		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>						
		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)													'97	0	Dec:	-		
Gutierrezia sarothrae																		
M	97	23	-	-	-	-	-	-	-	-	23	-	-	-	8820	6	6	441
% Plants Showing '97		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>%Change</u>						
		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)													'97	8820	Dec:	-		

SUMMARY

Site Comparisons between Leamington burn & seed 21-20 and Leamington burn and chain 21-21.











Basic ground cover characteristics are similar between the two sites but some slight differences are apparent. Vegetation cover is slightly higher on the burn & seed site. However, this is due primarily to the abundance of cheatgrass and annual forbs which are over two times more abundant and produced 4 times more cover here compared to the burn, aerially seed, and one-way chained site. Litter cover is higher (7% vs 10%) on the chained site due in part to the presence of chained tree cover lying on the ground. This provides better soil protection than dead standing snags. The chaining treatment provided for better seeded grass establishment. Seeded species, crested wheatgrass, intermediate wheatgrass, and orchard grass have a 35 times higher sum of nested frequency compared to the burn and seeded site. In contrast, native grasses established better on the burn & seed treatment where they were found to be three times higher in nested frequency. Unfortunately, the burn and seeded site also provided a better environment for cheatgrass and weedy annual forbs to become established. Cheatgrass is nearly twice as abundant and produces almost two times more cover on the burn and seeded site. Annual forbs are more than three times more abundant and produce twice as much cover on the burn and seeded site. Both sites had nearly identically low frequency of seeded forbs, alfalfa, and small burnet. From these preliminary findings, seeded grasses and forbs did not successfully establish on the burn and only seeded site after one growing season. In addition, seeded forbs did not become successfully established on the chaining treatment. More data will need to be collected over several years to determine if these preliminary findings remain constant.

Management Unit 24

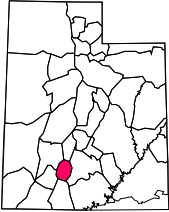


Map Scale 1:331,000 (1" = 5.2 miles)

Legend

- | | | |
|--|---|--|
|  Forest Service |  State Wildlife Res. |  Ditch, Canal, Aqueduct |
|  BLM |  Water Body |  Transect Location |
|  State of Utah |  Road |  Perennial Stream |
|  Private Land | | |
|  Bankhead Jones | | |

Unit Location



WILDLIFE MANAGEMENT UNIT - 24 (46) - MT. DUTTON

Boundary Description

Garfield and Piute Counties - Boundary begins at the junction of Highways US-89 and SR-62; then south on US-89 to Highway SR-12; then east on SR-12 to the Widtsoe-Antimony Road; then north on this road to Highway SR-22; then north on SR-22 to SR-62; then west on SR-62 to US-89 and beginning point.

Herd Unit Description

The Dutton Unit is located at the southern end of one of several high plateaus in southern Utah that are the result of a long succession of volcanic activity which centered in the Tushar Mountains and extended south and east to create the Kolob, Sevier and Aquarius Plateaus. Table Mountain is an example of a lava capped plateau on the north end of the unit. Non-marine sedimentary rocks form the parent material for the soils at lower elevations on the southern and eastern portions of the unit. Mt. Dutton rises to an elevation of 11,036 feet near the center of the unit. The reader is directed to review the herd unit description given by Huff (1965) for information on the major drainages, municipalities and the limits of normal and severe deer winter range. Huff (1965) identified the vegetation composition of normal and severe deer winter range. The acreages for each type are presented below.

ACREAGE OF VEGETATION TYPES FOR NORMAL AND SEVERE WINTER RANGE

Vegetation Type	Acres	%
Pinyon-Juniper	97,500	66
Sagebrush	32,000	22
Mixed Types	10,900	8
Mountain Brush	0	0
Sagebrush-Rabbitbrush	900	1
Seedings	1,900	1
Agricultural Lands	2,600	2
TOTAL	145,900	100

The 1998 deer and elk management plans estimate 131,752 acres of deer and 114,892 acres of elk summer range on the unit. The majority of this range is on land administered by the U. S. Forest Service, 94% and 99% respectively. Winter range is estimated at 159,508 acres for deer and 71,951 for elk. Most of the winter range is on Forest Service lands, 51% and 70% respectively, but some occurs on BLM administered lands (36% and 10%).

Key Areas

Key winter range areas for deer were identified by the local interagency committee during the spring of 1987 and include the following areas: North Pole Canyon, Deer Creek Bench, North Bull Rush, Mud Springs, Cow Creek, and the Marshall Basin chaining. The elevation of these key areas range from 6,500 to 7,300 feet. Range types included in the monitoring effort are pinyon-juniper (chained and seeded), Wyoming big sagebrush, and black sagebrush.

Key areas for elk during the winter and summer periods were also identified by the local interagency committee and include: Suicide Pasture, Table Mountain, Cow Creek, Mud Spring Ridge, Barnhurst Ridge, and Prospect

Pasture. These sites range in elevation from 7,200 feet for winter range in Cow Creek to 9,600 feet for summer range in Suicide. The range types included in the monitoring effort are mixed alpine, black sagebrush, and mixed mountain brush.

Activities which have greatly influenced the vegetation composition on these key areas are livestock grazing, range seedings, prescribed burning, and logging. Since livestock grazing has impacted every key area, a discussion of the allotment management plans for each area gives important background information for these sites.

Livestock Grazing Summary

East Pines - C & H Allotment

Prior to 1954, sheep and cattle used the area now included in this allotment. Approximately 5,770 acres were dixe harrowed or plowed and seeded from 1949 to the early 1950's. From 1954-68, the unit was grazed on a deferred rotation system. Since 1968, it has been grazed by cattle only on a three pasture, rest-rotation system involving the Showalter, West Hunt, and East Hunt pastures. The Mud Spring trend study is located in the Showalter pasture. The Allotment Management Plan, prepared in 1965 and updated in 1977 found 23% of the pasture to be in good condition, 70% in fair condition, and 7% in poor condition. About 50% of the pasture which is suitable for livestock grazing was seeded in the early 1950's. The permittee uses this Forest Service allotment 6/1 to 10/10 and then grazes state land adjacent to U.S. Forest Land in Johns Valley in the fall from 10/10-12/1.

Hunt Creek

Cottonwood S & G Allotment

The allotment has been grazed by livestock since the 1860's. Livestock numbers have fluctuated from 50 to 140 cows and from 800-1,750 sheep. In addition, cattle drift in from adjacent areas to increase the level of use in the area. In 1953, the allotment was allocated to sheep only. From 1953-59 the allotment was composed of the West Hunt Creek S & G Allotment and the Prospect Creek - Spring Creek S & G Allotment. Active preference for the two units was 1,148 sheep from 6/15-9/30 each year (803 AUMs). In 1960, these two units were combined to form the Hunt Creek S & G Allotment. Stocking levels were reduced to 595 AUMs for the same period of use. In 1965, the same number of AUMs were authorized for a shorter grazing period (7/1-9/30). In 1981, the allotment was combined with the Cottonwood S & G Allotment. Numbers were changed to 1,200 from 6/16-10/10 (932 AUMs). Prior to this time, 400-450 AUMs had been allocated for sheep use in the Cottonwood Allotment since 1962. The Barnhurst Ridge trend study is located in the West Hunt Pasture which is grazed by 930 cattle as part of a 5 pasture deferred rotation grazing system.

Widtsoe C & H Allotment

The population in Johns Valley reached a peak population of 1,200 in 1915 as homesteaders attempted to dry farm. Lack of sufficient moisture forced the settlers to move. By 1935, most of the homesteads were purchased by the government through the Resettlement Act and returned to federal ownership. In 1960, an executive order gave sole jurisdiction of 14,825 acres to the BLM and 11,783 acres to the U.S. Forest Service. The Widtsoe Allotment was described as a separate unit and included inside the U.S. Forest Service boundary at that time. The unit was divided into three pastures in 1968 following the treatment of approximately 8,200 acres of sagebrush rangeland. A 1977 updated AMP shows that 88% of the treated area is in good condition, and 12% is only in fair condition. The native range (1,139 acres) is considered to be in fair condition, and 500 acres dominated by rabbitbrush are listed as being in poor condition.

The Prospect trend study is located in the lower Prospect Pasture which is grazed by 337 cattle from June 1st to

October 10th, as part of a three pasture deferred rotation system. The number of elk using this allotment has increased over the years during late winter and early spring months.

Jones Corral C & H Allotment

The Mud Springs and Suicide trend studies are located in the Mud Springs Division of the Jones Corral C & H Allotment. The Mud Springs site was chained and seeded in 1975 (2,418 acres). The Jones Corral Enclosure was also seeded.

The Mud Springs C & H allotment was established in 1969. Prior to 1955, seven permittees grazed 110 cattle season long. The cows drifted to higher elevations and caused overstocking problems in the vicinity of Jones Corral. Prior to the creation of the U.S. Forest Service, the Jones Corral area was grazed by a large number of sheep. It has since been converted to cattle and is the middle unit of a 3-pasture deferred rotation system involving two pastures in the Mud Springs chaining. Currently, the Mud Springs part of the unit is grazed by 208 cattle sometime between June 1st to October 10th depending on the rotation. Cattle do not get on to the Suicide area until mid-July.

Deer Creek Sheep Allotment

Three units make up this allotment: Horse Valley, Table Mountain and Deer Creek. The Marshall Basin trend study is located in the Horse Valley Unit, although the chained area has been set aside for wildlife. The Table Mountain study is located in the Table Mountain Unit.

The Horse Valley Unit was grazed with cattle and horses prior to 1922. After 1922, it was switched over to sheep use, and numbers varied from 1,076 prior to 1924 to 900 in 1931 following a 10% reduction. Table Mountain has always been sheep range. Cattle have drifted from the Jones Corral Unit onto Table Mountain, and sheep have drifted into the cattle allotment. For the past few years, sheep have been kept off the Table Mountain area.

Pine Creek Allotment - BLM

This allotment historically has provided spring and fall range for cattle. For the grazing history of this area and the percent composition of the various condition classes for suitable grazing land, the reader is referred to the BLM Resource Management Plan for the area. Active preference is 691 AUM's on the federal portion and 62 AUM's on the state with spring and fall cattle use.

The North Pole Canyon and Cow Creek trend studies are located on state land adjacent to this allotment.

Herd Unit Management Objectives

The current management objectives for deer are to achieve a target population size of 2,400 wintering deer with a post season buck to doe ratio of 15:100 and 30% of these bucks being three point or better. The elk management objective is to achieve a target winter population of 900 elk with a minimum post season bull to cow ration of 14:100 and at least 70 of these bulls being 2 ½ years of age or older. The bull elk harvest objective is to provide opportunity for a 60% bull harvest success ratio and 40% of the harvest being 2 ½ year or older bulls. The bull harvest will be managed to average 3 to 4 year old animals.

Herd Unit Status

The buck deer harvest averaged 201 between 1990 and 1995. This is a major decline from the previous four years (1986 to 1989) which averaged 565 bucks harvested per year. The fawn/doe ratio is currently marginal with 49 fawns/100 does estimated during the 1994-95 and 1995-96 seasons. Since 1991-92, the ratio has averaged only 54 fawns/100 does. Poor fawn production was also found in 1989-90 and 1990-91 at 34 and 42 fawns/100 does respectively. Prior to those years fawn production was much higher averaging 72 fawns/100 does between 1986-87 and 1988-89.

The Mt. Dutton unit is a limited entry elk unit. Harvests have averaged 41 bulls between 1991 and 1995. Antlerless permits have been issued during each season with the exception of 1992. A high of 207 antlerless permits were issued in 1995. Elk calf production has improved since the severe winter of 1991-92 when only 20 calves/100 cows were estimated. In 1994-95, that ratio increased to 52 calves/100 cows.

Study Site Description

A total of 11 trend study sites were established on the unit in 1987. These sites were reread in 1991 and 1997. Study sites monitor important winter, spring/winter and summer range for elk and deer. Seven of the 11 study areas occur on Forest Service land with two on BLM land and two on land administered by the DWR. A site description for each site follows along with data tables and a discussion of trends taking place.

Trend Study 24-1-97

Study site name: North Pole Canyon .

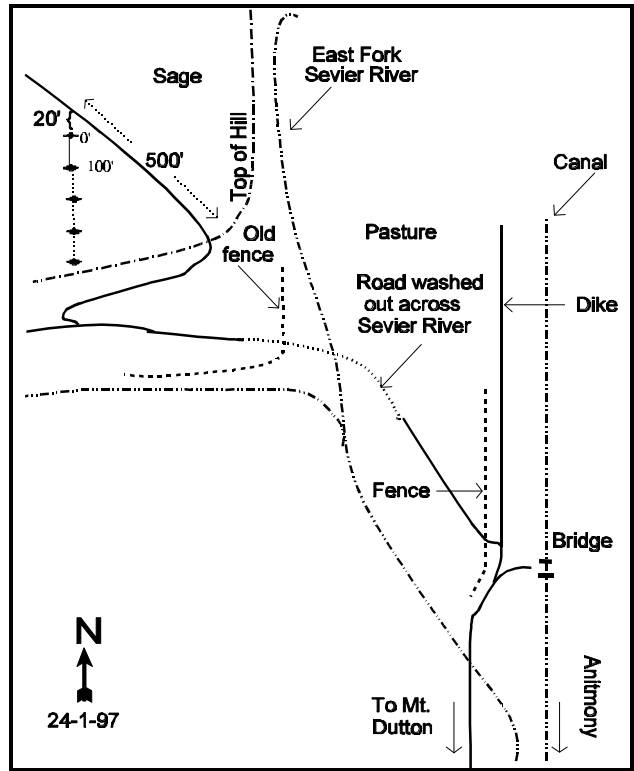
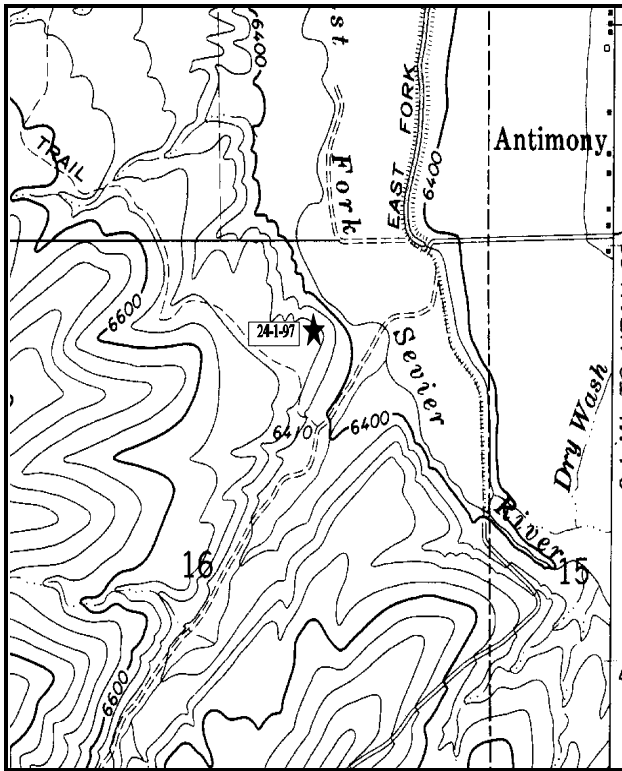
Range type: Big Sagebrush .

Compass bearing: frequency baseline 165 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement: line 1 (11 & 95ft.), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the town of Antimony, drive west on the Mt. Dutton road for approximately 1/2 mile to a canal and bridge. Just past the canal bridge, turn right, go through a gate and bear left down towards the Sevier River. Go 0.1 mile to another gate. Go through the gate and continue 0.2 miles across a field to the river. The old road is washed out, so cross the river on foot and hike up the hill to the southwest along an old jeep trail. The transect is on top of the hill and starts 20 feet south of the old road. The study is marked by short, green fence posts. There is a browse tag on the 1st baseline stake.



Map Name: Deep Creek

Diagrammatic Sketch

Township 31S , Range 2W , Section 16

UTM 4218738.463 N,411279.037 E

DISCUSSION

Trend Study 24-1 (50-1)

The North Pole Canyon study is located on a bench above the East Fork of the Sevier River and about one-half mile from the town of Antimony. The site is at an elevation of about 6,520 feet with a gentle 4% slope and a slight northeast aspect. It is a key area for wintering mule deer. Deer concentrate on the bench and utilize forage from adjacent agricultural lands in the valley during the spring and fall. Cattle use this area in the spring, and it appears as though the area has been overstocked. This area receives, on average, close to 10 inches of annual precipitation. The 1986 annual precipitation total for Angle, Utah, was only about 7 inches, which probably was indicative of a below average water year for the Antimony area also. This low rainfall exacerbated the use made during the spring of 1987. This site does not receive any pressure from people since the jeep trail across the East Fork of the Sevier River has been washed out. The only activities on this bench are those associated with livestock.

Soil on the site is relatively shallow with an effective rooting depth (see methods) estimated at 12 inches. The soil profile is very rocky with considerable amounts of rock and pavement on the surface (28%). Soil temperature is relatively high averaging 61°F at an average depth of 11 inches. Soil texture is a sandy clay loam with a neutral pH (6.8). Organic matter is limited at 1.3%, the lowest level of all the sites on the unit. The soil is vulnerable to erosion with an average of about 33% bare soil since 1987. Pedestalling around plants, especially the older sagebrush, is evident and small active gullies are found on the site. Litter is limited averaging 38% in 1991, but declining to only 16% in 1997. It is restricted mainly to the area directly beneath the sagebrush canopy.

The key species is Wyoming big sagebrush, which currently accounts for 100% of the shrub cover. The stand was fairly dense in 1987 with an estimated 5,998 plants/acre. Many of the interspaces were occupied by seedlings (3,433/acre) in 1987. Young plants were also common at that time accounting for 48% of the population. However, sagebrush density dropped 27% by 1991 to 4,399 plants/acre and the number of decadent plants increased from 9% to 51%. In addition, 72% of the decadent plants were classified as dying. During the 1997 reading, the population remained relatively stable at 4,420 plants/acre. Percent decadence declined to 12% and recruitment is good with a reproductive potential (percentage of seedlings to the population) of 8% with 39% of the population consisting of young plants. Vigor is normal on most plants. The stand has received considerable use by deer in the past. Eighty-four percent of the shrubs (seedlings not included) were moderate or heavily hedged in 1987 with this number declining to 38% in 1991. Use has since declined with less than one percent of the sagebrush sampled displaying heavy use in 1997, 8% were moderately hedged.

Herbaceous species are lacking in the area. Blue grama is the primary grass. Perennial forbs are nearly absent but weedy annual forbs consisting of goosefoot, nodding eriogonum, and stickseed, are abundant and currently provide more cover than grasses.

1991 TREND ASSESSMENT

Soil trend appears to be stable, but in very poor condition. Recent gullies formed by flash floods are evident and there is potential for gullies to enlarge with the lack of cover in the interspaces. The dominant overstory is Wyoming big sagebrush. Although heavy hedging has decreased by nearly 30%, the sagebrush population went from 9% decadent to 51% decadent, showing a downward trend. The increase in weedy annual forbs and no desirable species is a cause for concern. Grasses have also decreased slightly on the site.

TREND ASSESSMENT

soil - stable, but in poor condition

browse - down

herbaceous understory - down

1997 TREND ASSESSMENT

Trend for soil is stable, but still in poor condition. Percent bare ground has declined slightly since 1991 with litter cover also decreasing. Trend for Wyoming big sagebrush is up slightly. Density has remained relatively similar to 1991 estimates. However, utilization is lighter, vigor improved and percent decadence has declined from 51% to 12%. Trend for the herbaceous understory is stable. Sum of nested frequency of grasses has remained similar to 1991 estimates with the frequency of forbs increasing. However, five of the six forbs encountered in 1997 are weedy annuals consisting of goosefoot, nodding eriogonum, and stickseed. These weedy species account for more than 99% of the forb cover. The only perennial forb encountered on the site was Utah milkvetch which occurred in only 2 of the 100 quadrats.

TREND ASSESSMENT

soil - stable, but in poor condition

browse - up slightly

herbaceous understory - stable, but poor forb composition

HERBACEOUS TRENDS --

Herd unit 24 , Study no: 1

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'87	'91	'97	'87	'91	'97	
G	Bouteloua gracilis	_b 240	_a 210	_a 203	80	79	75	7.00
G	Bromus tectorum (a)	1	-	-	1	-	-	-
G	Oryzopsis hymenoides	3	1	-	1	1	-	.00
G	Sitanion hystrix	2	-	-	1	-	-	-
G	Sporobolus cryptandrus	_b 15	_{ab} 9	_a 1	10	5	1	.01
G	Stipa comata	_b 4	_a -	_{ab} 1	4	-	1	.00
Total for Grasses		265	220	205	97	85	77	7.02
F	Astragalus utahensis	-	-	2	-	-	2	.01
F	Chenopodium fremontii (a)	_a 10	_b 75	_c 194	5	38	75	6.01
F	Chenopodium leptophyllum (a)	-	-	108	-	-	42	1.19
F	Eriogonum cernuum (a)	_a -	_a 3	_b 83	-	1	33	1.09
F	Lappula occidentalis (a)	-	-	24	-	-	10	.05
F	Salsola iberica (a)	3	-	-	1	-	-	-
Total for Forbs		13	78	411	6	39	162	8.36

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 24 , Study no: 1

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata wyomingensis	75	6.47
B	Chrysothamnus nauseosus	1	-
B	Sclerocactus	2	-
Total for Browse		78	6.47

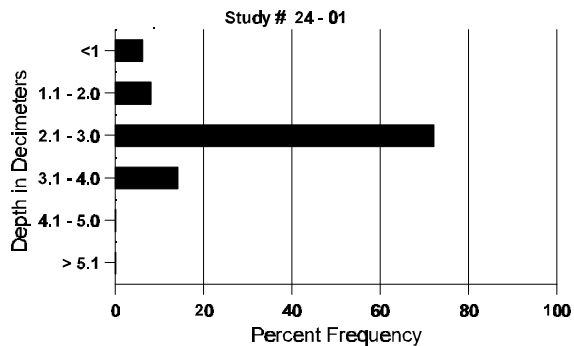
BASIC COVER --
Herd unit 24 , Study no: 1

Cover Type	Nested Frequency '97	Average Cover %		
		'87	'91	'97
Vegetation	298	14.50	6.75	21.54
Rock	259	6.75	4.75	7.22
Pavement	355	15.00	16.25	20.33
Litter	368	29.00	38.00	16.26
Cryptogams	14	0	0	.18
Bare Ground	330	34.75	34.25	29.45

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 01

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.1	61.0 (10.9)	6.8	52.7	22.7	24.6	1.3	12.3	188.8	1.2

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 24 , Study no: 1

Type	Quadrat Frequency '97
Rabbit	7
Elk	1
Deer	20
Cattle	5

BROWSE CHARACTERISTICS --

Herd unit 24 , Study no: 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				
<i>Artemisia tridentata wyomingensis</i>																		
S	87	103	-	-	-	-	-	-	-	-	103	-	-	-	3433			103
	91	-	-	-	4	-	-	-	-	-	4	-	-	-	133			4
	97	15	-	-	3	-	-	-	-	-	18	-	-	-	360			18
Y	87	24	50	12	-	-	-	-	-	-	71	-	15	-	2866			86
	91	14	3	1	6	-	-	6	-	-	29	-	-	1	1000			30
	97	81	-	-	5	-	-	-	-	-	84	-	-	2	1720			86
M	87	3	16	58	-	-	-	-	-	-	77	-	-	-	2566	13	18	77
	91	13	11	4	4	3	-	-	-	-	35	-	-	-	1166	12	19	35
	97	90	14	1	-	4	-	-	-	-	109	-	-	-	2180	18	26	109
D	87	2	8	7	-	-	-	-	-	-	13	-	-	4	566			17
	91	24	4	5	22	2	1	1	-	8	19	-	-	48	2233			67
	97	26	-	-	-	-	-	-	-	-	11	-	-	15	520			26
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	1	-	-	-	840			42
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		41%			43%			11%			-27%							
'91		17%			14%			37%			+ 0%							
'97		08%			.45%			08%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	5998	Dec:	9%			
												'91	4399		51%			
												'97	4420		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				
Ceratoides lanata																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	1	-	-	-	-	-	-	1	-	-	-	33		1	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	1	2	-	-	-	-	-	-	-	3	-	-	-	100	12	2	3
	91	1	-	2	1	-	-	-	-	-	4	-	-	-	133	7	7	4
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		50%			25%			00%			+ 0%							
'91		00%			50%			00%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	133	Dec:	-				
											'91	133		-				
											'97	0		-				
Chrysothamnus nauseosus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80	-	-	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'91	0		-				
											'97	80		-				
Sclerocactus																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	11	11	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'91	0		-				
											'97	60		-				

Trend Study 24-2-97

Study site name: Deer Creek Bench .

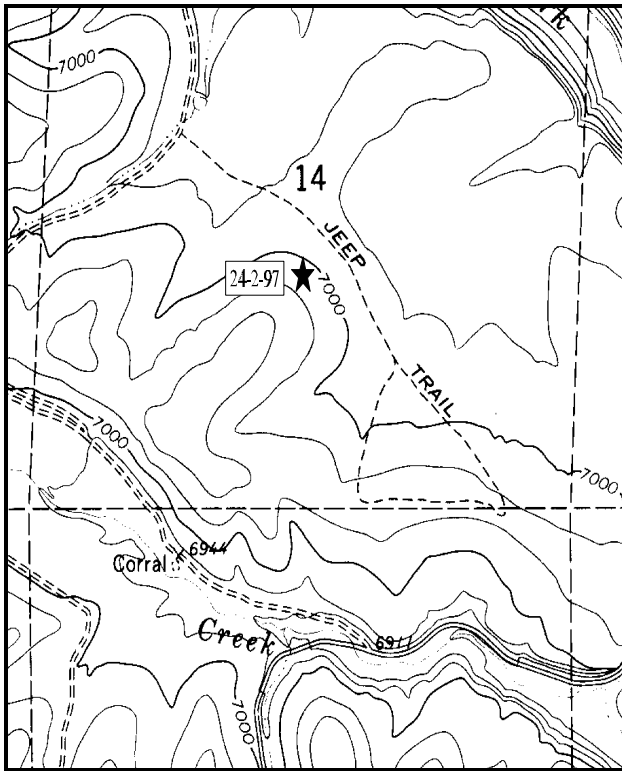
Range type: Black Sagebrush .

Compass bearing: frequency baseline 168 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

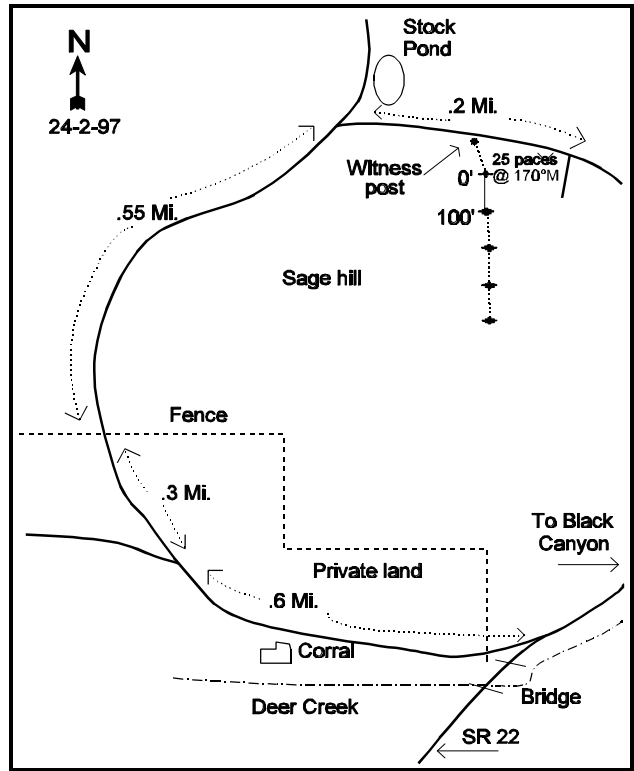
LOCATION DESCRIPTION

From SR22 in the southern end of Black Canyon, follow the highway up Deer Creek to a bridge. Immediately north of the bridge, turn hard left. Take this road, which crosses private land, northwest for 0.4 miles to a corral. Stay right and continue 0.2 miles to a fork. Bear right, go 0.3 miles to a fence. Continue 0.55 miles to a fork by a stockpond. Turn right onto the jeep trail and proceed 0.2 miles to the study area. There is a witness post located on the right side of the road. Walk approximately 25 paces bearing 170 degrees to the 0-foot baseline stake. The study is marked by 2-foot tall fence posts. The 0-stake has a red browse tag, #9100, attached. The transect runs south up the hill.



Map Name: Antimony

Township 32S , Range 2W , Section 14



Diagrammatic Sketch

UTM 4209453.243 N, 414332.270 E

DISCUSSION

Trend Study 24-2(50-2)

The Deer Creek trend study is located on the east side of the unit in an area characterized by a broad, gently sloping (11%) surface with low relief that is situated near the base of steeper slopes that rise up to the Sevier Plateau. The area is covered with alluvial gravel and sand over bedrock. The key browse species are Wyoming big sagebrush and black sagebrush. This is a key winter use area for mule deer that is also utilized by a growing herd of antelope. Numerous deer pellet groups and several antler drops were found in the area during each reading. Pellet group data from 1997 estimate there to be 121 deer use days/acre. Elk also lightly use the area with 8 elk use days/acre estimated in 1997. Escape and thermal cover are not present on the site, but some is located one-half mile to the west. It appears as though the area currently is used lightly by livestock (6 cow use days/acre). A stock pond is one-quarter mile away, and Deer Creek is three-quarters of a mile from the study. There are no other known uses of the area and human pressure is assumed to be minimal during the year.

The soils are a coarse textured, sandy loam. A large portion of the surface is covered with an erosion pavement and rock. The soil is fairly shallow with an effective rooting depth estimated at almost 14 inches. The soils lack a well-developed organic layer. There is an abundance of small pebbles and large gravel on the surface and through the soil profile down to a depth of six to eight inches. Few rocks are found below eight inches. At about 10 to 12 inches in depth, a light colored more sandy horizon is found. Patches of bare ground are interspersed among the rocks, litter, and vegetation. Most of the litter is found beneath the shrub canopy. There is not much evidence of excessive erosion on this site.

A fairly dense stand of black sagebrush occupies the site. Density has varied over the years primarily due to identification problems with black sagebrush and Wyoming big sagebrush. There is also some pygmy sagebrush on the site which was lumped with black sagebrush in 1997. During the 1987 reading, Wyoming big sagebrush had an estimated density of 5,598 plants/acre. The average mature plant measured 15 inches in height. Black sagebrush had a population of 4,398 plants/acre with mature shrubs averaging 13 inches in height. During the 1991 reading, the Wyoming big sagebrush population was estimated at only 66 plants/acre, while density of black sagebrush increased to 8,532 plants/acre. The much larger sample used in 1997 found no Wyoming big sagebrush in the shrub density strips, but some plants were found and measured for height/crown measurements. Black sagebrush remained at similar densities to 1991 estimates at 8,480 plants/acre. Mature plants currently account for 78% of the population. There are some downward indications of a slightly downward trend in the population. These would include a biotic potential that has been steadily declining along with the percentage of young plants in the population. Additionally, the percentage of decadent plants classified as dying has also steadily increased to where it is at a high of 48%.

Slenderbush eriogonum provides some additional forage on the site with a current density of 5,600 plants/acre. These shrubs are small averaging only 3 inches in height and provide only 5% of the total shrub cover. Narrowleaf low rabbitbrush was encountered in the larger sample used in 1997. It currently has an estimated density of 3,060 plants/acre, 94% of which are mature. Broom snakeweed is also found on the site and there may have been some identification problems between it and rabbitbrush during past readings.

Herbaceous plants are rare. Bottlebrush squirreltail, Indian ricegrass, and needle-and-thread are the only perennial grasses found on the site. These three perennial species produced only 4% of the total cover in 1997. Ten forb species were encountered in 1997, but only trailing fleabane and scarlet globemallow occur more than rarely. All forbs combined produces less than one percent cover in 1997. They are probably of limited value to mule deer during the spring.

1991 TREND ASSESSMENT

Basal vegetative cover and litter cover have both declined since the last survey, from 9% to 3%, and 25% to 17%, respectively. Collectively, rock and pavement cover have increased somewhat from 47% to 54%. This data would indicate a downward trend for soil. Trend for browse has become somewhat more difficult to determine since the survey in 1987. Black sagebrush and Wyoming sagebrush are considered combined for this analysis since they are so similar with a lot of hybridizing between the two populations. Whether they are separated or not, they both are considered the key browse species on this site. Collectively, the density has decreased from 9,996 down to 8,598 plants per acre, a decrease of 14% in the population. Amount of heavy hedging has decreased from 58% to 36% but poor vigor and dying vigor classes have increased from 2% to 21%. Trend for browse would be down even with a notable decrease in the broom snakeweed population. The herbaceous understory is about the same for the grasses, but the forbs are mostly on the decline. The trend would be stable to slightly declining. An extended period of drought has been responsible for much of this downward trend.

TREND ASSESSMENT

soil - slightly downward

browse - slightly downward

herbaceous understory - stable to slightly downward

1997 TREND ASSESSMENT

The soil trend appears to have improved slightly since 1991. Percent bare ground has declined from 24% to 13% and rock/pavement cover has also declined from 54% to 39%. Percent litter cover has remained at similar levels to 1991 estimates. In addition, sum of nested frequency of grasses has increased slightly. Trend for the key browse, black sagebrush, is considered stable to slightly down. Density has remained steady, moderate and heavy use has declined from 81% to 36%, vigor has improved and percent decadence declined from 55% to 15%. However, biotic potential and percent young age class has steadily decreased since 1987, along with a steady increase in the percentage of decadent plants being classified as dying where it is now at a high of 48%. Trend for the herbaceous understory is up slightly but still depleted with grass and forb cover producing only 5% total cover.

TREND ASSESSMENT

soil - up slightly, but in poor condition

browse - stable to slightly down

herbaceous understory - up slightly but depleted

HERBACEOUS TRENDS --

Herd unit 24 , Study no: 2

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'87	'91	'97	'87	'91	'97	
G	<i>Bromus tectorum</i> (a)	-	-	3	-	-	1	.00
G	<i>Oryzopsis hymenoides</i>	_a 9	_a 11	_b 73	6	6	27	2.04
G	<i>Sitanion hystrix</i>	126	98	101	59	52	47	1.66
G	<i>Stipa comata</i>	_a -	_{ab} 7	_b 14	-	3	8	.26
Total for Grasses		135	116	191	65	61	83	3.97
F	<i>Antennaria rosea</i>	-	-	2	-	-	1	.00
F	<i>Arabis</i> spp.	_b 9	_a -	_{ab} 5	5	-	3	.01
F	<i>Astragalus</i> spp.	_b 20	_b 24	_a 4	10	11	2	.01
F	<i>Astragalus utahensis</i>	-	-	6	-	-	2	.01
F	<i>Chenopodium</i> spp. (a)	-	-	18	-	-	8	.04
F	Cruciferae	5	-	-	3	-	-	-
F	<i>Erigeron pumilus</i>	_b 48	_a 19	_b 41	25	11	22	.31
F	<i>Gayophytum ramosissimum</i> (a)	-	-	35	-	-	12	.08
F	<i>Paronychia</i> spp.	_b 19	_b 21	_a -	10	9	-	-
F	<i>Phlox longifolia</i>	13	20	6	4	10	2	.01
F	<i>Senecio multilobatus</i>	1	-	-	1	-	-	-
F	<i>Sphaeralcea coccinea</i>	_b 60	_b 58	_a 31	28	28	16	.20
Total for Forbs		175	142	148	86	69	68	0.69

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --
Herd unit 24 , Study no: 2

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia nova	93	16.65
B	Artemisia pygmaea	22	.82
B	Artemisia tridentata wyomingensis	0	-
B	Ceratoides lanata	1	-
B	Chrysothamnus viscidiflorus stenophyllus	47	2.23
B	Eriogonum microthecum	53	1.14
B	Gutierrezia sarothrae	4	-
B	Opuntia spp.	4	-
Total for Browse		224	20.87

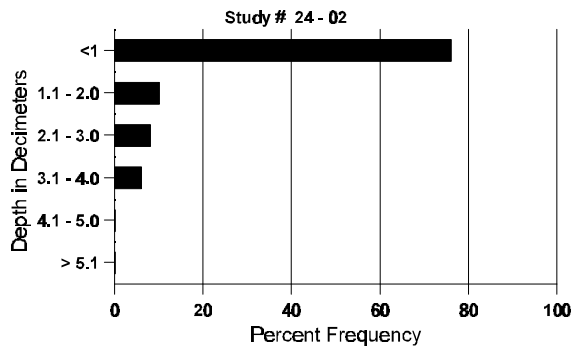
BASIC COVER --
Herd unit 24 , Study no: 2

Cover Type	Nested Frequency '97	Average Cover %		
		'87	'91	'97
Vegetation	288	8.50	2.75	25.71
Rock	301	16.75	8.75	11.87
Pavement	363	30.00	45.25	27.52
Litter	361	24.50	17.00	16.72
Cryptogams	67	1.50	2.00	.34
Bare Ground	306	18.75	24.25	13.28

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 02

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.9	51.0 (14.9)	7.1	61.0	23.1	15.9	1.8	13.6	92.8	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 24 , Study no: 2

Type	Quadrat Frequency '97
Rabbit	2
Elk	3
Deer	46
Cattle	3

BROWSE CHARACTERISTICS --

Herd unit 24 , 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		1	2					
Artemisia nova													
S	87	9	-	-	-	-	-	-	9	-	9		
	91	10	-	-	-	-	-	-	10	-	10		
	97	10	-	-	1	-	-	-	11	-	11		
Y	87	7	2	1	-	-	-	-	10	-	10		
	91	9	10	1	-	-	-	-	19	-	20		
	97	38	-	-	1	-	-	-	39	-	39		
M	87	2	9	23	-	-	-	-	34	-	34		
	91	4	15	15	1	3	-	-	37	-	38		
	97	131	65	15	-	3	-	-	214	-	214		
D	87	-	4	18	-	-	-	-	20	-	22		
	91	10	30	27	-	1	2	-	45	-	70		
	97	18	26	-	-	-	-	-	22	-	46		
X	87	-	-	-	-	-	-	-	-	-	0		
	91	-	-	-	-	-	-	-	-	-	0		
	97	-	-	-	-	-	-	-	-	-	780		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>% Change</u>					
'87		23%		64%		03%		+48%					
'91		46%		35%		21%		-30%					
'97		31%		05%		07%							
Total Plants/Acre (excluding Dead & Seedlings)										'87	4398	Dec:	33%
										'91	8532		55%
										'97	5980		15%
Artemisia pygmaea													
S	87	-	-	-	-	-	-	-	-	-	0		
	91	-	-	-	-	-	-	-	-	-	0		
	97	5	-	-	-	-	-	-	5	-	5		
Y	87	-	-	-	-	-	-	-	-	-	0		
	91	-	-	-	-	-	-	-	-	-	0		
	97	5	3	-	-	-	-	-	8	-	8		
M	87	-	-	-	-	-	-	-	-	-	0		
	91	-	-	-	-	-	-	-	-	-	0		
	97	90	27	-	-	-	-	-	117	-	117		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>% Change</u>					
'87		00%		00%		00%		None					
'91		00%		00%		00%		Appeared					
'97		24%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-
										'91	0		-
										'97	2500		-

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>								
S	87	18	-	-	-	-	-	18
	91	-	-	-	-	-	-	0
	97	-	-	-	-	-	-	0
Y	87	18	5	2	-	-	-	25
	91	-	-	-	-	-	-	0
	97	-	-	-	-	-	-	0
M	87	1	7	29	-	-	-	37
	91	-	-	-	-	-	-	0
	97	-	-	-	-	-	-	0
D	87	-	8	14	-	-	-	21
	91	-	-	1	-	-	-	1
	97	-	-	-	-	-	-	0
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>			
'87		24%	54%	01%	-99%			
'91		00%	100%	00%	Died out			
'97		00%	00%	00%				
Total Plants/Acre (excluding Dead & Seedlings)					'87	5598	Dec:	26%
					'91	66		100%
					'97	0		0%
<i>Atriplex canescens</i>								
M	87	1	-	-	-	-	-	66
	91	-	-	-	-	-	-	0
	97	-	-	-	-	-	-	0
D	87	-	-	-	-	-	-	0
	91	-	-	1	-	-	-	66
	97	-	-	-	-	-	-	0
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>	<u>%Change</u>			
'87		00%	00%	00%	+ 0%			
'91		00%	100%	100%	Died out			
'97		00%	00%	00%				
Total Plants/Acre (excluding Dead & Seedlings)					'87	66	Dec:	0%
					'91	66		100%
					'97	0		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				
<i>Ceratoides lanata</i>																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	-	1	-	-	-	-	-	-	-	1	-	-	-	20	4	8	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			Appeared							
'97		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'97	20		-			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'97	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
M	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	8	12	1
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	142	2	-	-	-	-	-	-	-	144	-	-	-	2880	6	12	144
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	'97	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			+ 0%							
'91		00%			00%			00%			+98%							
'97		01%			00%			.65%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	0%			
												'91	66		100%			
												'97	3060		1%			

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>Eriogonum microthecum</i>																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	97	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
Y	87	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	91	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	97	32	-	-	-	-	-	-	-	-	32	-	-	-	640		32	
M	87	51	-	-	-	-	-	-	-	-	51	-	-	-	3400	3	3	51
	91	10	11	5	3	-	-	-	-	-	29	-	-	-	1933	2	2	29
	97	212	12	-	24	-	-	-	-	-	248	-	-	-	4960	3	5	248
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			-37%							
'91		32%			15%			00%			+60%							
'97		04%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	3600	Dec:	-				
											'91	2266		-				
											'97	5600		-				
<i>Gutierrezia sarothrae</i>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	10	-	-	-	-	-	-	-	-	10	-	-	-	666		10	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	97	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
M	87	19	-	-	-	-	-	-	-	-	19	-	-	-	1266	8	9	19
	91	16	-	-	1	-	-	-	-	-	17	-	-	-	1133	5	4	17
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80	8	7	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			-41%							
'91		00%			00%			00%			-93%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	1932	Dec:	-				
											'91	1133		-				
											'97	80		-				

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.																	
S	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	'91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'91	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	'97	3	-	-	1	-	-	-	-	-	4	-	-	-	80	4	4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>						
'87		00%			00%			00%			Appeared						
'91		00%			00%			00%			-76%						
'97		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'91	333		-			
											'97	80		-			

Trend Study 24-3-97

Study site name: North Bull Rush .

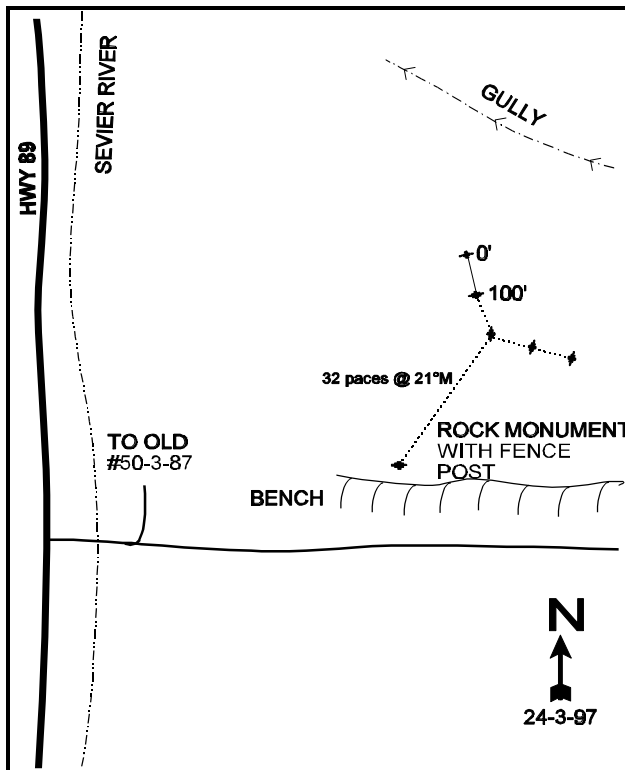
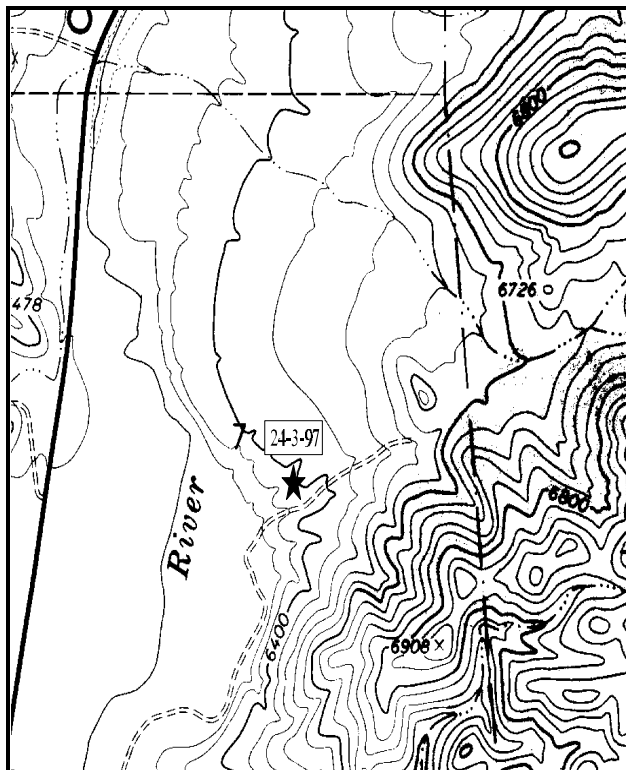
Range type: Big Sage-Grass .

Compass bearing: frequency baseline 348 degrees. (Lines 3 & 4 96 degrees)

First frame placement on frequency belts 5 feet. Frequency belt placement: line 1 (11 & 95 ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the Highway 89 and SR20 Junction, proceed north on 89 for 5.4 miles. Here at the beginning of Circleville Canyon, turn right off the highway onto a dirt road. Cross the Sevier River, and go 0.15 miles to a gate and intersection. Go straight for another (east) 0.5 miles. Stop here. Walk 18 paces up on the edge of a low bench on the north side of the road at an azimuth of 356° magnetic to a rock monument with a fencepost. Walk approximately 60 paces at an azimuth of 9° magnetic to the 100' baseline stake.



Map Name: Bull Rush Peak

Diagrammatic Sketch

Township 32S , Range 4 1/2W , Section 7

UTM 4209603.538 N, 381687.333 E

DISCUSSION

Trend Study 24-3 (50-3)

The North Bull Rush study is located 1/4 mile west of the Forest Service boundary on BLM land. The sagebrush covered bench slopes gradually (3% to 5%) to the northwest at an elevation of 6,400 feet. The Sevier River is one-half mile west of the site. Agricultural land is located in the valley bottom between the site and the river. The bench is relatively small, a half mile long and a half mile wide at the widest point, and is dissected by numerous small gullies. This site is a key area for deer during the winter and spring.

This BLM allotment is grazed with cattle by the adjacent private landowner. No sign of cattle was encountered in 1991, but some cattle sign was found in 1997. Deer pellet groups were abundant in 1991 and an antler drop was also found on the site that year. Few elk pellet groups were found and some sheep sign was also noted in 1991. During the 1997 reading, deer pellet groups were abundant with a quadrat frequency of 41%. A few elk groups were also encountered.

The soil has a sandy loam texture with a considerable amount of pavement on the surface which is evidence of a long history of soil loss from the site. It is characteristic of the alluvial deposits that formed the low-lying foothills on the unit. Effective rooting depth (see methods) was estimated at just over 13 inches with a relatively high soil temperature (for this elevation) of almost 58°F at an average depth of nearly 16 inches. Some small gullies in the area are experiencing some down-cutting problems. Organic matter is limited in the soil at only 1.4%. Phosphorus may also be limiting at only 7.1 ppm where the minimum is thought to be 10 ppm.

Wyoming big sagebrush is both the dominant and key browse overstory on the site, with blue grama and needle-and-thread grass providing most of the herbaceous cover. Very few forbs are present. The sagebrush population was predominantly mature (69%) in 1987, with 14% young plants scattered throughout the stand and a reproductive potential (percentage of seedlings to the population) of 1%. Shrub density was fairly high at 6,666 plants/acre. Data from 1991 indicate a 19% drop in the population to 5,400 plants/acre. No seedlings were found and the number of young plants also dropped to 7%. Percent decadency increased dramatically from 17% to 67%. The area receives a considerable amount of use by deer during the winter and early spring. This browse use has been exacerbated by the extended drought. Eighty-five percent of the sagebrush plants showed evidence of heavy hedging in 1987. Utilization in 1991 was more moderate with only 38% of the sagebrush showing heavy use. Poor vigor increased between 1987 and 1991 from 3% to 32%. Additionally, 31% of the decadent sagebrush were classified as dying in 1997. During the 1997 reading, density remained similar, vigor improved, and percent decadence is down to 48%, but still very high. Utilization is more moderate with only 7% of the sagebrush sampled displaying heavy use. Reproductive potential is up from 0 to 3% but the proportion of young plants in the population continues to decline.

Species diversity is very limited on this site, as is the case with most Wyoming big sagebrush communities. The herbaceous understory is composed mostly of blue grama, bottlebrush squirreltail, and needle-and-thread grass. These three grasses produced 10% cover in 1997. Forbs are almost nonexistent.

1991 TREND ASSESSMENT

The soil trend would be considered slightly downward because of some of the key parameters measured. Vegetative basal cover and litter cover both declined while both pavement and bare ground increased since 1987. Trend for the key browse species, Wyoming big sagebrush, is down. Its population has decreased by 19% with the rate of decadency going from 17% to 67%. The herbaceous understory is slightly declining. The most abundant grass, needle-and-thread, is stable with an 85% quadrat frequency. Nested frequency of blue grama and bottlebrush squirreltail have declined significantly. The forbs are almost nonexistent on this site, but with what few species are present, all have declining quadrat frequencies.

TREND ASSESSMENT

soil - slightly downward

browse - down

herbaceous understory - slightly downward

1997 TREND ASSESSMENT

Trend for the soil is stable but in poor condition due to the lack of herbaceous vegetation and litter cover. Percent bare ground, litter, and pavement cover are similar to 1991 estimates. Trend for Wyoming big sagebrush is slightly down due to a still moderately high percent decadency (48%), decline in percent young age class, and that the percentage of decadent plants classified as dying has steadily increased since 1987. It is currently at its highest it has ever been. This would mean that over 800 plants would be added to the dead plants which already make up 33% of the population. Recruitment is poor and the population could decline further in the future if the proportion of seedlings and young do not improve. Trend for the herbaceous understory appears stable. Sum of nested frequency of grasses and forbs have remained similar to 1991 estimates. Nested frequency of the dominant grass, needle-and-thread, remains constant but the frequency of blue gramma increased significantly while the nested frequency of bottlebrush squirreltail declined significantly.

TREND ASSESSMENT

soil - stable, but in poor condition

browse - slightly down

herbaceous understory - stable, but depleted

HERBACEOUS TRENDS --

Herd unit 24 , Study no: 3

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'87	'91	'97	'87	'91	'97	
G	Bouteloua gracilis	_b 222	_a 96	_a 114	78	44	48	1.88
G	Bromus tectorum (a)	-	-	-	-	-	-	.00
G	Sitanion hystrix	_c 138	_b 76	_a 35	56	39	14	.70
G	Sporobolus cryptandrus	_a -	_b 16	_b 10	-	10	5	.10
G	Stipa comata	220	236	243	85	85	89	7.52
Total for Grasses		580	424	402	219	178	156	10.21
F	Astragalus spp.	16	4	6	7	2	2	.01
F	Chenopodium spp. (a)	-	-	11	-	-	6	.03
F	Cryptantha fulvocanescens	7	-	-	3	-	-	-
F	Erigeron pumilus	19	3	7	8	2	6	.03
F	Gilia spp. (a)	-	-	3	-	-	1	.00
F	Mammillaria spp.	3	-	-	1	-	-	-
Total for Forbs		45	7	27	19	4	15	0.07

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 24 , Study no: 3

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata wyomingensis	91	13.67
B	Ceratoides lanata	1	-
B	Chrysothamnus viscidiflorus	4	.15
B	Opuntia spp.	3	.18
Total for Browse		99	14.00

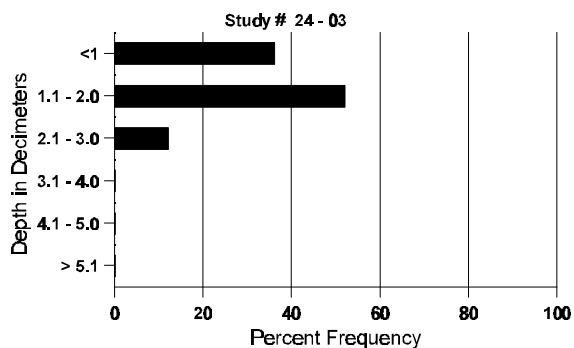
BASIC COVER --
Herd unit 24 , Study no: 3

Cover Type	Nested Frequency '97	Average Cover %		
		'87	'91	'97
Vegetation	299	11.75	9.25	25.75
Rock	152	2.25	1.00	1.43
Pavement	355	30.75	36.25	35.46
Litter	395	39.50	30.75	28.81
Cryptogams	48	1.25	1.75	.72
Bare Ground	312	14.50	21.00	17.67

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 03

Effective rooting depth (inches)	Temp °F (depth)	PH	% sand	% silt	% clay	%OM	PPM P	PPM K	dS/m
13.4	57.8 (15.7)	6.7	60.4	20.1	19.6	1.4	7.1	208.0	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 24 , Study no: 3

Type	Quadrat Frequency '97
Rabbit	8
Elk	4
Deer	41
Cattle	3

BROWSE CHARACTERISTICS --

Herd unit 24 , Study no: 3

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.		
<i>Artemisia tridentata wyomingensis</i>																		
S	87	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	2	-	-	8	-	-	-	-	-	10	-	-	-	200			10
Y	87	-	10	4	-	-	-	-	-	14	-	-	-	933			14	
	91	-	3	1	-	-	-	2	-	5	-	1	-	400			6	
	97	8	1	-	-	-	-	-	-	9	-	-	-	180			9	
M	87	-	5	64	-	-	-	-	-	69	-	-	-	4600	14	18	69	
	91	2	9	7	-	3	-	-	-	18	-	3	-	1400	19	23	21	
	97	42	87	12	-	-	-	-	-	141	-	-	-	2840	15	28	142	
D	87	-	-	17	-	-	-	-	-	14	-	-	3	1133			17	
	91	3	21	20	1	6	3	-	-	32	-	10	12	3600			54	
	97	45	86	8	-	-	-	-	-	94	-	2	43	2780			139	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	2720			136	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		15%			85%			03%			-19%							
'91		52%			38%			32%			+ 7%							
'97		60%			07%			16%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	6666	Dec:	17%				
											'91	5400		67%				
											'97	5800		48%				

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>Ceratoides lanata</i>																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'97	20		-			
<i>Chrysothamnus viscidiflorus</i>																		
M	'87	-	13	1	-	-	-	-	-	-	14	-	-	-	933	6	7	14
	'91	-	-	-	-	-	-	-	-	1	-	-	-	1	66	2	3	1
	'97	5	-	-	-	-	-	-	-	-	5	-	-	-	100	9	12	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		93%			07%			00%			-93%							
'91		00%			100%			100%			+34%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	933	Dec:	-			
												'91	66		-			
												'97	100		-			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	7	11	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			None							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'97	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				
Opuntia spp.																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	2	-	-	1	-	-	-	-	-	3	-	-	-	60	6	13	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'91	0		-				
											'97	60		-				
Pinus edulis																		
S	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	1	-	-	1	-	-	-	66			1
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			None							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'91	0		-				
											'97	0		-				

Trend Study 24-4-97

Study site name: Mud Spring Chaining .

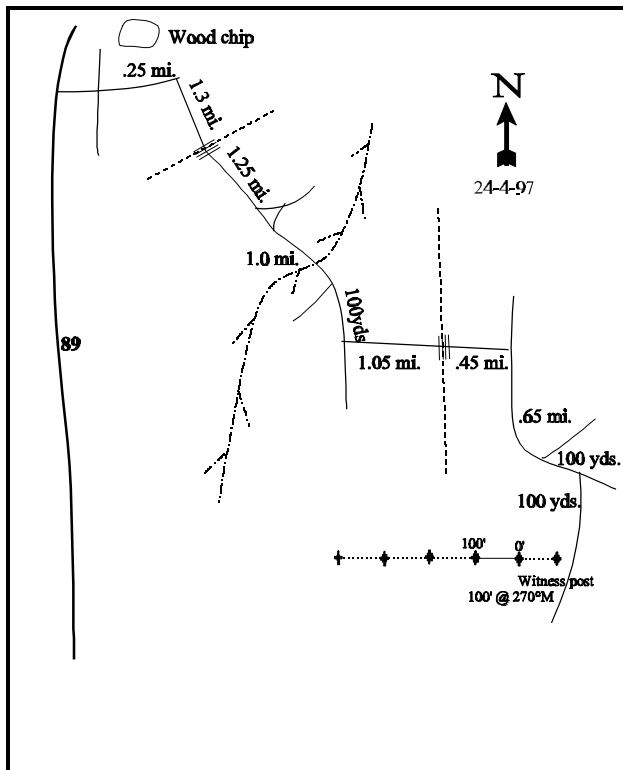
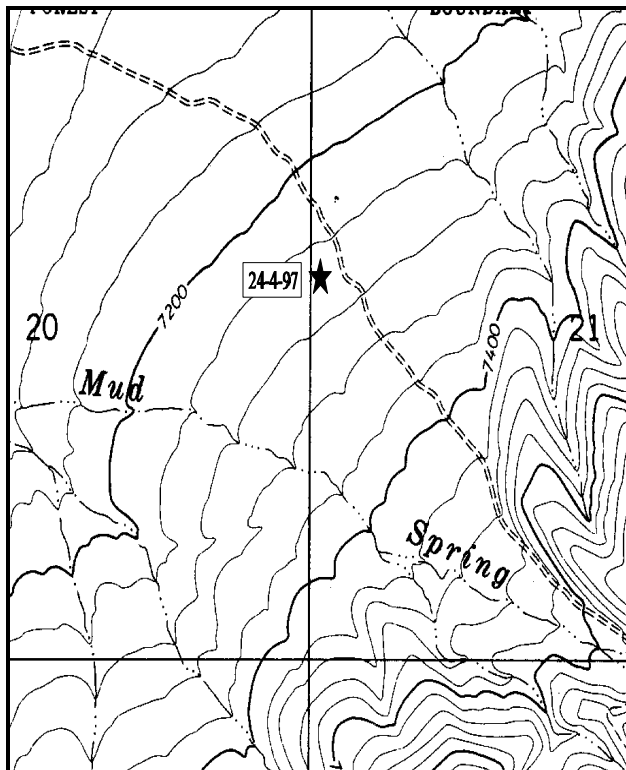
Range type: Chained, Seeded Pinyon-Juniper

Compass bearing: frequency baseline 270 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

At the junction of HWY 89 and 400 south in Circleville go east for 0.5 miles. Turn right 200 feet after crossing a bridge. Continue for 0.55 miles to a four-way fork. Go straight through the fork for 0.4 miles to a canal and 5 forked roads. Take the second left road going off at 45° angle towards a woodchip operation. Continue on a road through a hay field for 0.25 miles and turn right. After 1.3 miles there will be a cattleguard and keep going for 1.25 mile to a fork. Stay right (straight) to another fork 1.0 mile away. Turn left at this fork for 100 yds. to another fork. At this fork turn left again. After 1.05 miles you will reach the Forest Service boundary (cattleguard). From here continue for 1.15 miles to a fork followed immediately by another. Stay right at both forks. The witness post is 600 yards from the last fork. The post is off the right side of the road. The 0-foot baseline stake has browse tag #7887.



Map Name: Mt. Dutton

Diagrammatic Sketch

Township 31S , Range 3W , Section 21

UTM 4217823.617 N, 393836.392 E

DISCUSSION

Trend Study 24-4 (50-4)

The Mud Spring Chaining study is located in a chained pinyon-juniper woodland in the northwest portion of the herd unit. The site is located in the Mud Spring area at an elevation of 7,200 feet. This is a key area for deer during the winter and spring but deer pellet groups were not abundant with a quadrat frequency of only 8% in 1997. Some sign of livestock was also encountered in 1997. Escape and thermal cover is provided by a mature pinyon-juniper woodland that surrounds the chained area. The site slopes gradually (less than 6%) to the northwest.

The soil is relatively shallow and very rocky with an effective rooting depth (see methods) estimated at just under 13 inches in 1997. Soil texture is a sandy loam with a neutral pH (6.9). Rocks and pavement are common on the surface and in the profile. A considerable amount of organic matter has built up underneath the trees and shrubs. There was evidence of down-cutting in the numerous active gullies found over the chaining, but the well-drained soils and high rock cover minimize the adverse effect of runoff.

The key shrub species is mountain big sagebrush which accounts for 54% of the shrub cover at a density that has averaged about 1,000 plants/acre since 1987. Total sagebrush cover averaged just over 6% in 1997. It is light to moderately utilized, in good vigor with low decadence and adequate amounts of seedlings and young. Antelope bitterbrush is also present, although found in such low numbers (20 plants/acre) that it is not a significant component to the community.

Pinyon and juniper have become reestablished and/or released by the chaining, but still are found at low densities. Point-quarter data from 1987 estimated 67 pinyon and 200 juniper trees/acre. Pinyon nearly doubled in density by 1991 to 129 trees/acre while juniper densities declined to 108 trees/acre. Data from 1997 estimate 90 pinyon trees/acre and 127 juniper trees/acre. Average diameter of pinyon is three inches while that of juniper is 4.2 inches. Pinyon was mostly removed during the chaining, and the seedlings that were present at that time had grown to an average height of two feet by 1987. Both juniper and pinyon trees currently average around eight to 10 feet in height.

The most abundant grass is crested wheatgrass which accounts for 98% of the grass cover. No other seeded species was encountered on the study. Five other perennial grasses and one sedge are found on the site yet they occur rarely. Forbs are uncommon and currently produce only just over one-quarter of one percent cover.

1991 TREND ASSESSMENT

Percent rock, pavement, and bare ground cover all increased since 1987. Percent litter decreased during the same period. Vegetative basal cover stayed about the same. Erosion is currently evident on the site but severe only in the washes. Trend would be considered slightly down at this time. The key browse species, mountain big sagebrush, has increased its population by 26%, while the increaser, broom snakeweed had decreased its numbers by 68%. This is a good upward trend taking place. The sagebrush density is still quite low at 1,265 plants per acre, but this would be expected to increase through time. The most common grass is crested wheatgrass with a quadrat frequency of 86%. Forbs occur in very low numbers. The herbaceous understory appears to have a stable trend.

TREND ASSESSMENT

soil - slightly downward

browse - upward

herbaceous understory - stable

1997 TREND ASSESSMENT

Trend for soil appears stable with similar amounts of bare ground and litter cover compared to 1991 estimates. Trend for mountain big sagebrush is also stable with a similar density, light to moderate use, good vigor and low decadence. Recruitment is good with a reproductive potential (percentage of seedlings to the population) of 17% and 27% of the population consisting of young plants. The herbaceous understory is totally dominated by crested wheatgrass which currently accounts for 96% of the herbaceous cover. It has remained stable since 1987 with a quadrat frequency ranging from 86% to 91%. Other grasses and forbs are rare. The herbaceous understory trend is stable with poor composition.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 24 , Study no: 4

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'87	'91	'97	'87	'91	'97	
G	Agropyron cristatum	257	249	267	88	86	91	11.16
G	Bouteloua gracilis	_b 57	_a 30	_a 10	21	12	5	.05
G	Carex spp.	13	20	8	6	7	4	.02
G	Oryzopsis hymenoides	4	5	3	3	3	1	.03
G	Poa fendleriana	_b 13	_a 1	_a -	8	1	-	-
G	Sitanion hystrix	_b 31	_b 29	_a 9	15	16	3	.07
G	Stipa comata	_b 16	_{ab} 10	_a 2	8	4	1	.00
Total for Grasses		391	344	299	149	129	105	11.34
F	Arabis spp.	_b 19	_a 1	_a 6	10	1	3	.01
F	Astragalus spp.	-	3	-	-	1	-	-
F	Cryptantha spp.	7	3	3	3	1	1	.01
F	Erigeron pumilus	_b 19	_{ab} 11	_a 2	9	5	2	.01
F	Hymenopappus filifolius	11	23	23	6	9	10	.22
F	Machaeranthera canescens	-	1	2	-	1	1	.00
F	Penstemon pachyphyllus	_b 9	_{ab} 4	_a -	4	2	-	-
F	Phlox hoodii canescens	3	-	-	1	-	-	-
F	Tragopogon dubius	1	-	-	1	-	-	-
Total for Forbs		69	46	36	34	20	17	0.26

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 24 , Study no: 4

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata vaseyana	31	6.21
B	Eriogonum microthecum	1	.00
B	Gutierrezia sarothrae	11	.08
B	Juniperus osteosperma	5	.03
B	Opuntia spp.	2	.03
B	Pinus edulis	13	5.18
B	Purshia tridentata	1	-
B	Yucca spp.	1	.03
Total for Browse		65	11.57

CANOPY COVER --

Herd unit 24 , Study no: 4

Species	Percent Cover '97
Juniperus osteosperma	2
Pinus edulis	4

BASIC COVER --

Herd unit 24 , Study no: 4

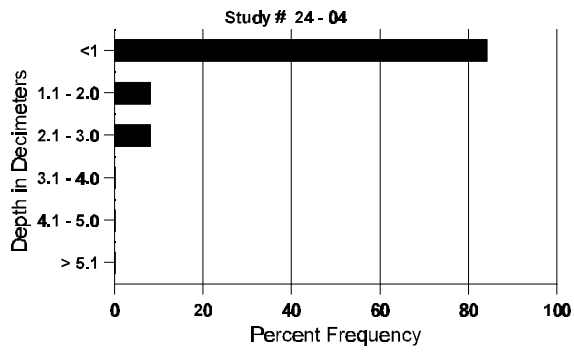
Cover Type	Nested Frequency '97	Average Cover %		
		'87	'91	'97
Vegetation	297	4.25	4.00	26.82
Rock	278	20.50	27.50	18.86
Pavement	282	4.25	6.75	13.48
Litter	382	53.75	41.50	37.68
Cryptogams	25	0	0	.06
Bare Ground	265	17.25	20.25	14.53

SOIL ANALYSIS DATA --

Herd Unit 24, Study no: 04

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.7	55.2 (16.0)	6.9	67.0	18.4	14.6	3.6	38.4	608.0	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 24 , Study no: 4

Type	Quadrat Frequency '97
Rabbit	9
Deer	8
Cattle	3

BROWSE CHARACTERISTICS --

Herd unit 24 , Study no: 4

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	87	1	-	-	-	-	-	-	1	1
	91	6	-	-	1	-	-	-	6	7
	97	8	1	-	-	-	-	-	9	9
Y	87	2	23	-	-	-	-	-	25	25
	91	21	2	-	1	-	-	1	25	25
	97	11	3	-	-	-	-	-	14	14
M	87	1	2	-	-	-	-	-	3	3
	91	7	3	-	1	-	-	-	11	11
	97	24	9	1	-	-	-	-	34	34
D	87	-	-	-	-	-	-	-	0	0
	91	-	2	-	-	-	-	-	2	2
	97	4	-	-	-	-	-	-	4	4
X	87	-	-	-	-	-	-	-	0	0
	91	-	-	-	-	-	-	-	0	0
	97	-	-	-	-	-	-	-	40	2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>		
'87		89%		00%		00%		+26%		
'91		18%		00%		00%		-18%		
'97		23%		02%		08%				
Total Plants/Acre (excluding Dead & Seedlings)						'87	933	Dec:	0%	
						'91	1265		5%	
						'97	1040		8%	
<i>Eriogonum microthecum</i>										
Y	87	-	-	-	-	-	-	-	0	0
	91	-	-	-	-	-	-	-	0	0
	97	-	-	-	1	-	-	-	1	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>		
'87		00%		00%		00%		None		
'91		00%		00%		00%		Appeared		
'97		00%		00%		00%				
Total Plants/Acre (excluding Dead & Seedlings)						'87	0	Dec:	-	
						'91	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				
Gutierrezia sarothrae																		
Y	87	13	-	-	-	-	-	-	-	-	13	-	-	-	433		13	
	91	9	-	-	-	-	-	-	-	-	9	-	-	-	300		9	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	83	1	-	-	-	-	-	-	-	84	-	-	-	2800	7	7	84
	91	19	-	-	-	-	-	-	-	-	19	-	-	-	633	4	4	19
	97	11	-	-	-	-	-	-	-	-	11	-	-	-	220	8	12	11
D	87	2	-	-	-	-	-	-	-	-	-	-	2	66		2		
	91	4	-	-	-	-	-	-	-	-	3	-	-	133		4		
	97	1	-	-	-	-	-	-	-	-	1	-	-	20		1		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		01%			00%			02%			-68%							
'91		00%			00%			03%			-76%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	3299	Dec:	2%				
											'91	1066		12%				
											'97	260		8%				
Juniperus osteosperma																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	91	1	-	-	-	-	-	-	-	-	1	-	-	33		1		
	97	1	-	-	-	-	-	-	-	-	1	-	-	20		1		
Y	87	4	-	-	-	-	-	-	-	-	4	-	-	133		4		
	91	2	1	-	-	-	-	-	-	-	3	-	-	100		3		
	97	1	-	-	-	-	-	-	-	-	1	-	-	20		1		
M	87	2	-	-	-	-	-	-	-	-	2	-	-	66	79	39	2	
	91	-	1	-	-	-	-	-	-	-	1	-	-	33	108	33	1	
	97	2	-	-	2	-	-	-	-	-	3	-	1	80	-	-	4	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	97	-	-	-	-	-	-	-	-	-	-	-	-	20		1		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			-33%							
'91		50%			00%			00%			-25%							
'97		00%			00%			20%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	199	Dec:	-				
											'91	133		-				
											'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.																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	8	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			Appeared							
'91		00%			00%			00%			+45%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	33		-			
												'97	60		-			
Pinus edulis																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	5	-	-	4	-	-	2	-	-	11	-	-	-	220	-	11	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+ 0%							
'91		00%			00%			00%			+88%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	33	Dec:	-			
												'91	33		-			
												'97	280		-			

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	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	-	1	-	-	-	-	-	-	-	1	-	-	-	20	23	52	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			Appeared							
'97		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'97	20		-			
Yucca spp.																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	7	15	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'97	20		-			

Trend Study 24-5-97

Study site name: Suicide .

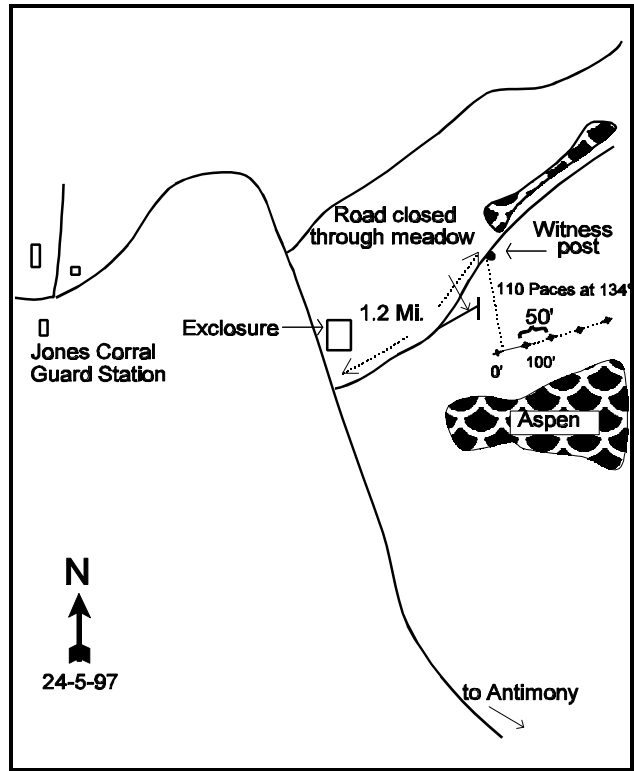
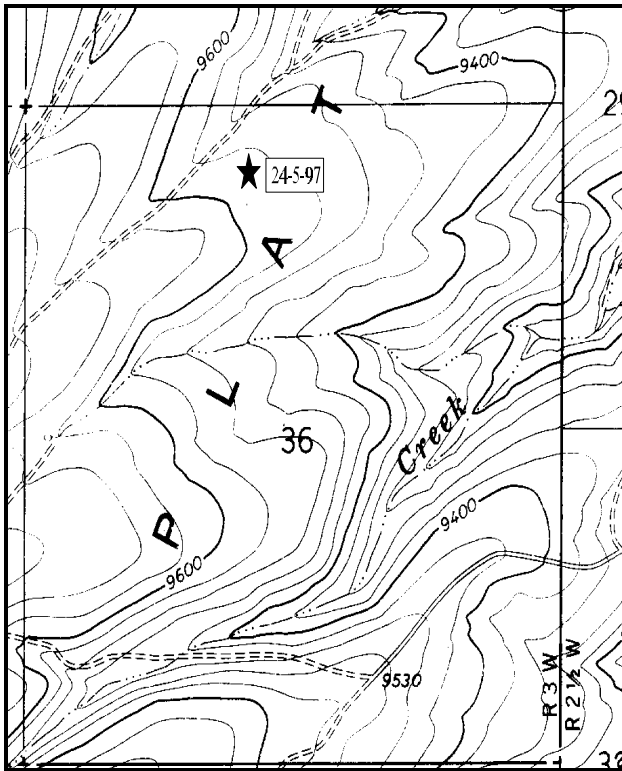
Range type: Mountain Big Sage/Grass-Forb.

Compass bearing: frequency baseline 65 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Take the Mt. Dutton road (#125), either south from Antimony or north from Cottonwood AS, towards Jones Corral Guard Station. Turn west off of #125 towards the guard station. Proceed 1.2 miles to an intersection by an exclosure. Turn right and go 1.2 miles along a road above a meadow area (the lower road is closed by dozer piles). There is a witness post on the right side of the road to mark the study area. From this witness post, walk approximately 110 paces southeast across the stream bottom and up the hillside to the short fencepost tagged #71166. The transect runs northeast (65°) from here.



Map Name: Mt. Dutton

Diagrammatic Sketch

Township 31S , Range 3W , Section 36

UTM 4215335.120 N, 399681.269 E

DISCUSSION

Trend Study 24-5 (50-5)

The Suicide study site is located at an elevation of 9,500 feet and approximately one mile northeast of the Jones Corral Guard Station. The vegetation type is mountain big sagebrush/forb-grass, which is adjacent to small and large continuous stands of aspen. The site is on a moderate slope of 25% with a north-northwest aspect. This area is representative of many of the sagebrush-grass/aspen areas in the vicinity of Jones Corral. A considerable amount of forage is available adjacent to the aspen cover. It is a key use area for elk during the summer and fall. The area is also utilized by cattle with several stock ponds in the immediate area. Pellet group data from 1997 estimate 16 deer, 23 elk and 29 cow use days/acre. Local community pressure is limited to the roads, but is probably higher within the vicinity of the guard station than elsewhere on the mountain.

The soil is a dark brown loam with a moderately acidic pH (6.2). The soil contains a high level of organic matter (5.7%), the highest level on the unit. There is an abundance of rocks of various sizes on the surface and in the profile. Effective rooting depth (see methods) is estimated at nearly 14 inches. The vegetative cover is continuous and intact and serves to limit erosion. Litter buildup has occurred, which also helps slow down erosion. Good vegetation and litter cover, coupled with fairly well drained soils, has allowed this area to maintain a stable to improving soil trend. The Forest Service has implemented a road maintenance plan in this area. Several unnecessary roads have been closed in the drainage and revegetated in an effort to limit soil erosion point sources.

The herbaceous vegetation is dominated by a mountain big sagebrush overstory which currently produces nearly 20% cover, or 60% of the browse cover. Sagebrush density is fairly high and increasing with 4,532 plants/acre estimated in 1987, 6,932 plants/acre in 1991 and 16,680 by 1997. Density of mature plants remained similar at 3,020 plants/acre in 1997. The decadency rate has decreased from 43% in 1987 to 15% in 1991, and to only 2% in 1997. Vigor has improved and utilization has declined from moderate to only light use. Some of the change in density may be due to the larger sample used in 1997, but it is obvious that the sagebrush population has steadily increased since 1987. The overabundance of sagebrush seedlings and young is likely caused by the removal of the competitive herbaceous understory by livestock combined with optimum precipitation conditions for seedling establishment. Right now, 79% of the population is contributed by the young age class. Obviously, many of these seedlings and young sagebrush will not survive, but any future increase in the shrub canopy cover will only further reduce the herbaceous understory which is important for wildlife as well as livestock.

Snowberry is the second most abundant shrub and has also increased in density with 1,799 plants/acre reported in 1987 increasing to 6,200 plants/acre in 1991. The much larger sample size used in 1997 estimated a lower density of 2,400 plants/acre, 80% of which are mature plants. Utilization was moderate to heavy in 1987, light to moderate in 1991, and mostly light in 1997. Vigor has been good over the years and percent decadence low. The larger sample used in 1997 also picked up some heavily used bitterbrush. Density is estimated at 480 plants/acre, 71% of which are mature. The increaser, stickyleaf low rabbitbrush, has remained at a similar density of around 1,200 plants/acre. Currently, the population is mostly mature and does not appear to be increasing.

The understory is rich in species diversity and abundance. Eleven grasses and 26 forbs were encountered on the site in 1997. Grasses combine to produce almost 12% cover, while forbs add another 17% cover. The key grasses include: a Carex, Letterman needlegrass, and a combination of Sandberg and mutton bluegrass. These grasses were all classified as Sandberg bluegrass in 1987 and 1991. Low growing increaser forbs including dandelion, Eaton fleabane, rose pussytoes, and cinquefoil are numerous, but silvery lupine is the dominate forb.

1991 TREND ASSESSMENT

Soil trend is slightly downward because of increase in bare ground (it doubled), rock, and pavement, with an accompanying decline in litter cover. Both key browse species increased. Of importance was the increase in mountain big sagebrush (35%), decrease in decadency (43% down to 15%), and reproductive potential increasing (<1% up to 19%). Heavy hedging has increased slightly, yet vigor has also improved. Trend for browse is up. Trend for herbaceous understory is also up slightly with most grasses and forbs increasing in nested frequency values.

TREND ASSESSMENT

soil - slightly downward

browse - up

herbaceous understory - slightly upward

1997 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1991. Trend for the key browse species, mountain big sagebrush, is up with a similar density of mature plants compared to 1991. Also, the reproductive potential dramatically increased from 19% to 62% coupled with an increase in the proportion of young plants from 37% to 79%. In addition, utilization is lighter, vigor improved, and percent decadency is down from 15% to only 2%. Any increase in sagebrush density or cover will come at the expense of grasses and forbs. Other preferred browse species, bitterbrush, and snowberry appear to have stable populations. Since this site is used in the spring and summer the herbaceous understory is the most important aspect of this site. Trend for grasses and forbs is down with declining sum of nested frequencies for both. The only grasses which increased in nested frequency are prairie Junegrass and Letterman needlegrass. Most of the forbs also show a decrease in nested frequency. Composition is also poor with many of the forbs consisting of weedy increasers.

TREND ASSESSMENT

soil - stable

browse - up

herbaceous understory - down

HERBACEOUS TRENDS --

Herd unit 24 , Study no: 5

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'87	'91	'97	'87	'91	'97	
G	Agropyron trachycaulum	_b 89	_b 53	_a 28	41	27	13	.29
G	Bouteloua gracilis	-	1	-	-	1	-	-
G	Bromus anomalus	_c 193	_b 112	_a 8	76	49	3	.05
G	Carex obtusata	_a 124	_b 167	_{ab} 144	52	61	51	2.95
G	Elymus spp.	-	1	-	-	1	-	-
G	Festuca ovina	_b 158	_c 201	_a 65	66	76	25	.61
G	Koeleria cristata	_a 46	_b 108	_b 115	23	40	43	1.30
G	Muhlenbergia spp.	2	3	-	1	3	-	-
G	Poa fendleriana	_a -	_a -	_b 127	-	-	51	1.87

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'87	'91	'97	'87	'91	'97	
G	<i>Poa pratensis</i>	-	-	3	-	-	1	.03
G	<i>Poa secunda</i>	_b 229	_b 230	_a 86	80	82	30	1.24
G	<i>Sitanion hystrix</i>	_b 108	_b 137	_a 51	47	62	25	.26
G	<i>Stipa comata</i>	_b 101	_b 119	_a 47	37	46	18	.78
G	<i>Stipa lettermani</i>	_a 39	_a 22	_b 86	13	9	32	2.19
Total for Grasses		1089	1154	760	436	457	292	11.60
F	<i>Achillea millefolium</i>	_b 50	_b 52	_a 6	18	21	2	.18
F	<i>Agoseris glauca</i>	_a -	_c 34	_b 15	-	18	7	.03
F	<i>Antennaria rosea</i>	_b 183	_{ab} 70	_a 155	69	64	60	4.53
F	<i>Androsace septentrionalis</i> (a)	-	-	6	-	-	4	.02
F	<i>Artemisia dracunculus</i>	-	-	3	-	-	1	.03
F	<i>Arabis pulchra</i>	_b 61	_a 9	_a 5	26	3	2	.01
F	<i>Astragalus argophyllus</i>	_{ab} 2	_b 8	_a -	1	5	-	-
F	<i>Astragalus miser</i>	5	3	1	3	1	1	.00
F	<i>Aster</i> spp.	-	-	3	-	-	1	.00
F	<i>Castilleja linariaefolia</i>	-	-	2	-	-	2	.01
F	<i>Calochortus nuttallii</i>	-	-	1	-	-	1	.00
F	<i>Collomia linearis</i> (a)	-	-	9	-	-	3	.01
F	<i>Comandra pallida</i>	_b 8	_a -	_a -	4	-	-	-
F	<i>Crepis acuminata</i>	3	3	-	1	1	-	-
F	Cruciferae	-	14	-	-	7	-	-
F	<i>Cryptogramma</i>	-	3	-	-	1	-	-
F	<i>Cymopterus lemmonii</i>	_b 10	_{ab} 6	_a -	5	3	-	-
F	<i>Epilobium paniculatum</i> (a)	-	-	10	-	-	4	.04
F	<i>Erigeron eatonii</i>	_a 72	_b 149	_a 104	37	63	44	.94
F	<i>Erigeron flagellaris</i>	_b 110	_b 83	_a 43	46	36	20	.64
F	<i>Eriogonum racemosum</i>	_a -	_a -	_b 9	-	-	5	.05
F	<i>Eriogonum umbellatum</i>	_a 1	_b 13	_a 3	1	6	1	.03
F	<i>Euphorbia</i> spp.	-	-	7	-	-	4	.04
F	<i>Frasera speciosa</i>	1	-	-	1	-	-	-
F	<i>Lupinus argenteus</i>	_a 76	_b 105	_a 70	40	51	33	4.66
F	<i>Lychnis drummondii</i>	-	4	4	-	2	2	.01
F	<i>Penstemon</i> spp.	_a 4	_b 26	_a -	2	13	-	-
F	<i>Phlox longifolia</i>	_a 18	_b 43	_{ab} 32	6	19	14	.09
F	<i>Potentilla anersina</i>	-	-	3	-	-	1	.03

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'87	'91	'97	'87	'91	'97	
F	Potentilla diversifolia	55	53	67	25	23	27	1.89
F	Polygonum douglasii (a)	-	-	126	-	-	48	.54
F	Ranunculus inamoenus	_b 15	_a -	_a -	6	-	-	-
F	Senecio multilobatus	-	-	2	-	-	2	.01
F	Taraxacum officinale	_b 321	_b 304	_a 187	97	96	68	3.32
F	Thermopsis montana	14	3	4	5	1	2	.01
F	Tragopogon dubius	_c 32	_b 10	_a -	20	7	-	-
F	Trifolium nanum	_b 9	_b 15	_a -	4	6	-	-
F	Unknown forb-perennial	-	4	-	-	2	-	-
Total for Forbs		1050	1114	877	417	449	359	17.19

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 24 , Study no: 5

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata vaseyana	82	19.67
B	Chrysothamnus nauseosus albicaulis	12	.21
B	Chrysothamnus viscidiflorus viscidiflorus	38	1.97
B	Juniperus communis	6	-
B	Populus tremuloides	2	-
B	Purshia tridentata	14	3.26
B	Ribes spp.	2	.15
B	Rosa woodsii	2	-
B	Symphoricarpos oreophilus	56	7.59
B	Tetradymia canescens	2	-
Total for Browse		216	32.87

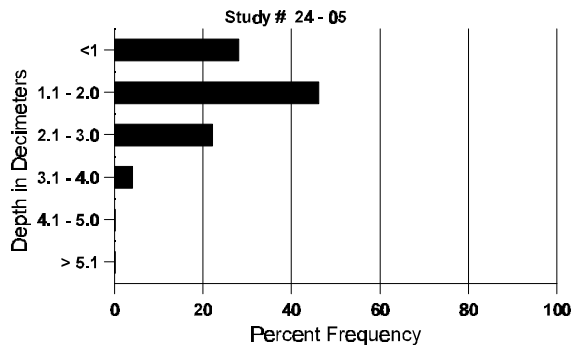
BASIC COVER --
Herd unit 24 , Study no: 5

Cover Type	Nested Frequency '97	Average Cover %		
		'87	'91	'97
Vegetation	366	14.00	20.25	56.58
Rock	199	7.25	9.75	6.03
Pavement	263	1.75	6.25	7.90
Litter	391	70.25	49.00	45.49
Cryptogams	28	1.00	2.25	.44
Bare Ground	263	5.75	12.50	15.41

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 05

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.9	44.2 (16.2)	6.2	48.7	40.7	10.6	5.7	40.2	358.4	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 24 , Study no: 5

Type	Quadrat Frequency '97
Rabbit	2
Elk	14
Deer	27
Cattle	6

BROWSE CHARACTERISTICS --

Herd unit 24 , Study no: 5

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>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	93	78	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			None							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'97	0		-			
<i>Artemisia tridentata vaseyana</i>																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	9	-	-	11	-	-	-	-	-	20	-	-	-	1333			20
	97	510	-	-	14	-	-	-	-	-	524	-	-	-	10480			524
Y	87	13	10	-	-	-	-	-	-	-	23	-	-	-	1533			23
	91	12	11	1	7	-	-	7	-	-	38	-	-	-	2533			38
	97	642	-	-	15	-	-	3	-	-	660	-	-	-	13200			660
M	87	5	11	-	-	-	-	-	-	-	10	-	6	-	1066	17	17	16
	91	28	16	3	-	2	-	1	-	-	45	-	5	-	3333	17	17	50
	97	120	26	2	3	-	-	-	-	-	151	-	-	-	3020	24	33	151
D	87	17	11	1	-	-	-	-	-	-	24	-	5	-	1933			29
	91	11	4	1	-	-	-	-	-	-	10	-	1	5	1066			16
	97	19	1	-	3	-	-	-	-	-	14	-	-	9	460			23
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	1160			58
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		47%			01%			16%			+35%							
'91		32%			05%			11%			+58%							
'97		03%			.23%			01%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	4532	Dec:	43%			
												'91	6932		15%			
												'97	16680		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				
Chrysothamnus nauseosus albicaulis																		
Y	87	9	-	-	-	-	-	-	-	-	9	-	-	-	600		9	
	91	12	4	-	1	-	-	1	-	-	18	-	-	-	1200		18	
	97	14	3	-	-	-	-	-	-	-	13	-	-	-	340		17	
M	87	12	-	-	-	-	-	-	-	-	12	-	-	-	800	9	6	12
	91	2	4	6	1	-	-	-	-	-	13	-	-	-	866	10	14	13
	97	3	-	-	4	-	-	-	-	-	7	-	-	-	140	9	7	7
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	5	5	-	-	-	-	-	-	9	-	-	1	666		10	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			+49%							
'91		32%			27%			02%			-82%							
'97		13%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	1400	Dec:	0%			
												'91	2732		24%			
												'97	480		0%			
Chrysothamnus viscidiflorus viscidiflorus																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	91	2	1	-	1	-	-	2	-	-	6	-	-	-	400		6	
	97	6	-	-	-	-	-	-	-	-	5	-	-	-	120		6	
M	87	13	-	-	-	-	-	-	-	-	13	-	-	-	866	11	7	13
	91	6	-	-	5	-	-	1	-	-	12	-	-	-	800	10	10	12
	97	48	-	1	7	-	-	-	-	-	55	-	-	-	1120	12	14	56
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	3	4	1	-	-	-	-	-	-	4	-	1	3	533		8	
	97	-	-	1	-	-	-	-	-	-	-	-	-	-	20		1	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			+35%							
'91		19%			04%			15%			-27%							
'97		00%			03%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	1132	Dec:	0%			
												'91	1733		31%			
												'97	1260		2%			

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 communis																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	97	7	-	-	4	-	-	-	-	-	11	-	-	-	220	9 3	11
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			None						
'91		00%			00%			00%			Appeared						
'97		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'91	0		-		
												'97	380		-		
Populus tremuloides																	
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	97	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7
Y	87	-	2	-	-	-	-	-	-	-	1	-	1	-	133		2
	91	-	1	1	1	1	-	-	-	-	2	-	2	-	266		4
	97	-	1	-	2	-	-	-	-	-	3	-	-	-	60		3
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	1	-	-	-	-	-	-	-	-	-	1	66		1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		100%			00%			50%			+60%						
'91		40%			40%			60%			-82%						
'97		33%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	133	Dec:	0%		
												'91	332		20%		
												'97	60		0%		

AGE	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.		
Purshia tridentata																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	3	1	1	-	-	1	-	-	7	-	-	-	140		7	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	-	-	-	-	8	8	1	-	-	17	-	-	-	340	27	48	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			Appeared							
'97		46%			38%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'91	0		-				
											'97	480		-				
Ribes spp.																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	-	1	-	-	-	-	-	-	-	1	-	-	-	20	40	50	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			Appeared							
'97		50%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'91	0		-				
											'97	40		-				
Rosa woodsii																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'91	0		-				
											'97	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								
Symphoricarpos oreophilus													
S	87	-	-	-	-	-	-	-	-	-	0		0
	91	1	-	-	-	-	-	-	-	-	66		1
	97	1	-	-	-	-	-	-	-	-	20		1
Y	87	2	2	4	-	-	-	-	-	-	533		8
	91	17	5	-	4	1	-	3	-	-	2000		30
	97	12	-	-	1	-	-	-	-	-	260		13
M	87	2	7	8	-	-	-	-	-	-	1133	14 13	17
	91	14	22	8	7	-	1	5	-	-	3800	15 19	57
	97	73	-	2	15	3	-	3	-	-	1920	16 32	96
D	87	-	1	1	-	-	-	-	-	-	133		2
	91	2	-	-	3	1	-	-	-	-	400		6
	97	4	-	1	6	-	-	-	-	-	220		11
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'87		37%		48%		00%		+71%					
'91		31%		10%		02%		-61%					
'97		03%		03%		.83%							
Total Plants/Acre (excluding Dead & Seedlings)										'87	1799	Dec:	7%
										'91	6200		6%
										'97	2400		9%
Tetradymia canescens													
S	87	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	0		0
	97	1	-	-	-	-	-	-	-	-	20		1
Y	87	-	-	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	-	-	0		0
	97	3	-	-	-	-	-	-	-	-	60		3
M	87	-	-	-	-	-	-	-	-	-	0	- -	0
	91	-	-	-	-	-	-	-	-	-	0	- -	0
	97	-	-	-	-	-	1	-	-	-	20	11 11	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'87		00%		00%		00%		None					
'91		00%		00%		00%		Appeared					
'97		00%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-
										'91	0		-
										'97	80		-

Trend Study 24-6-97

Study site name: Table Mountain .

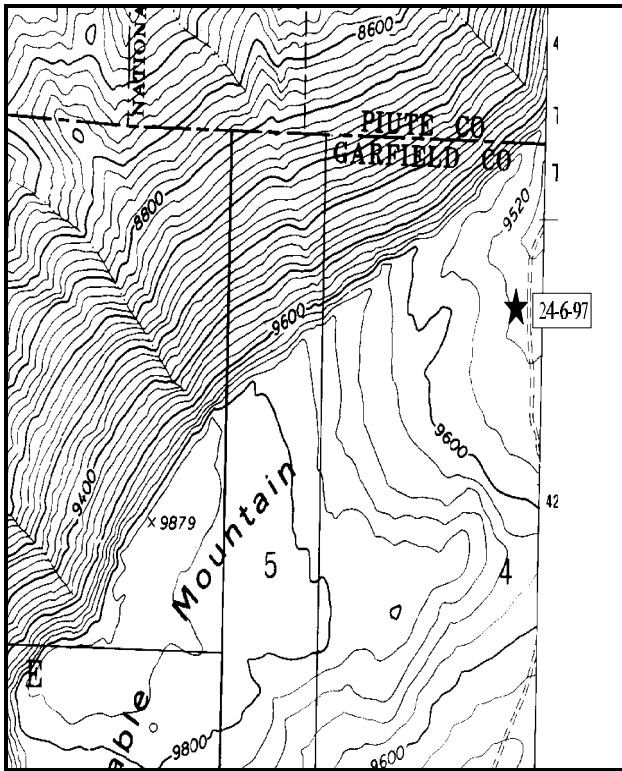
Range type: Burn .

Compass bearing: frequency baseline 163 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 4 (71ft).

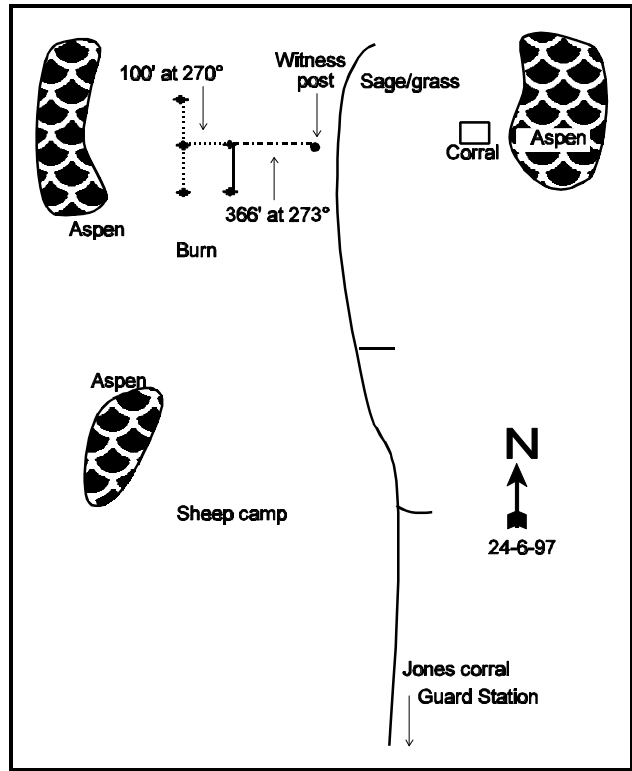
LOCATION DESCRIPTION

From the Jones Corral Guard Station, head north towards Table Mountain. Go 0.35 miles to a fork, stay right and continue 0.8 miles to a fork. Stay right and continue 1.3 miles to a fork and cattleguard. Keep right and go 0.1 miles to another fork. Bear left and continue 2.3 miles to a fork. Stay right and continue north for 1.4 miles to a burned flat surrounded by aspens. Look for a 4' tall fencepost on the left side of the road. This witness post marks the location of the study, which starts about 120 yards west of the road. The 0-foot baseline stake is marked by a red browse tag #9004.



Map Name: Junction

Township 31S , Range 2 1/2W , Section 4



Diagrammatic Sketch

UTM 4221463.607 N, 401219.422 E

DISCUSSION

Trend Study 24-6 (50-6)

The Table Mountain study is located on a prescribed burn on Table Mountain at an elevation of 9,500 feet. The terrain slopes gradually to the southeast with a slope of 7%. This is a key area for elk and deer during the summer. The site once supported an extensive stand of mountain big sagebrush which is reestablishing itself on the site. A variety of grasses now dominate and provide good ground cover. Adjacent stands of aspen provide escape cover for big game that use this area. Pellet group data from 1997 estimate 53 deer, 61 elk, and 10 cow use days/acre. This is a sheep allotment which has been grazed by 720 sheep from July 1st to September 30th. This unit has been in non-use status since 1995.

The soils are deep, rocky, and derived from volcanic parent material. The soil is well drained and not compacted with an effective rooting depth (see methods) estimated at almost 15 inches. It has a brown-orange color, has a loam texture and a moderately acidic pH (6.1). The vegetation is continuous and intact, leaving little bare ground unprotected. Erosion is not a problem on the site.

Oregon grape and snowberry sprouted after the fire and they dominated the browse composition in 1987 and 1991. Mountain big sagebrush was sparsely distributed over the burn, at a density of only 33 plants/acre in 1987 and 66 in 1991. The much larger sample used in 1997 estimated 1,640 sagebrush plants/acre, 61% of which are young plants. Density of snowberry declined 53%, primarily due to the increased sample size since there are few dead plants in the population. The majority of the snowberry were heavily hedged (95%) in 1987, but use has steadily declined since with 20% heavily hedged in 1991 and only 5% in 1997. Vigor is normal and percent decadence low at 11%. This same trend of declining heavy use is seen in sagebrush. Current use is mostly light.

Woods rose was not sampled on the site in 1987 or 1991, but it was present in the area and heavily hedged. Sheep that used this allotment then appear to have utilized a significant portion of the forage produced by these two shrubs. The larger sample utilized in 1997 picked up some Woods rose (220 plants/acre), however none appear to have been utilized this season.

The herbaceous understory dominates the site with 12 grass species providing 22% cover and 20 species of forbs producing an additional 16% cover. The most abundant grass is Letterman needlegrass which provides nearly half (48%) of the grass cover. Bluebunch wheatgrass, mutton bluegrass, and needle-and-thread are also common. The forb composition is dominated by silvery lupine which produces 53% of the forb cover. The only other forbs which provide more than 1% cover include a phlox and dandelion. Some misidentification between the *Poa* species (*Poa fendleriana*, *Poa pratensis* and *Poa secunda*) appears to have occurred in 1987 causing large changes in nested and quadrat frequencies.

1991 TREND ASSESSMENT

Vegetative basal cover has increased to almost 14% with bare ground going down to about 9%. Percent rock decreased slightly and percent litter increased slightly. Soil trend is improving. For the browse, normally the key species would be mountain big sagebrush, but with only 66 plants/acre it cannot be counted on very much. Snowberry on this site is heavily used. Its density has decreased by 5% with a slight increase in percent decadency. Trend is improving but still poor since the prescribed burn. The trend for the herbaceous understory is, for the most part improving. However, most of the species for both grasses and forbs are increaser's in habit, which is not an ideal situation. Other species would be more preferred.

TREND ASSESSMENT

soil - slightly upward

browse - slightly upward, but still poor composition with low density for mountain big sagebrush

herbaceous understory - slightly upward, but poor composition with too many increaser species

1997 TREND ASSESSMENT

Trend for soil is stable with excellent protective ground cover. Trend for browse is up for mountain big sagebrush with a 96% increase in density. Reproductive potential and the proportion of young plants in the population have both increased dramatically since 1991. Utilization is mostly light, vigor good with few decadent plants. Snowberry has declined in density by 53%, however this appears to be due more to the larger sample size used in 1997 which better estimates shrub densities. The snowberry appears to have a stable, lightly utilized population. Trend for the herbaceous understory is stable even though there was a decline in the sum of nested frequency for both grasses and forbs. Looking at the photo point comparisons between years, it appears that the decline in nested frequency of herbaceous species is a natural thinning process after a flush of growth following the burn. Grasses and forbs are very abundant and produce 37% cover on the site and browse cover, for all species, is only 9%.

TREND ASSESSMENT

soil - stable

browse - up for sagebrush

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 24 , Study no: 6

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'87	'91	'97	'87	'91	'97	
G	Agropyron spicatum	96	90	103	41	36	41	3.33
G	Agropyron trachycaulum	_b 64	_b 52	_a 16	27	20	7	.18
G	Bromus anomalus	_{ab} 14	_b 29	_a 3	8	13	3	.02
G	Carex spp.	17	26	33	9	10	11	.56
G	Festuca ovina	_b 155	_a 8	_a 17	60	5	6	.22
G	Koeleria cristata	_a 5	_b 112	_a 27	3	46	13	.24
G	Poa fendleriana	_a 60	_b 148	_a 86	26	65	41	1.69
G	Poa pratensis	_a 7	_b 91	_a 4	2	35	2	.06
G	Poa secunda	_b 146	_a 8	_a -	58	3	-	-
G	Sitanion hystrix	55	54	46	24	23	22	.95
G	Stipa columbiana	_a -	_a -	_b 15	-	-	7	.78
G	Stipa comata	_a 5	_b 77	_b 91	3	32	38	2.86
G	Stipa lettermani	_a 163	_b 266	_a 178	61	91	55	9.94
Total for Grasses		787	961	619	322	379	246	20.88
F	Achillea millefolium	7	6	3	3	2	1	.03
F	Agoseris glauca	_a -	_a 1	_b 39	-	1	18	.09

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'87	'91	'97	'87	'91	'97	
F	<i>Antennaria rosea</i>	2	3	-	1	1	-	-
F	<i>Arabis pulchra</i>	_b 166	_a 1	_a 1	69	1	1	.00
F	<i>Astragalus convallarius</i>	_a -	_c 48	_b 23	-	26	13	.21
F	<i>Astragalus</i> spp.	-	-	1	-	-	1	.00
F	<i>Calochortus nuttallii</i>	-	-	4	-	-	2	.01
F	<i>Chenopodium album</i> (a)	-	-	14	-	-	8	.04
F	<i>Crepis acuminata</i>	-	-	5	-	-	2	.06
F	<i>Erigeron eatonii</i>	_a -	_b 15	_a 6	-	9	2	.03
F	<i>Eriogonum flavum</i>	-	6	-	-	2	-	-
F	<i>Eriogonum racemosum</i>	5	10	13	3	4	6	.11
F	<i>Lupinus argenteus</i>	97	95	105	47	55	53	8.69
F	<i>Lychnis drummondii</i>	_a -	_b 86	_a -	-	42	-	-
F	<i>Lygodesmia</i> spp.	-	-	4	-	-	2	.01
F	<i>Penstemon</i> spp.	_b 107	_a 21	_a 7	43	9	6	.06
F	<i>Phlox pulvinata</i>	_b 145	_b 156	_a 65	50	54	21	4.34
F	<i>Potentilla diversifolia</i>	_a -	_a 4	_b 12	-	1	7	.06
F	<i>Potentilla</i> spp.	6	3	6	3	2	3	.06
F	<i>Senecio multilobatus</i>	_{ab} 8	_a -	_b 16	3	-	7	.06
F	<i>Taraxacum officinale</i>	_c 303	_b 228	_a 139	97	88	58	2.26
F	<i>Thermopsis montana</i>	-	-	2	-	-	1	.03
F	<i>Tragopogon dubius</i>	6	6	9	3	3	4	.07
F	Unknown forb-perennial	7	-	-	3	-	-	-
Total for Forbs		859	689	474	325	300	216	16.27

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 24 , Study no: 6

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata vaseyana	38	3.08
B	Chrysothamnus viscidiflorus viscidiflorus	1	-
B	Mahonia repens	11	.34
B	Ribes cereum inebrians	2	.15
B	Rosa woodsii	2	.03
B	Symphoricarpos oreophilus	43	5.71
Total for Browse		97	9.31

BASIC COVER --

Herd unit 24 , Study no: 6

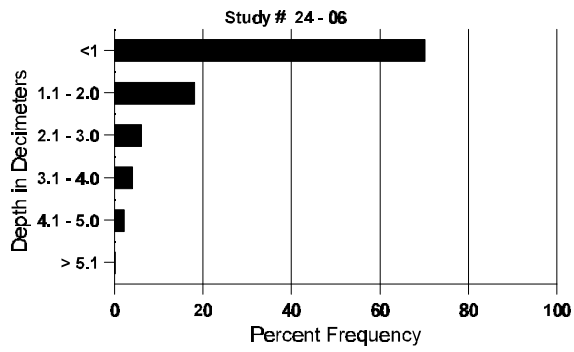
Cover Type	Nested Frequency '97	Average Cover %		
		'87	'91	'97
Vegetation	367	11.75	13.50	52.29
Rock	275	7.75	6.25	7.28
Pavement	311	19.75	19.75	10.85
Litter	388	48.50	52.00	33.23
Cryptogams	30	0	0	.39
Bare Ground	169	12.25	8.50	5.76

SOIL ANALYSIS DATA --

Herd Unit 24, Study no: 06

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.8	47.2 (16.3)	6.1	38.4	35.1	26.6	5.0	47.1	454.4	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 24 , Study no: 6

Type	Quadrat Frequency '97
Rabbit	4
Elk	15
Deer	18
Cattle	2

BROWSE CHARACTERISTICS --

Herd unit 24 , 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				
<i>Artemisia tridentata vaseyana</i>									
S	87	1	-	-	-	-	-	1	1
	91	2	-	-	-	-	-	2	2
	97	16	-	-	22	-	-	38	38
Y	87	-	1	-	-	-	-	1	1
	91	-	1	-	-	-	-	1	1
	97	44	-	-	6	-	-	50	50
M	87	-	-	-	-	-	-	0	0
	91	1	-	-	-	-	-	33	10 14
	97	25	5	-	1	-	-	620	22 38
D	87	-	-	-	-	-	-	0	0
	91	-	-	-	-	-	-	0	0
	97	-	-	-	-	-	-	20	1
X	87	-	-	-	-	-	-	0	0
	91	-	-	-	-	-	-	0	0
	97	-	-	-	-	-	-	280	14
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>				<u>%Change</u>	
'87		100%	00%	00%				+50%	
'91		50%	00%	00%				+96%	
'97		06%	00%	00%					
Total Plants/Acre (excluding Dead & Seedlings)					'87	33	Dec:	0%	
					'91	66		0%	
					'97	1640		1%	
<i>Chrysothamnus viscidiflorus</i>									
D	87	-	-	1	-	-	-	1	1
	91	-	-	-	-	-	-	0	0
	97	-	-	-	-	-	-	0	0
% Plants Showing		<u>Moderate Use</u>	<u>Heavy Use</u>	<u>Poor Vigor</u>				<u>%Change</u>	
'87		00%	100%	100%				Died out	
'91		00%	00%	00%				None	
'97		00%	00%	00%					
Total Plants/Acre (excluding Dead & Seedlings)					'87	33	Dec:	100%	
					'91	0		0%	
					'97	0		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>Chrysothamnus viscidiflorus viscidiflorus</i>												
M	87	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	1	-	-	1	-	66	6	6	2
	97	-	-	-	1	-	-	-	20	13	14	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>% Change</u>				
'87		00%		00%		00%		Appeared				
'91		00%		100%		00%		-70%				
'97		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'87	0	Dec:	-			
						'91	66		-			
						'97	20		-			
<i>Mahonia repens</i>												
S	87	51	-	-	-	-	-	-	1700			51
	91	4	-	-	-	-	-	-	133			4
	97	-	-	-	-	-	-	-	0			0
Y	87	79	2	-	-	-	-	-	2700			81
	91	129	1	-	11	-	-	2	4766			143
	97	5	-	-	-	-	-	-	100			5
M	87	131	-	-	-	-	-	-	4366	4	4	131
	91	185	8	4	20	2	-	2	7366	3	3	221
	97	84	-	-	8	-	-	-	1840	4	6	92
D	87	-	-	-	-	-	-	-	0			0
	91	2	-	-	-	-	-	-	66			2
	97	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>% Change</u>				
'87		.94%		00%		00%		+42%				
'91		03%		01%		00%		-84%				
'97		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'87	7066	Dec:	0%			
						'91	12198		1%			
						'97	1940		0%			
<i>Pseudotsuga menziesii</i>												
X	87	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>% Change</u>				
'87		00%		00%		00%		None				
'91		00%		00%		00%		None				
'97		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'87	0	Dec:	-			
						'91	0		-			
						'97	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				
Ribes spp.																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	42	46	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			None							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'97	0		-			
Ribes cereum inebrians																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	1	-	-	-	-	1	-	-	2	-	-	-	66	18	19	2
	'97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	42	60	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			Appeared							
'91		50%			00%			00%			-39%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	66		-			
												'97	40		-			
Rosa woodsii																		
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'97	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	6	-	-	-	-	-	-	-	-	6	-	-	-	120	8	9	6
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'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				
Symphoricarpos oreophilus																		
S	87	-	6	2	-	-	-	-	-	-	8	-	-	-	266		8	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2	
Y	87	-	4	35	-	-	-	-	-	-	29	-	-	10	1300		39	
	91	6	12	1	-	-	-	-	-	-	17	-	2	-	633		19	
	97	4	-	-	2	-	-	-	-	-	6	-	-	-	120		6	
M	87	-	-	46	-	-	-	-	-	-	42	-	-	4	1533	18 20	46	
	91	5	21	14	6	8	-	-	-	-	54	-	-	-	1800	14 24	54	
	97	36	6	2	3	2	1	-	-	-	49	1	-	-	1000	17 36	50	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	4	1	2	-	-	-	-	-	7	-	1	-	266		8	
	97	5	1	-	1	-	-	-	-	-	5	-	-	2	140		7	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		05%			95%			16%			- 5%							
'91		56%			20%			04%			-53%							
'97		14%			05%			03%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	2833	Dec:	0%				
											'91	2699		10%				
											'97	1260		11%				

Trend Study 24-7-97

Study site name: Cow Creek .

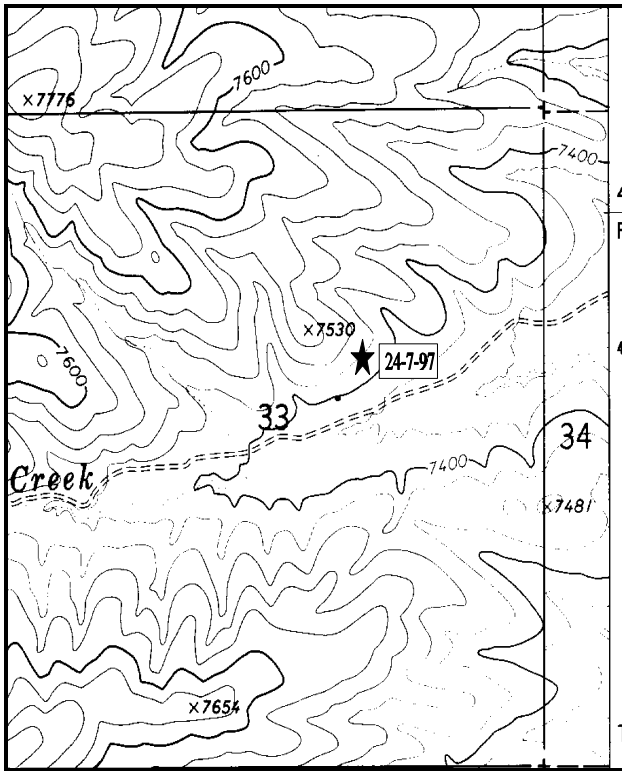
Range type: Chained, Railed-Shrubland .

Compass bearing: frequency baseline 43 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

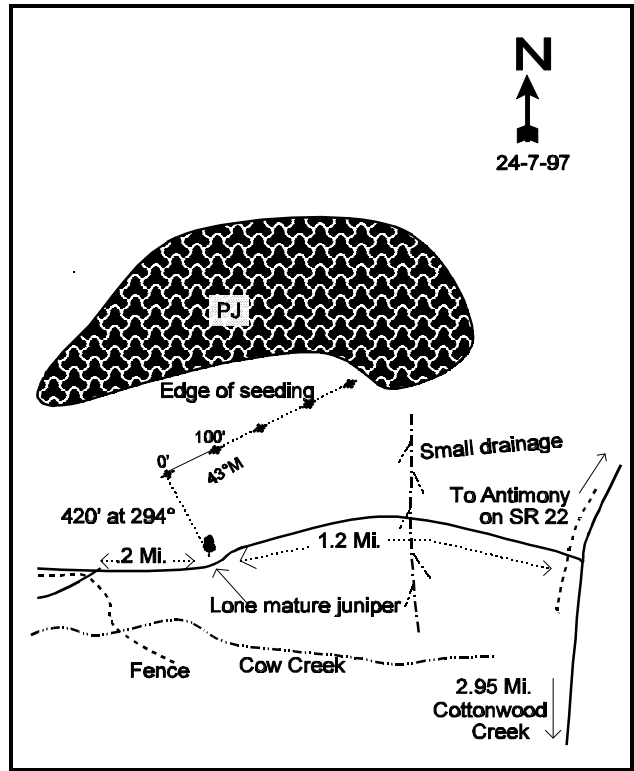
LOCATION DESCRIPTION

From the Cottonwood Creek turnoff on SR22 south of Antimony, proceed north on the highway 2.95 miles to a gate by Cow Creek. Turn west and drive through the seeded pasture up Cow Creek for 1.2 miles to a lone mature juniper right by the road. If you go too far (0.2 more miles) you will come to a fork by a fence. Stop by the lone Juniper and walk up the hill about 140 yards bearing 294 degrees to the start of the baseline a short fencepost with browse tag #9002. The transect runs east-northeast along the top edge of the seeding.



Map Name: Cow Creek

Township 32S , Range 2W , Section 33



Diagrammatic Sketch

UTM 4203923.054 N, 411418.356 E

DISCUSSION

Trend Study 24-7 (50-7)

The Cow Creek study site is located on School Trust land in the mouth of Cow Creek at an elevation of 7,500 feet. This is a sagebrush-grass site that was disked and drill seeded prior to study establishment in 1987. It is a key area for elk in the spring and also for deer during the winter and spring. Antelope probably use this area year-round. Pellet group data from 1997 estimate seven deer, 63 elk and 27 cow use days/acre. Sheep sign was also noted in 1997. Wyoming big sagebrush occurs on the foothill slopes and basin big sagebrush is found on the deeper soils of the drainage bottoms. The treatment was more effective on the Wyoming big sagebrush than the Basin big sagebrush. The Basin big sagebrush that was not killed has regrown with vigorous vegetative growth and seed stalk production. The site is located on a 20-25% slope that has a southeast exposure.

The soil at the study site is moderately deep and rocky with an estimated effective rooting depth (see methods) of almost 18 inches. Texture is a sandy loam with a slightly alkaline pH (7.4). Erosion pavement is present on the surface, as are rocks of various sizes. Litter from the disked sagebrush and the drill rows of seeded grasses serve to slow down water movement. However, the higher incidence of pedestalled bunch grasses and small rills indicates that a significant amount of soil movement has taken place in the area. The soil is very loose and easily transported during high intensity summer storms. Although the seeding greatly increased the grass cover, patches of bare ground are prevalent between the drill rows.

The key shrub species on this site is Wyoming big sagebrush. Basin big sagebrush was supposedly encountered in 1987, but the crew in 1991 classified all the sagebrush as Wyoming big sagebrush. There is some hybridizing of the two species making identification difficult. Density was estimated at 3,466 plants/acre in 1987 and 3,199 by 1991. Density had declined by 29% in 1997, due to a die-off of decadent plants which accounted for 60% of the population in 1991. Of the sagebrush sampled in 1987, 94% percent were mature or decadent, and therefore, were established prior to the treatment. Currently, 92% of the population is mature or decadent. Utilization of the sagebrush has been moderate to heavy in 1987 and 1991, but light to moderate in 1997. There was a relatively large die-off of decadent plants in 1991. The die-off will continue, but not at as high a rate. The pattern of the die off is shown in the percentage of decadent plants that were classified as dying. Since 1987, this percentage has increased steadily from 12% in 1987, to 48% in 1991, and finally 56% in 1997. Vigor has improved and percent decadence has declined, however there is very little biotic potential or young plants in the population to replace the losses to the population. Therefore, the trend would continue to be slightly down.

Broom snakeweed is the second most abundant shrub, but it has declined steadily in density from 4,133 plants/acre in 1987 to only 220 in 1997. It currently provides less than 1% of the browse cover. Pinyon and juniper trees are found scattered throughout the site at densities estimated at 14 trees/acre for juniper and 42 trees/acre for pinyon in 1997. Overhead canopy cover of pinyon is currently estimated at 5%.

The herbaceous understory on the site is dominated by grasses, the most abundant of which is crested wheatgrass (seeded) and a warm season native, blue grama. Intermediate wheatgrass (also seeded) is less abundant and has declined in quadrat frequency from 34% in 1987 to only 4% in 1997. This site is probably marginal for intermediate wheatgrass since it is east of Mt. Dutton and within a rain shadow. Forbs are very limited with six species producing only 1% cover. Rangeland alfalfa was seeded on the site but it has not done well. It had a quadrat frequency of only 3% in 1987 and was not encountered in 1991 or 1997. The only common forbs include Newberry milkvetch and a cryptantha.

1991 TREND ASSESSMENT

Both vegetative basal and litter cover have been reduced dramatically since 1987. Bare ground, pavement, and rock cover have all increased. These respective increases and decreases indicate a downward trend for soil. Population density for the key browse species, Wyoming big sagebrush, has gone from 3,466 to 3,199 plants per acre, an 8% drop. Broom snakeweed has decreased by 36%. Even with the great decrease in broom snakeweed, the trend would still be slightly downward with the increase in the rate of decadency for Wyoming big sagebrush reaching 60%. Plants displaying poor vigor has also increased from 6% to 33%. Trend for the herbaceous understory is down slightly due to a significant decline in the sum of nested frequency of the seeded crested and intermediate wheatgrass. Nested frequency of blue grama increased significantly but this is a less desirable and less productive grass.

TREND ASSESSMENT

- soil - slightly downward
- browse - slightly downward
- herbaceous understory - slightly downward

1997 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1991. Trend for the key browse species, Wyoming big sagebrush, is slightly down. Density has declined by 29% due to a die-off of decadent plants. However, density of mature plants increased slightly. Use is more light to moderate, vigor improved and percent decadence has declined from 60% to 34%. However, the percentage of decadent plants classified as dying has steadily increased since 1987, indicating further losses in the population. Recruitment is improved with increased numbers of seedling and young plants, but they are still inadequate to replace those that have died. A positive trend indicator is the 92% decline in the density of broom snakeweed which now numbers only 220 plants/acre. Trend for the herbaceous understory is stable but forbs are still very limited.

TREND ASSESSMENT

- soil - stable
- browse - slightly down
- herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 24 , Study no: 7

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'87	'91	'97	'87	'91	'97	
G	Agropyron cristatum	_b 207	_a 169	_{ab} 193	70	65	67	6.09
G	Agropyron intermedium	_b 65	_a 5	_a 9	34	2	4	.04
G	Bouteloua gracilis	_a 90	_a 113	_b 151	35	40	55	4.38
G	Bromus inermis	5	-	-	3	-	-	-
G	Dactylis glomerata	2	9	-	1	3	-	-
G	Oryzopsis hymenoides	2	9	6	2	5	3	.07
G	Poa secunda	-	-	2	-	-	1	.00
G	Sitanion hystrix	_b 119	_b 137	_a 51	55	59	24	.68

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'87	'91	'97	'87	'91	'97	
G	<i>Stipa comata</i>	12	11	20	5	6	8	.19
Total for Grasses		502	453	432	205	180	162	11.48
F	<i>Astragalus newberryi</i>	22	22	27	9	12	13	.06
F	<i>Chenopodium</i> spp. (a)	-	-	3	-	-	1	.00
F	<i>Cryptantha</i> spp.	_a 17	_{ab} 31	_b 39	8	16	20	.59
F	<i>Gayophytum ramosissimum</i> (a)	-	-	21	-	-	8	.26
F	<i>Medicago sativa</i>	4	-	-	3	-	-	-
F	<i>Sphaeralcea coccinea</i>	-	-	6	-	-	3	.01
F	<i>Streptanthus cordatus</i>	-	-	2	-	-	2	.03
Total for Forbs		43	53	98	20	28	47	0.97

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 24 , Study no: 7

Type	Species	Strip Frequency '97	Average Cover % '97
B	<i>Artemisia tridentata wyomingensis</i>	64	6.56
B	<i>Gutierrezia sarothrae</i>	8	.04
B	<i>Juniperus osteosperma</i>	1	-
B	<i>Opuntia</i> spp.	2	.03
B	<i>Pinus edulis</i>	3	6.07
Total for Browse		78	12.72

CANOPY COVER --

Herd unit 24 , Study no: 7

Species	Percent Cover '97
<i>Pinus edulis</i>	5

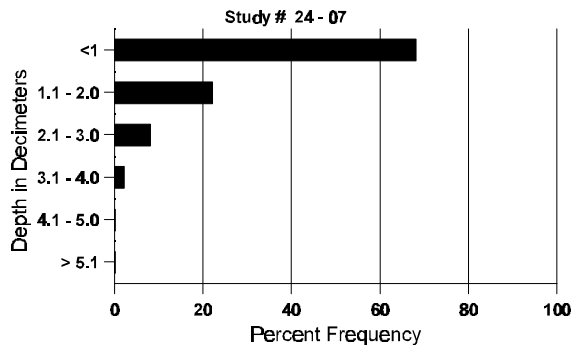
BASIC COVER --
Herd unit 24 , Study no: 7

Cover Type	Nested Frequency '97	Average Cover %		
		'87	'91	'97
Vegetation	306	10.00	7.25	26.76
Rock	218	4.25	6.25	3.86
Pavement	353	20.25	35.25	27.72
Litter	385	57.00	39.75	33.72
Cryptogams	-	0	0	0
Bare Ground	271	8.50	11.50	9.88

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 07

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
17.8	56.2 (16.6)	7.4	65.0	20.1	14.9	2.7	19.1	54.4	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 24 , Study no: 7

Type	Quadrat Frequency '97
Rabbit	13
Elk	31
Deer	17
Cattle	4

BROWSE CHARACTERISTICS --

Herd unit 24 , Study no: 7

AGE	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	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	87	2	1	-	-	-	-	-	-	-	3	-	-	-	200		3	
	91	1	-	-	-	-	-	-	-	1	-	-	-	66		1		
	97	9	-	-	-	-	-	-	-	9	-	-	-	180		9		
M	87	19	4	9	-	-	-	-	-	29	3	-	-	2133	16	17	32	
	91	7	8	2	-	1	-	-	-	17	-	1	-	1200	13	16	18	
	97	49	16	1	-	-	-	-	-	64	2	-	-	1320	21	27	66	
D	87	8	3	6	-	-	-	-	-	12	2	1	2	1133		17		
	91	9	11	8	1	-	-	-	-	14	-	1	14	1933		29		
	97	21	14	2	-	2	-	-	-	17	-	-	22	780		39		
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	91	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	97	-	-	-	-	-	-	-	-	-	-	-	-	1100		55		
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		15%			29%			06%			- 8%							
'91		42%			21%			33%			-29%							
'97		28%			03%			19%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	3466	Dec:	33%				
											'91	3199		60%				
											'97	2280		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			
<i>Gutierrezia sarothrae</i>																	
S	87	17	-	-	-	-	-	-	-	-	17	-	-	-	1133		17
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	14	-	-	-	-	-	-	-	-	14	-	-	-	933		14
	91	4	1	-	-	-	-	-	-	-	5	-	-	-	333		5
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	87	48	-	-	-	-	-	-	-	-	48	-	-	-	3200	8 6	48
	91	23	1	-	-	-	-	1	-	-	22	3	-	-	1666	5 6	25
	97	8	-	-	1	-	-	-	-	-	9	-	-	-	200	8 8	10
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	91	9	1	-	-	-	-	-	-	-	7	-	-	3	666		10
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>						
'87		00%			00%			00%			-36%						
'91		08%			00%			08%			-92%						
'97		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	4133	Dec:	0%			
											'91	2665		25%			
											'97	220		0%			
<i>Juniperus osteosperma</i>																	
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	91	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>						
'87		00%			00%			00%			+ 0%						
'91		00%			00%			00%			-70%						
'97		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	66	Dec:	-			
											'91	66		-			
											'97	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				
Opuntia spp.																		
Y	87	7	-	-	-	-	-	-	-	-	7	-	-	-	466		7	
	91	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	4	7	
	91	4	-	-	-	-	-	-	-	-	4	-	-	-	266	3	5	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	5	10	
D	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			-40%							
'91		17%			00%			00%			-90%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	665	Dec:	20%				
											'91	399		0%				
											'97	40		0%				
Pinus edulis																		
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	1	-	-	-	-	-	1	-	-	2	-	-	-	40	-	2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+ 0%							
'91		00%			00%			00%			- 9%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	66	Dec:	-				
											'91	66		-				
											'97	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				
Sclerocactus																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	3	11	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>				<u>% Change</u>						
	'87	00%			00%			00%				None						
	'91	00%			00%			00%				None						
	'97	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'97	0		-			

Trend Study 24-8-97

Study site name: Prospect Seeding .

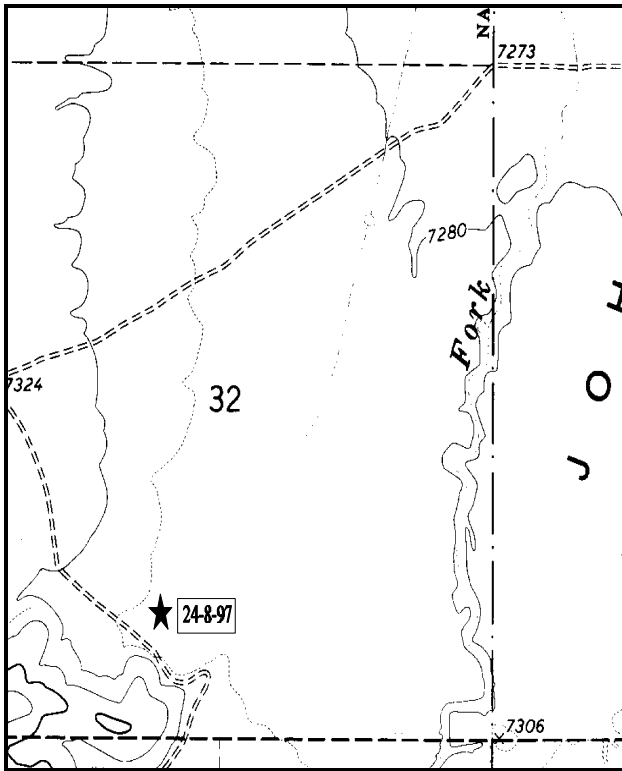
Range type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 0 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11& 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

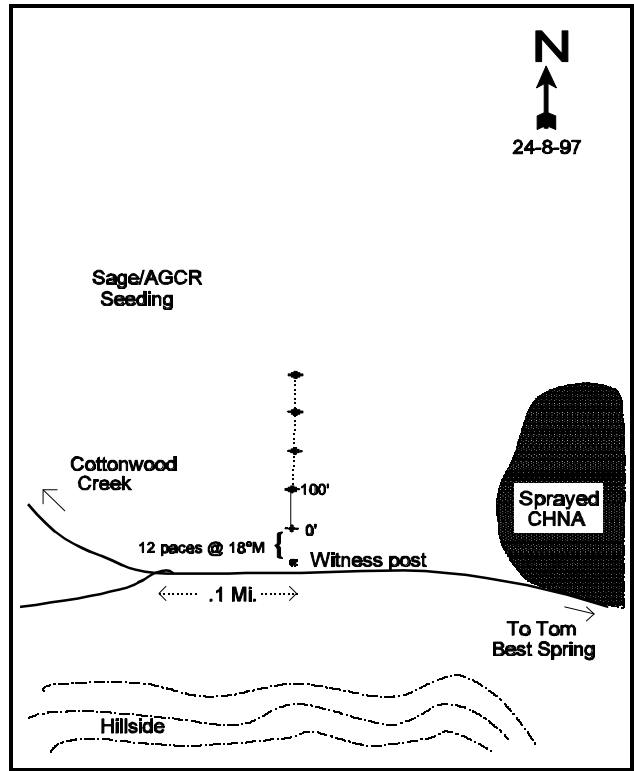
LOCATION DESCRIPTION

From SR22, turn towards Cottonwood Creek (west onto the Mt. Dutton loop road) and travel about 2 miles to a major fork. Turn south towards Tom Best spring (Cottonwood AS is to the right, north) and go 0.3 miles to the U.S. Forest Service boundary fence. Cross the cattleguard and continue on the main road for 4.35 miles. The study area here is marked by a 4 foot green fencepost, and is north of the road in a sage-grass flat. The transect is marked by 1-foot tall fence posts.



Map Name: Cow Creek

Township 33S , Range 2W , Section 32



Diagrammatic Sketch

UTM 4193647.916 N, 409124.480 E

DISCUSSION

Trend Study 24-8 (50-8)

The Prospect Seeding study is located approximately one-fourth mile north of Prospect Creek, and three-fourths of a mile west of the East Fork of the Sevier River, which cuts through the middle of John's Valley. The site is located on level ground at an elevation of 7,300 feet. The area is administered by the BLM. This site is located in the Lower Prospect Pasture of the Widtsoe C & H allotment. The area was disked and seeded in 1968. Wyoming big sagebrush has become reestablished and fairway crested wheatgrass provides nearly all the herbaceous forage. This is becoming a key area for elk during the winter and spring months. Antelope use the area during the summer and fall. This is not a critical winter range for mule deer. Pellet group data from 1997 estimate 48 elk, 13 deer, and 64 cattle days use/acre. Some sheep pellet groups were also encountered. Antelope and deer pellet groups are lumped due to the difficulty in differentiating between the two species.

The soils are moderately deep with an estimated effective rooting depth (see methods) of 23 inches. Soil texture is a sandy loam with a neutral pH (7.2). There is little rock but some pavement scattered on the surface. Harvester ant mounds are numerous in the area. Bare ground is abundant and although the site is fairly level, sheet erosion has occurred resulting in pedestaling of sagebrush and grasses to a height of about 2-3 inches in much of the area.

This is a Wyoming big sagebrush site with very little diversity in the understory. Sagebrush is a key species for antelope that use the area during the spring, summer and fall. The stand in 1987 was represented by mostly vigorous, young and mature plants, 26% and 66% respectively, out of a population of 9,066 plants/acre. Overall, the shrubs were only moderately hedged. During the 1991 reading, population density declined 26% to 6,665 plants/acre. Young plants declined to only 8% of the population and percent decadency increased to a staggering 79%. Utilization increased from 9% heavy use in 1987 to 58% in 1991. An additional 34% of the sagebrush was moderately hedged. By 1997, the sagebrush population continued to decline to 2,280 plants/acre, a 66% drop in numbers. Utilization is more moderate and percent decadence has declined to a more manageable 35%. There is some reproduction evident but not enough to replace the 460 decadent-dying plants per acre estimated. The pattern of a downward trend continues. The percentage of decadent plants that have been classified as dying has continually increased since 1987; 9% in 1987, 18% in 1991, and 58% in 1997. The ratio of dead to live currently is 1:1.5, or 40% of the sagebrush are dead. It appears that another 20% of the population will be lost. Therefore, trend for sagebrush is slightly down.

Crested wheatgrass was the only grass species encountered in 1997. Bottlebrush squirreltail and Russian wildrye were observed on the study site in small numbers in 1991. Crested wheatgrass provides a consistent ground cover but is not continuous. Forbs are very rare.

1991 TREND ASSESSMENT

The soil trend for this site is reasonably stable, but it still has over 60% bare ground and should be considered in very poor condition. The key browse, Wyoming big sagebrush, has decreased in numbers by 26%. This decrease could be beneficial later when the extended drought ends. With the lower densities, vigor could be increased, for the density was too high for the site potential. The effect of the drought is still being felt with the rate of decadency increasing from 8 to 79%. Heavy hedging (extended drought is exacerbating this use) of the sagebrush has drastically increased from 9% to 58%. Trend for browse would be considered down. As for the herbaceous understory, there is only one forb (a weedy increaser) and one major grass being crested wheatgrass. With the drought, it's numbers are decreasing. The trend would be considered slightly downward.

TREND ASSESSMENT

soil - stable, but poor condition with over 60% bare soil

browse - down

herbaceous understory - slightly downward, poor species diversity

1997 TREND ASSESSMENT

Trend for soil is stable (because of the level terrain), but with the abundance of unprotected bare soil, it is in poor condition. Trend for browse slightly down. Population density has declined further by 66%. This reduction comes almost entirely from a die-off of decadent plants resulting in a smaller but healthier population. Percent decadence has declined from 79% in 1991 to 35% currently. However, again the percentage of decadent plants classified as dying has steadily increased since 1987, where it has now at 58%. Currently, 40% of the population is dead, and with poor recruitment utilization is more moderate, the population will continue to decline in the future for there are not enough seedlings and young to replace the dead plants. Trend for the herbaceous understory is up slightly due to an increase in the sum of nested frequency of crested wheatgrass. Forbs are still severely lacking.

TREND ASSESSMENT

soil - stable, but poor condition

browse - slightly downward

herbaceous understory - up slightly, but poor diversity

HERBACEOUS TRENDS --

Herd unit 24 , Study no: 8

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'87	'91	'97	'87	'91	'97	
G	Agropyron cristatum	_{ab} 215	_a 191	_b 258	85	78	90	12.21
G	Elymus junceus	-	3	-	-	3	-	-
G	Sitanion hystrix	3	7	-	2	2	-	-
Total for Grasses		218	201	258	87	83	90	12.21
F	Chenopodium album (a)	_a 8	_a 16	_b 36	4	9	17	.33
F	Cryptantha spp.	-	-	1	-	-	1	.00
Total for Forbs		8	16	37	4	9	18	0.34

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 24 , Study no: 8

T y p e	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata wyomingensis	63	2.80
B	Chrysothamnus nauseosus	1	-
Total for Browse		64	2.80

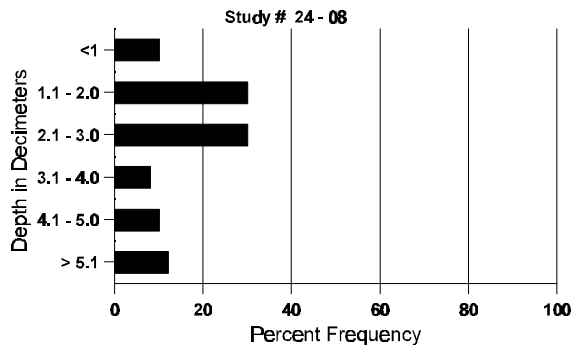
BASIC COVER --
Herd unit 24 , Study no: 8

Cover Type	Nested Frequency '97	Average Cover %		
		'87	'91	'97
Vegetation	284	4.50	5.25	15.66
Rock	44	0	0	.11
Pavement	348	3.50	8.25	11.48
Litter	376	25.00	26.00	13.57
Cryptogams	15	0	0	.46
Bare Ground	371	67.00	60.50	46.99

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 08

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
23.1	55.4 (17.6)	7.2	54.4	30.1	15.6	1.8	12.7	921.6	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 24 , Study no: 8

Type	Quadrat Frequency '97
Sheep	1
Rabbit	37
Elk	21
Deer	12
Cattle	8

BROWSE CHARACTERISTICS --

Herd unit 24 , 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>Artemisia tridentata wyomingensis</i>																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	87	13	20	2	-	-	-	-	-	-	35	-	-	-	2333		35	
	91	-	4	3	-	1	-	-	-	-	8	-	-	-	533		8	
	97	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	87	17	63	10	-	-	-	-	-	-	87	2	1	-	6000	14	12	90
	91	-	3	9	1	-	-	-	-	-	13	-	-	-	866	8	9	13
	97	27	35	3	-	-	-	-	-	-	65	-	-	-	1300	13	17	65
D	87	4	7	-	-	-	-	-	-	-	10	-	-	1	733		11	
	91	5	20	43	1	6	3	1	-	-	63	-	2	14	5266		79	
	97	28	9	1	-	2	-	-	-	-	15	-	2	23	800		40	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	1480		74	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		66%			09%			01%			-26%							
'91		34%			58%			16%			-66%							
'97		40%			04%			22%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	9066	Dec:	8%				
											'91	6665		79%				
											'97	2280		35%				
<i>Chrysothamnus nauseosus</i>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	1	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			Appeared							
'97		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'91	0		-				
											'97	20		-				

Trend Study 24-9-97

Study site name: Mud Spring .

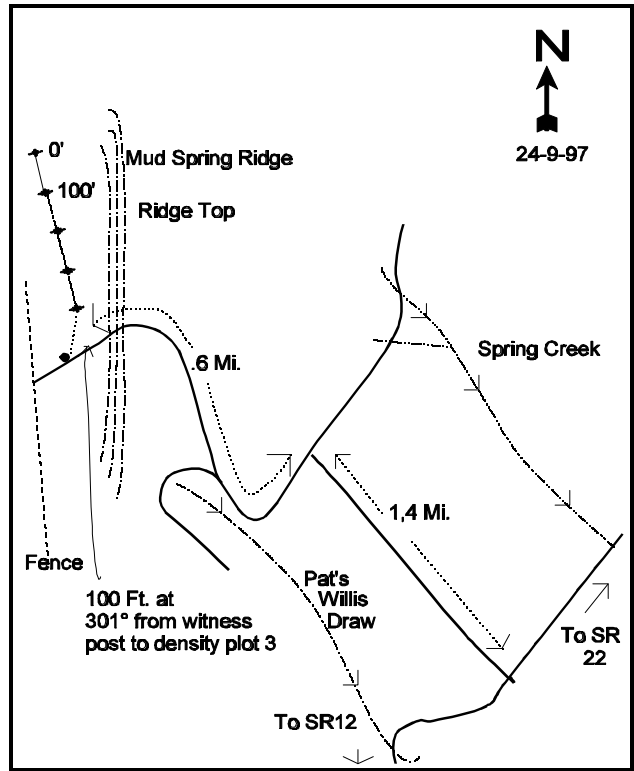
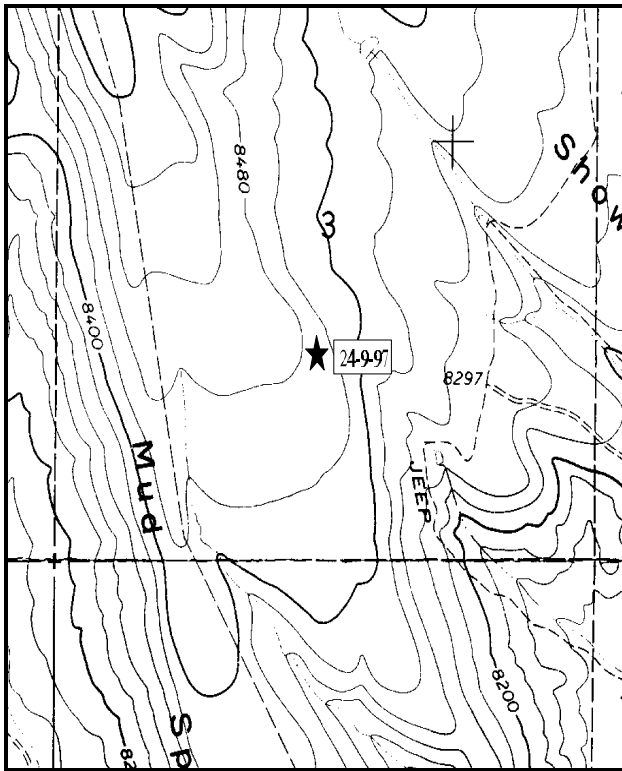
Range type: Black Sagebrush .

Compass bearing: frequency baseline 167 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95 ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From SR 22, about 1 1/2 miles south of Widstoe Junction, turn west onto the road leading to Tom Best Spring and Highway 12. Proceed 4.2 miles to the U.S. Forest Service boundary. Continue on the main road for 5.3 miles to an intersection at Showalter Creek. Continue on the main road 1 mile to a faint road on the right. Turn and go up towards Mud Spring Ridge 1.4 miles to a T-intersection. Turn left and go 0.6 miles up a faint, rough road to the top of the ridge and a witness post identifying the study area. The 400-foot stake is 100 feet northwest of the witness post. The start of the transect is actually 400 feet north, and runs back south towards the road. Study markers are 1-foot tall fence posts.



Map Name: Flake Mountain West

Diagrammatic Sketch

Township 35S ,Range 4W , Section 3

UTM 4182639.615 N, 393177.484 E

DISCUSSION

Trend Study 24-9 (50-9)

The Mud Spring Ridge study site is located on a gently sloping (3-5%), sagebrush covered bench with an aspect to the east-southeast, at an elevation of 8,480 feet. Spring Creek is east of the site and Pat Willis Draw lies to the southeast. The southern aspect, coupled with sufficient wind, limits snow depth on this area during much of the winter. Black sagebrush is the dominant shrub on this site, and a variety of grasses and forbs occupy the understory. This is a key wintering area for elk. Several deer were seen near the site in 1997 and there was evidence that moderately high numbers of deer and elk have been using the site. Quadrat frequency of deer pellet groups was 22% while elk numbered 34%. Cattle also use the area and were seen in the vicinity by a stock pond in 1997.

Soil depth is moderately shallow, as evidenced by the predominance of the shallow rooted black sagebrush. Effective rooting depth (see methods) is estimated almost 12 inches. Soil texture at the site is a sandy clay loam with a slightly acidic pH (6.1). Soil temperature was 53°F at 14 inches. Rocks are common on the surface and throughout the profile. They are generally less than three inches in diameter. Erosion pavement is present on the soil surface, indicating some sheet erosion has taken place over time. Many plants are pedestaled, but overall, the erosion potential on this site is currently low to moderate, given the rocky soil and gentle slope. Ground cover appears adequate to limit surface runoff and to promote infiltration.

The key shrub species at the site is black sagebrush. This shrub accounts for 63% of the browse cover in 1997. There is also some isolated patches of mountain big sagebrush on the site where the soils are invariably deeper. Black sagebrush has had a moderately high density since 1987 when 12,065 plants/acre were estimated. Seedlings were abundant and young plants accounted for 30% of the population. By 1991, density increased to 22,733 plants/acre with an increase in density for all age classes. Use was light to moderate in 1987 and 1991 with good vigor and low decadence. Density declined 56% in 1997 partly due to the larger sample used that year. The current population numbers 9,920 plants/acre, 69% of which are classified as mature. Recruitment is down from the high numbers previously found, therefore there are not sufficient numbers to maintain the current population. Utilization is mostly light and percent decadence low at 17%. As has been previously noted on other sites, this site is no different, the percentage of decadent plants classified as dying has shown a continual increase since 1987; 12% in 1987, 14% in 1991, and a high of 63% in 1997. This would indicate further reductions in the black sagebrush population.

The site also supports a fairly high density of stickyleaf low rabbitbrush and dwarf rabbitbrush. These two species of rabbitbrush appear to have been lumped together as stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus viscidiflorus*) in 1987 and 1991. Density of rabbitbrush increased from 9,333 plants/acre in 1987 to 14,666 in 1991. Dwarf and stickyleaf low rabbitbrush currently number a combined 4,920 plants/acre. Seedlings and young plants are much less common now and the population appears stable. Prickly phlox is another less desirable shrub which has declined substantially since 1991.

The herbaceous understory is diverse and fairly abundant for a black sagebrush site. Seven perennial grasses and one sedge combine to produce over 13% cover in 1997. Twenty-seven forbs were also identified in 1997, but only a few are very common. The most abundant grass species are mutton bluegrass, a sedge, and Letterman needlegrass. The abundance of forbs on this site may be a response to heavy livestock grazing pressure in the past.

1991 TREND ASSESSMENT

Most basic cover parameters are almost unchanged since 1987, but two of the more important have changed. Litter cover has been reduced from 54% to 46% while bare ground has increased from 19% to 29%. This would indicate a downward trend, making the soil more susceptible to soil loss with late summer high intensity storms. Trend for the browse component of the community would be up, because the key species, black sagebrush, has almost doubled its population with only a slight increase in percent decadency. Because of the high diversity for both forbs and grasses on the site and that on average, about half increased and the other half decreased in quadrat frequency, the trend appears stable at this time. An end to the extended drought will help many of the species to recover in a fairly short time.

TREND ASSESSMENT

soil - slightly downward

browse - upward

herbaceous understory - stable

1997 TREND ASSESSMENT

Trend for soil appears stable. Percent bare ground declined slightly but litter cover also continued to decline. Trend for the key browse species, black sagebrush, is down slightly. Density has declined 56% since 1991, and there has been an obvious substantial reduction in density from all age classes. The lack of large numbers of dead plants suggests that some of the change in density, of mature and decadent plants, is due to the much larger sample size used in 1997. The current population of 9,920 plants/acre is at a more sustainable level. However, as pointed out in the discussion, the percentage of decadent plants classified as dying has continued to increase since 1987, with it being at a high of 63% at this time. There has also been a decline in the densities of rabbitbrush and prickly phlox, two less desirable increaser shrubs. Trend for the herbaceous understory appears to be stable. Sum of nested frequency for grasses has remained similar since 1991.

TREND ASSESSMENT

soil - stable

browse - down slightly for black sagebrush

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 24 , Study no: 9

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'87	'91	'97	'87	'91	'97	
G	Agropyron smithii	3	7	13	1	4	6	.34
G	Bouteloua gracilis	29	23	20	16	13	10	.15
G	Carex spp.	a62	b102	ab79	28	43	33	2.15
G	Poa fendleriana	a-	a-	b158	-	-	57	3.26
G	Poa secunda	b211	b218	a44	77	82	17	1.27
G	Sitanion hystrix	b102	a65	a33	45	31	17	.21
G	Stipa comata	51	34	43	21	15	19	.86
G	Stipa lettermani	a146	b179	b219	73	75	87	5.17
Total for Grasses		604	628	609	261	263	246	13.44
F	Antennaria rosea	a14	a16	b42	6	8	16	1.27
F	Arabis spp.	b20	a3	a1	12	1	1	.00
F	Astragalus humistratus	c151	b14	a-	61	7	-	-
F	Astragalus newberryi	-	4	-	-	2	-	-
F	Aster spp.	-	-	3	-	-	1	.00
F	Astragalus spp.	a-	b29	c96	-	14	45	.73
F	Balsamorhiza ssp.	-	3	-	-	1	-	-
F	Castilleja linariaefolia	b42	a1	a3	21	1	3	.02
F	Chaenactis douglasii	4	-	4	2	-	1	.00
F	Cirsium spp.	b46	ab35	a23	23	15	10	.37
F	Crepis acuminata	-	7	-	-	3	-	-
F	Cryptantha spp.	-	3	1	-	1	1	.03
F	Erigeron eatonii	c246	b215	a31	90	81	15	.20
F	Erigeron pumilus	a-	a-	b16	-	-	7	.06
F	Eriogonum racemosum	223	214	185	86	84	76	1.45
F	Eriogonum umbellatum	75	80	57	36	38	28	.56
F	Galium boreale	-	-	5	-	-	2	.01
F	Hymenoxys acaulis	a-	a-	b6	-	-	4	.04
F	Hymenopappus filifolius	-	4	-	-	2	-	-
F	Linum lewisii	-	-	1	-	-	1	.03
F	Lotus utahensis	b24	ab14	a1	14	8	1	.00
F	Lupinus pusillus (a)	3	-	-	1	-	-	-
F	Lupinus sericeus	b65	a38	ab51	36	20	26	1.33
F	Lygodesmia spinosa	10	14	16	6	5	7	.10
F	Microsteris gracilis (a)	-	-	2	-	-	1	.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'87	'91	'97	'87	'91	'97	
F	Orthocarpus spp. (a)	-	-	2	-	-	2	.01
F	Penstemon comarrhenus	_b 16	_a 4	_a 5	9	2	2	.01
F	Phlox longifolia	_a -	_a -	_b 19	-	-	8	.04
F	Potentilla diversifolia	7	2	10	4	2	5	.22
F	Polygonum douglasii (a)	-	-	23	-	-	10	.05
F	Senecio multilobatus	_b 71	_a 4	_a 21	35	3	12	.18
F	Sphaeralcea coccinea	_a -	_a -	_b 11	-	-	4	.04
F	Taraxacum officinale	-	2	3	-	2	1	.00
Total for Forbs		1017	706	638	442	300	290	6.82

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 24 , Study no: 9

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia nova	78	12.12
B	Artemisia tridentata vaseyana	13	1.64
B	Chrysothamnus depressus	45	3.40
B	Chrysothamnus nauseosus albicaulis	6	.01
B	Chrysothamnus parryi	2	.03
B	Chrysothamnus viscidiflorus viscidiflorus	28	1.90
B	Gutierrezia sarothrae	1	-
B	Leptodactylon pungens	12	.02
B	Symphoricarpos oreophilus	1	-
B	Tetradymia canescens	1	-
Total for Browse		187	19.15

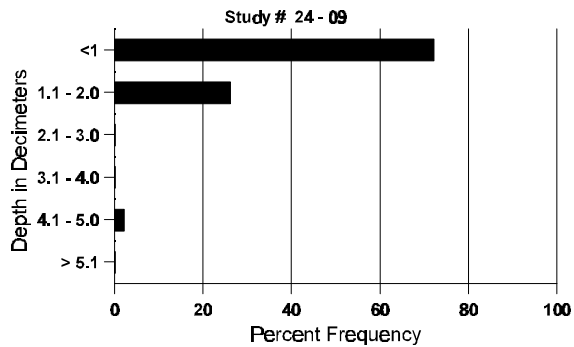
BASIC COVER --
Herd unit 24 , Study no: 9

Cover Type	Nested Frequency '97	Average Cover %		
		'87	'91	'97
Vegetation	269	10.75	10.50	29.07
Rock	222	8.00	9.25	8.10
Pavement	277	8.25	4.75	6.79
Litter	382	53.75	46.25	30.77
Cryptogams	32	0	.25	.13
Bare Ground	316	19.25	29.00	22.82

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 09

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.6	53.4 (14.1)	6.1	48.7	25.4	25.8	2.7	11.9	275.2	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 24 , Study no: 9

Type	Quadrat Frequency '97
Rabbit	8
Elk	34
Deer	22
Cattle	8

BROWSE CHARACTERISTICS --

Herd unit 24 , Study no: 9

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																		
S	87	36	-	-	-	-	-	-	-	-	36	-	-	-	2400		36	
	91	233	-	-	26	-	-	2	-	-	260	1	-	-	17400		261	
	97	24	-	-	-	-	-	-	-	-	24	-	-	-	480		24	
Y	87	50	5	-	-	-	-	-	-	-	51	-	4	-	3666		55	
	91	104	12	-	-	-	-	1	-	-	117	-	-	-	7800		117	
	97	63	-	-	9	-	-	-	-	-	72	-	-	-	1440		72	
M	87	84	24	1	-	-	-	-	-	-	97	2	9	1	7266	11 13	109	
	91	132	20	2	2	2	-	-	-	-	157	1	-	-	10533	13 14	158	
	97	328	14	-	-	-	-	-	-	-	337	-	5	-	6840	12 19	342	
D	87	14	3	-	-	-	-	-	-	-	11	-	4	2	1133		17	
	91	33	18	-	12	3	-	-	-	-	56	-	1	9	4400		66	
	97	78	4	-	-	-	-	-	-	-	30	-	-	52	1640		82	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	2	-	-	-	-	-	-	-	-	-	-	-	-	680		34	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		18%			.55%			11%			+47%							
'91		16%			.58%			03%			-56%							
'97		04%			00%			11%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	12065	Dec:	9%			
												'91	22733		19%			
												'97	9920		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		1	2			
<i>Artemisia tridentata vaseyana</i>											
S	87	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	0		0
	97	4	-	-	-	-	-	-	80		4
M	87	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	1	-	-	-	66	10	11
	97	10	1	-	-	-	-	-	220	24	34
D	87	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	0		0
	97	4	2	-	-	-	-	-	120		6
X	87	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	0		0
	97	-	-	-	-	-	-	-	60		3
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'87		00%		00%		00%		Appeared			
'91		00%		00%		00%		+81%			
'97		18%		00%		06%					
Total Plants/Acre (excluding Dead & Seedlings)							'87	0	Dec:	0%	
							'91	66		0%	
							'97	340		35%	
<i>Chrysothamnus depressus</i>											
S	87	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	0		0
	97	1	-	-	-	-	-	-	20		1
Y	87	-	-	-	-	-	-	-	0		0
	91	-	-	-	-	-	-	-	0		0
	97	29	-	-	-	-	-	-	580		29
M	87	-	-	-	-	-	-	-	0	-	0
	91	-	-	-	-	-	-	-	0	-	0
	97	123	-	-	-	-	-	-	2460	5	8
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>			
'87		00%		00%		00%		None			
'91		00%		00%		00%		Appeared			
'97		00%		00%		00%					
Total Plants/Acre (excluding Dead & Seedlings)							'87	0	Dec:	-	
							'91	0		-	
							'97	3040		-	

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	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	3	1	1	-	-	-	-	-	-	5	-	-	-	333		5	
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	91	1	1	2	-	-	-	-	-	-	4	-	-	-	266	5	6	
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80	7	10	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	1	4	-	-	1	-	-	-	6	-	-	-	400		6	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			Appeared							
'91		20%			53%			00%			-82%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%			
												'91	999		40%			
												'97	180		0%			
Chrysothamnus parryi																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60	9	10	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'97	80		-			

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	87	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	91	11	-	-	-	-	-	1	-	-	12	-	-	-	800			12
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	45	-	-	-	-	-	-	-	-	45	-	-	-	3000			45
	91	49	1	2	4	-	-	-	-	-	56	-	-	-	3733			56
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	92	-	-	-	-	-	-	-	-	85	-	5	2	6133	4	6	92
	91	48	14	79	6	1	1	-	-	-	148	-	1	-	9933	5	8	149
	97	75	2	-	16	-	-	-	-	-	93	-	-	-	1860	14	23	93
D	87	2	-	1	-	-	-	-	-	-	2	-	-	1	200			3
	91	2	-	12	1	-	-	-	-	-	11	-	-	4	1000			15
	97	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			.71%			06%			+36%							
'91		07%			43%			02%			-87%							
'97		02%			00%			01%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	9333	Dec:	2%				
											'91	14666		7%				
											'97	1880		1%				
<i>Gutierrezia sarothrae</i>																		
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	5	3	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	6	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			Died out							
'91		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	66	Dec:	-				
											'91	0		-				
											'97	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				
Leptodactylon pungens																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	87	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	91	51	1	-	5	-	-	5	-	-	61	-	1	-	4133			62
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	30	-	-	-	-	-	-	-	-	30	-	-	-	2000	5	3	30
	91	49	-	-	12	-	-	-	-	-	59	-	2	-	4066	4	5	61
	97	18	-	-	4	-	-	-	-	-	22	-	-	-	440	6	7	22
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	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>							
'87		00%			00%			00%			+73%							
'91		.80%			00%			02%			-94%							
'97		00%			00%			04%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	2266	Dec:	0%				
											'91	8265		1%				
											'97	460		4%				
Opuntia spp.																		
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	5	4	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	2	5	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			Died out							
'91		00%			00%			00%			None							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	66	Dec:	-				
											'91	0		-				
											'97	0		-				
Symphoricarpos oreophilus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	1	-	-	-	-	-	-	-	1	-	-	-	20	12	30	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			Appeared							
'97		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'91	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				
Tetradymia canescens																		
Y	'87	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	'91	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	'97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	'87	-	1	-	-	-	-	-	-	-	1	-	-	-	66	8	6	1
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		33%			00%			00%			+ 1%							
'91		00%			00%			00%			-90%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	199	Dec:	-			
												'91	200		-			
												'97	20		-			

Trend Study 24-10-97

Study site name: Barnhurst Ridge .

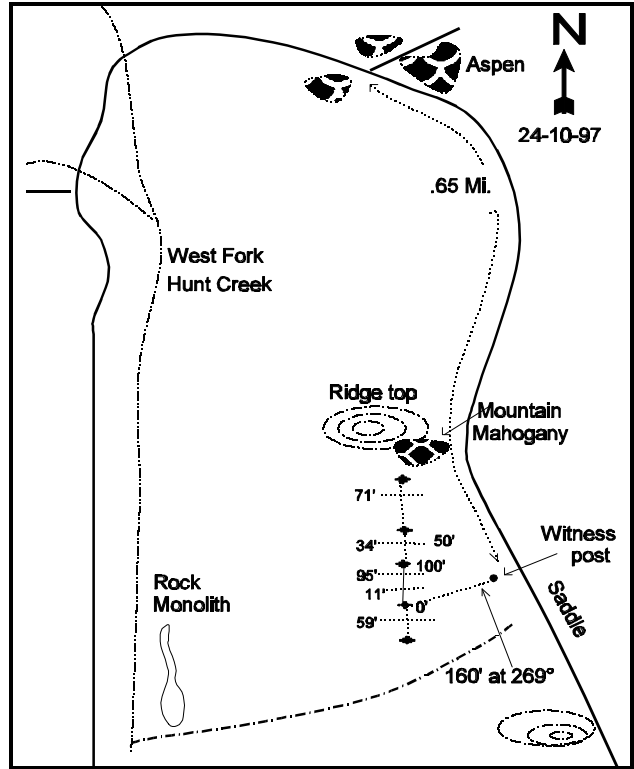
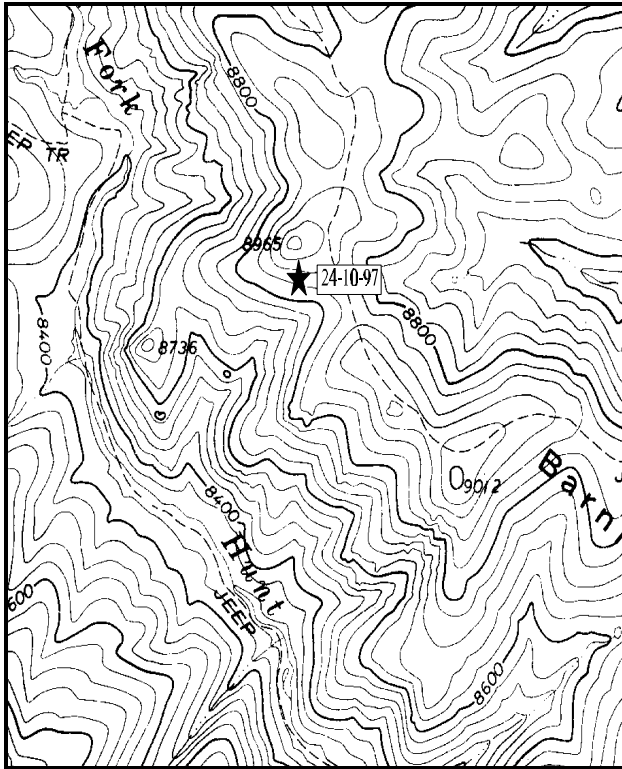
Range type: Mixed Mountain Brush .

Compass bearing: frequency baseline 160 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34 ft), line 3 (71ft), line 4 (59ft).

LOCATION DESCRIPTION

Go west off of SR 22 south of Widstoe Junction on the Tom Best Spring-Flake Mountain graveled road. Proceed 9.5 miles west on this road to the Showalter Creek intersection (6.5 mi. from Tom Best Spring turnoff on Highway 12 to Showalter Creek). Turn right and go 1 mile. Turn right towards West Hunt Creek. Go up 0.6 miles to a cattleguard. Continue 0.9 miles to a fork, keep left. Follow along the creek for 2.35 miles, then cross creek. Go 0.8 miles and cross back to south side of creek. Continue up the main canyon 0.95 miles to a fork and "Primitive Road" sign. Continue straight down into creek (left fork goes to Hancock Creek). Drive through the creek, then out and up 0.5 miles to a fork above the draw on the north side of Hunt Creek. Bear right at this fork and proceed 0.65 miles to a witness post on the right side of the road below a clump of mountain mahogany and before the saddle. The transect samples the slope on the west side of the road, starting with the 0-foot baseline stake 160 feet bearing 269 degrees from the witness post. This short fencepost is tagged #7840.



Map Name: Flake Mountain West

Diagrammatic Sketch

Township 34S , Range 4W , Section unsurveyed

UTM 4190009.053 N, 384056.446 E

DISCUSSION

Herd Unit 24-10 (50-10)

The Barnhurst Ridge study is located on Barnhurst Ridge at an elevation of 8,880 feet. This is a key area for elk use year-round. Quadrat frequency of deer and elk pellet groups are relatively similar at 10% and 12% respectively in 1997. The terrain is steep and the south slopes can be used during the winter where curlleaf mountain mahogany, serviceberry, mountain big sagebrush, and bitterbrush are found. A variety of grasses are also available on the basically snow-free slopes. The north-facing slopes are dramatically different, providing habitat suitable for elk during the summer months. Here aspen and conifers prevail, and adequate forage production is provided by grasses and forbs in the aspen understory. This site is positioned near the top of a southwest facing slope of 28% which appears steeper than it is. The site runs from Barnhurst Ridge to the West Fork of Hunt Creek.

The soil is a medium textured sandy clay loam that is moderately shallow and rocky. Effective rooting depth (see methods) is estimated at 10 inches. However, fractured bedrock must be accommodating the deeper rooted antelope bitterbrush and curlleaf mountain mahogany. The percent ground cover provided by rock and pavement is considerable, currently at 42%. There is evidence of overland flow of runoff, but erosion is minimal due to the high amounts of rock on the surface.

The key browse species are mountain big sagebrush, antelope bitterbrush, and curlleaf mountain mahogany. These species contribute respectively 53%, 27% and 7% of the overall browse cover. All are important sources of forage when herbaceous species are unavailable. Bitterbrush density has steadily declined since 1987 when 3,200 plants/acre were estimated. In 1991, the population declined 13% and percent decadence increased from 0 to 21%. The larger sample used in 1997 estimates 1,080 plants/acre of which 89% are mature. With no dead plants in the population, this decrease is a by-product of the much larger sample size giving more accurate estimates of species with discontinuous distributions. There were no seedlings and only 120 young plants/acre estimated in 1997. Utilization of this preferred shrub has remained moderate to heavy since 1987.

Mountain big sagebrush appears to have a slightly declining population. Density declined 24% between 1987 and 1991, then 28% between 1991 and 1997. Use of the sagebrush was moderate to heavy on 55% of the plants in 1987, but more moderate in 1991 and 1997. Poor vigor and an increase in decadence were noted in 1991, yet they have since declined to similar levels of 1987. The current population appears to continue to decline as indicated by the percentage of decadent plants classified as dying has continued to increase to its highest value since 1987 at 44%. The number of seedlings and percent young age class do not appear to be capable of maintaining the population at its current level.

Curlleaf mountain mahogany is composed of a small and increasingly mature population. Average mature plants measure just under four feet in height. Use has been light to moderate, although the population has a steadily declining number of seedlings and young, it is not critical for a very long-lived species. The decrease in the estimated population is more reflective of a much larger sample giving better estimates, rather than any real losses for there are no dead plants in the population.

The herbaceous understory is lacking on this site. Seven perennial grass species produce just under 7% cover. Forbs are extremely rare. The most abundant grasses include mutton bluegrass and letterman needlegrass. Combined, they produce 74% of the grass cover. Western wheatgrass, blue grama, and squirreltail are also fairly common. It appears that Sandberg and mutton bluegrass were combined and called Sandberg bluegrass in 1987 and 1991. Barnhurst ridge is located in the West Hunt Pasture, which is part of a five pasture deferred rotation grazing system. Barnhurst ridge grazing is deferred until grass seed have matured each year. Past use by sheep probably accounts for the lack of forbs relative to grasses on the site.

1991 TREND ASSESSMENT

Vegetative basal cover has decreased from 12% down to 7%. There has also been some decreases in rock cover, compensated by increases in percent pavement. Most importantly, percent bare ground has more than doubled to 12%. Trend for soil is slightly downward at this time. The three major browse species, mountain big sagebrush, antelope bitterbrush, and curleaf mountain mahogany, all have noted decreases in their respective populations of 24%, 13%, and 22%. Percent decadency has also gone up for sagebrush and bitterbrush. Trend for the key species is slightly downward. Most of the grasses on the site are small and not very productive but sum of nested frequency for grasses has remained similar. The forb diversity is good, but none occur in very high frequencies. Trend for the herbaceous understory is stable.

TREND ASSESSMENT

soil - slightly downward

browse - slightly downward

herbaceous understory - stable

1997 TREND ASSESSMENT

Trend for soil is currently stable. Percent bare ground declined slightly but litter cover also declined and pavement cover increased. Trend for key browse is considered slightly down with densities of the three key species declining since 1991. The change in density of sagebrush and bitterbrush comes primarily from the young and decadent age classes. Mountain big sagebrush, which makes up the majority of the key browse, is experiencing further declines in its population. This is illustrated by inspection of the percentage of decadent plants that are classified as dying, this has steadily increased since 1987. Currently, it is at its highest value of 44%. Eighteen percent of the population is dead, this will likely increase to about 25% in the future. Trend for the herbaceous understory is slightly down. Sum of nested frequency of grasses has declined slightly with a significant decline in western wheatgrass, bottlebrush squirreltail and the combined frequency of Sandberg and mutton bluegrass. Forbs are still depleted.

TREND ASSESSMENT

soil - stable

browse - slightly down

herbaceous understory - slightly down and depleted

HERBACEOUS TRENDS --

Herd unit 24 , Study no: 10

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'87	'91	'97	'87	'91	'97	
G	<i>Agropyron smithii</i>	ab15	a8	b29	6	4	13	.73
G	<i>Bouteloua gracilis</i>	52	53	34	22	19	12	.37
G	<i>Bromus tectorum</i> (a)	-	-	1	-	-	1	.00
G	<i>Festuca ovina</i>	-	4	4	-	2	1	.03
G	<i>Poa fendleriana</i>	a-	a-	b134	-	-	54	3.25
G	<i>Poa secunda</i>	b217	b227	a22	85	88	11	.13
G	<i>Sitanion hystrix</i>	b107	b96	a35	54	44	19	.43
G	<i>Stipa lettermani</i>	a3	a-	b33	1	-	11	1.77
Total for Grasses		394	388	292	168	157	122	6.74
F	<i>Agoseris glauca</i>	-	2	-	-	1	-	.00
F	<i>Arabis</i> spp.	5	4	-	2	1	-	-
F	<i>Astragalus utahensis</i>	3	8	1	2	4	1	.00
F	<i>Chaenactis douglasii</i>	3	1	1	3	1	1	.00
F	<i>Cirsium</i> spp.	-	-	3	-	-	2	.01
F	<i>Collinsia parviflora</i> (a)	-	-	3	-	-	1	.00
F	<i>Crepis acuminata</i>	-	4	-	-	2	-	-
F	Cruciferae	-	1	-	-	1	-	-
F	<i>Gayophytum ramosissimum</i> (a)	-	-	17	-	-	8	.04
F	<i>Gilia</i> spp. (a)	-	-	9	-	-	4	.04
F	<i>Hymenoxys richardsonii</i>	1	3	-	1	1	-	-
F	<i>Petradoria pumila</i>	-	1	-	-	1	-	.03
F	<i>Senecio multilobatus</i>	3	1	-	1	1	-	.00
F	<i>Trifolium</i> spp.	1	-	-	1	-	-	-
Total for Forbs		16	25	34	10	13	17	0.15

BROWSE TRENDS --

Herd unit 24 , Study no: 10

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia frigida	1	.03
B	Artemisia tridentata vaseyana	79	13.60
B	Cercocarpus ledifolius	7	1.85
B	Chrysothamnus nauseosus albicaulis	0	.00
B	Chrysothamnus parryi	2	.15
B	Chrysothamnus viscidiflorus viscidiflorus	2	.06
B	Eriogonum microthecum	1	-
B	Gutierrezia sarothrae	14	.18
B	Pinus edulis	1	1.85
B	Purshia tridentata	39	7.05
B	Symphoricarpos oreophilus	8	1.08
Total for Browse			25.88

CANOPY COVER --

Herd unit 24 , Study no: 10

Species	Percent Cover '97
Cercocarpus ledifolius	4
Pinus edulis	3

BASIC COVER --

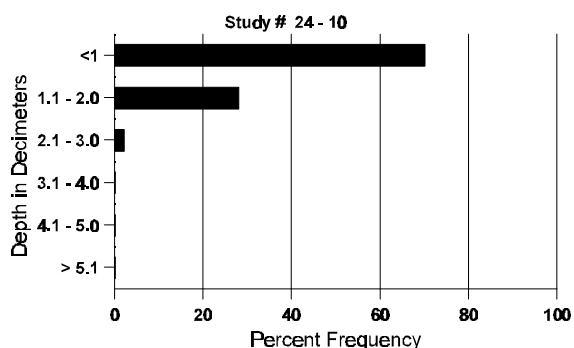
Herd unit 24 , Study no: 10

Cover Type	Nested Frequency '97	Average Cover %		
		'87	'91	'97
Vegetation	261	12.25	6.50	32.37
Rock	286	24.25	18.25	17.65
Pavement	314	13.25	15.75	24.24
Litter	373	44.50	47.25	30.19
Cryptogams	10	.50	0	.08
Bare Ground	213	5.25	12.25	7.72

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 10

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.0	49.8 (11.7)	6.6	52.7	25.7	21.6	2.8	11.2	307.2	.4

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 24 , Study no: 10

Type	Quadrat Frequency '97
Rabbit	10
Elk	12
Deer	10

BROWSE CHARACTERISTICS --
Herd unit 24 , 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	5	6	7	8	9	1	2	3	4								
Artemisia frigida																					
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0			
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0			
	97	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	20	11	7	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>										
'87		00%			00%			00%			None										
'91		00%			00%			00%			Appeared										
'97		00%			00%			00%													
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-						
												'91	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				
<i>Artemisia tridentata vaseyana</i>																		
S	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
Y	87	14	2	-	-	-	-	-	-	-	16	-	-	-	1066		16	
	91	3	3	-	-	-	-	1	-	-	7	-	-	-	466		7	
	97	25	-	-	-	-	-	-	-	-	25	-	-	-	500		25	
M	87	20	27	8	-	-	-	-	-	-	55	-	-	-	3666	20	23	55
	91	22	9	1	3	-	-	-	-	-	31	1	3	-	2333	23	24	35
	97	77	26	-	-	-	-	-	-	-	102	1	-	-	2060	23	45	103
D	87	6	7	5	-	-	-	-	-	-	17	-	-	1	1200		18	
	91	17	7	-	2	-	-	-	-	-	12	-	3	11	1733		26	
	97	29	6	-	1	-	-	-	-	-	19	-	1	16	720		36	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	720		36	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		40%			15%			01%			-24%							
'91		28%			01%			25%			-28%							
'97		20%			00%			10%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	5932	Dec:	20%				
											'91	4532		38%				
											'97	3280		22%				
<i>Cercocarpus ledifolius</i>																		
S	87	20	-	-	-	-	-	-	-	-	20	-	-	-	1333		20	
	91	2	-	-	1	-	-	3	-	-	6	-	-	-	400		6	
	97	-	-	-	2	-	-	-	-	-	2	-	-	-	40		2	
Y	87	18	-	-	-	-	-	-	-	-	18	-	-	-	1200		18	
	91	3	2	-	6	-	-	3	-	-	14	-	-	-	933		14	
	97	-	1	-	2	-	-	-	-	-	3	-	-	-	60		3	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	4	2	-	-	-	-	-	1	-	7	-	-	-	140	45	59	7
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			-22%							
'91		14%			00%			00%			-79%							
'97		30%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	1200	Dec:	-				
											'91	933		-				
											'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				
Chrysothamnus nauseosus albicaulis																		
M	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	12	7	1
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	10	21	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			Died out							
'91		00%			00%			00%			None							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-			
												'91	0		-			
												'97	0		-			
Chrysothamnus parryi																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	9	17	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'97	40		-			
Chrysothamnus viscidiflorus viscidiflorus																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	1	-	-	-	-	-	-	-	-	1	-	-	-	66	8	10	1
	'97	1	-	-	1	-	-	-	-	-	2	-	-	-	40	-	-	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			Appeared							
'91		00%			00%			00%			-39%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	66		-			
												'97	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			
<i>Eriogonum microthecum</i>																	
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'97	-	-	-	2	-	-	-	-	-	2	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>						
	'87	00%			00%			00%			None						
	'91	00%			00%			00%			Appeared						
	'97	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-		
												'91	0		-		
												'97	40		-		
<i>Gutierrezia sarothrae</i>																	
S	'87	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	'87	9	-	-	-	-	-	-	-	-	9	-	-	-	600		9
	'91	7	-	-	-	-	-	-	-	-	7	-	-	-	466		7
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	'87	28	-	-	-	-	-	-	-	-	28	-	-	-	1866	9 7	28
	'91	8	-	-	1	-	-	-	-	-	9	-	-	-	600	7 7	9
	'97	17	-	-	-	-	-	-	-	-	17	-	-	-	340	8 10	17
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	'91	2	-	-	-	-	-	-	-	-	1	-	-	1	133		2
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>						
	'87	00%			00%			00%			-51%						
	'91	00%			00%			06%			-72%						
	'97	00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'87	2466	Dec:	0%		
												'91	1199		11%		
												'97	340		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	87	2	-	-	-	-	-	-	-	-	1	1	-	-	133		2	
	91	-	-	-	1	-	-	1	-	-	2	-	-	-	133		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	6	3	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			-33%							
'91		00%			00%			00%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	199	Dec:	-			
												'91	133		-			
												'97	0		-			
Opuntia spp.																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	4	9	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+ 0%							
'91		00%			00%			00%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-			
												'91	66		-			
												'97	0		-			
Pinus edulis																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'97	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				
Purshia tridentata																		
S	87	9	-	-	-	-	-	-	-	-	9	-	-	-	600		9	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	10	5	-	-	-	-	-	-	-	15	-	-	-	1000		15	
	91	6	2	1	3	2	-	2	-	-	16	-	-	-	1066		16	
	97	4	-	-	2	-	-	-	-	-	6	-	-	-	120		6	
M	87	3	18	12	-	-	-	-	-	-	33	-	-	-	2200	26 24	33	
	91	-	9	3	1	1	3	-	-	-	17	-	-	-	1133	23 25	17	
	97	7	24	12	3	2	-	-	-	-	48	-	-	-	960	17 42	48	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	1	5	2	-	1	-	-	-	-	7	-	2	-	600		9	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		48%			25%			00%			-13%							
'91		48%			21%			05%			-61%							
'97		48%			22%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	3200	Dec:	0%			
												'91	2799		21%			
												'97	1080		0%			
Symphoricarpos oreophilus																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	87	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2	
	91	1	-	-	1	-	-	-	-	-	2	-	-	-	133		2	
	97	-	-	-	5	-	-	-	-	-	5	-	-	-	100		5	
M	87	1	1	-	-	-	-	-	-	-	2	-	-	-	133	10 13	2	
	91	2	2	-	1	-	-	5	-	-	10	-	-	-	666	13 9	10	
	97	5	-	-	3	-	-	-	-	-	7	1	-	-	160	14 26	8	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		50%			00%			00%			+67%							
'91		17%			00%			00%			-67%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	266	Dec:	-			
												'91	799		-			
												'97	260		-			

Trend Study 24-12-97

Study site name: Marshall Basin

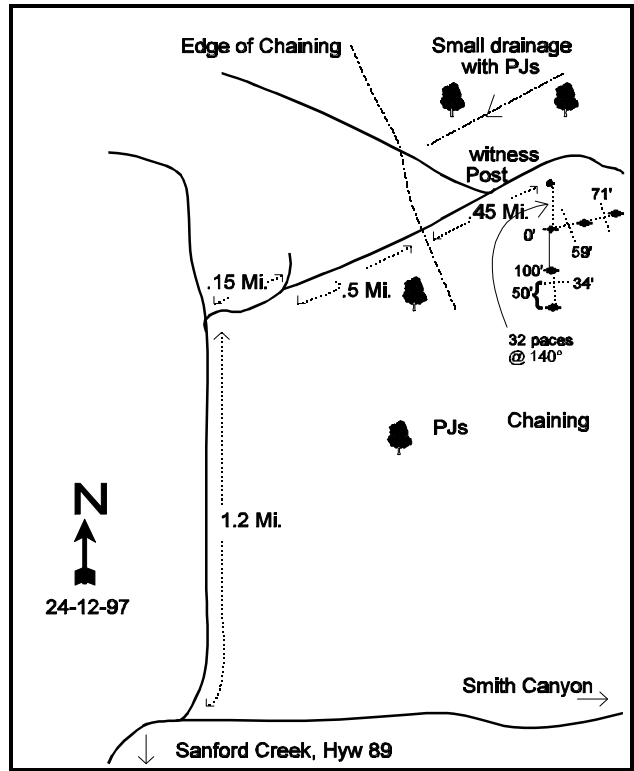
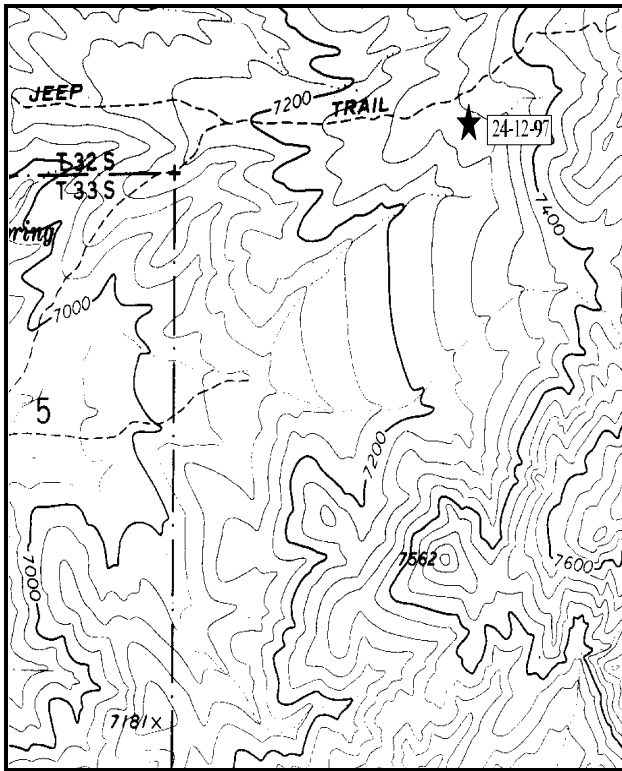
Range type: Chained, Seeded Pinyon-Juniper

Compass bearing: frequency baseline 170 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

About 8 miles north of Panguitch on Highway 89 (or 1.5 miles south of the SR20 and Highway 89 junction), turn east onto the Sanford Creek Road. Travel 4 miles east on the main road to a fork. Bear left towards Smith Canyon. Go 1.5 miles to a fork just below the mouth of Smith Canyon, turn left. Continue 1.2 miles to a fork. Stay right and go 0.15 miles to another fork. Stay right and continue 0.5 miles to the edge of a chaining. Continue 0.45 miles east into the chaining to the study area. The witness post marking the transect is a 2 foot tall fencepost, 30 feet off the right side of the road. The 0-foot baseline stake is 164 feet south, and marked with a browse tag #9003.



Map Name: Blind Spring Mountain

Diagrammatic Sketch

Township 32S, Range 4 1/2W, Section unsurv.

UTM 4204196.960 N, 384056.446 E

DISCUSSION

Trend Study 24-12 (50-12)

The Marshall Basin site monitors trend on a chained and seeded pinyon-juniper area in Marshall Basin. It is located on the western slope of the herd unit. Approximately 900 acres were chained and seeded in the fall of 1984 as part of a cooperative project involving the Powell Ranger District and the Division of Wildlife Resources. Elevation of the site is approximately 7,320 feet. The chained area consists of alluvial benches which gradually slope westward toward the Sevier River. Steep, wooded slopes provide a significant amount of cover above the chaining. Protective cover is also present in the draws which traverse the chained area. This is thought to be a key wintering area for mule deer. Quadrat frequency of deer and elk pellet groups are fairly abundant at 20% and 21% respectively.

Soils are fairly deep with an effective rooting depth (see methods) estimated at nearly 18 inches. The texture is a sandy loam. The soil surface is quite loose and much of it is exposed. Erosion pavement is quite common and was present prior to the chaining. Litter makes up a large part of the groundcover on this site, 41% in 1997. Scattered debris from the chaining and litter buildup from ungrazed grasses help to stabilize the soil on this site.

The chaining project was initiated to increase browse on deer winter range, but shrubs have been slow to become established on this chaining. The area is presently more valuable to deer during the spring and fall, at which time the area provides quality, succulent forage. No key browse species are present in adequate numbers, but mountain big sagebrush, rubber rabbitbrush and bitterbrush would be expected to increase on the site in time.

The herbaceous understory provides 87% of the vegetation cover on the site. The key grass species is crested wheatgrass which accounts for 86% of the grass cover. Intermediate wheatgrass was seeded and would be expected to increase on this site, but presently it is not very abundant. Crested wheatgrass has increased in nested frequency with each reading likely indicating that the site is too dry for the intermediate wheatgrass. The site supported a variety of forbs in 1987 but many were weedy invaders and/or increasers. Due to the prolonged drought, many forbs have disappeared from the site and only five species were encountered in 1997. These combined to produce less than one-tenth of one percent cover.

1991 TREND ASSESSMENT

Basic cover trends did show some notable changes that should not be considered good even though percent bare ground did decrease since 1987 from 17% to 12%. Vegetative cover also declined during this same period along with the combined value for rock and pavement increasing from 17% up to 32%. Trend should be considered slightly downward. There are no noteworthy browse species of any consequence on the site at this time, but through time sagebrush should come onto the site. Seeded crested wheatgrass still dominates the site. The herbaceous understory has lost many forbs since 1987. The forbs have gone from 14 species down to six in 1991. The seeded alfalfa and small burnet were two of the species not found in 1991. However, some of the forbs which have disappeared from the site included weedy early seral species. This was probably a direct result of the extended drought along with increased competition from crested wheatgrass. Another seeded grass, intermediate wheatgrass, did not increase, but stayed at almost the same frequencies as noted in 1987. It has been too dry for this species to increase its presence on this site. Trend for herbaceous understory is considered stable due to the loss of weedy forbs and a similar sum of nested frequency for grasses.

TREND ASSESSMENT

soil - slightly downward

browse - no key species on site at this time since chaining

herbaceous understory - stable

1997 TREND ASSESSMENT

Trend for soil is considered stable even though percent bare ground increased from 12% to 21%. Pavement and rock cover both declined substantially. Litter cover also declined but this would be expected as litter debris from the chaining deteriorates over time. Vegetative cover is moderately abundant with an average cover value of 16%. Nearly all (87%) of this cover comes from herbaceous plants which are more effective at protecting the soil. Trend for browse is slightly up with some sagebrush and bitterbrush sampled in 1997. They occur in small numbers but will likely increase in time. Trend for the herbaceous understory is stable with a change in composition. Nested frequency of crested wheatgrass increased significantly, but nested frequency of bottlebrush squirreltail and blue grama declined significantly and Sandberg bluegrass was not encountered. In 1987, squirreltail had a nested frequency slightly higher than crested wheatgrass, 88 compared to 103. In 1991, nested frequency of squirreltail was 106 and quadrat frequency was 44%. By 1997, nested frequency declined to only 3 and quadrat frequency to 1%. Forbs are still rare.

TREND ASSESSMENT

soil - stable

browse - slightly up, but inadequate for a winter range

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 24 , Study no: 12

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'87	'91	'97	'87	'91	'97	
G	Agropyron cristatum	_a 88	_a 124	_b 225	41	53	83	11.48
G	Agropyron intermedium	2	3	8	2	2	4	.07
G	Bouteloua gracilis	_c 100	_b 55	_a 17	39	25	8	.21
G	Bromus tectorum (a)	-	-	86	-	-	32	1.47
G	Festuca ovina	4	-	-	2	-	-	-
G	Oryzopsis hymenoides	3	8	1	2	5	1	.01
G	Poa secunda	5	6	-	2	2	-	-
G	Sitanion hystrix	103	106	3	51	44	1	.03
Total for Grasses		305	302	340	139	131	129	13.28
F	Astragalus spp.	_a 1	_b 16	_a -	1	9	-	-
F	Chenopodium album (a)	_b 12	_{ab} 3	_a 2	6	2	1	.01
F	Cryptantha fulvocanescens	_b 24	_b 21	_a -	12	10	-	-
F	Cruciferae	-	1	-	-	1	-	-
F	Cryptantha spp.	-	-	10	-	-	4	.05
F	Descurainia spp. (a)	-	-	2	-	-	1	.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '97
		'87	'91	'97	'87	'91	'97	
F	<i>Eriogonum hookeri</i> (a)	51	-	-	24	-	-	-
F	<i>Erigeron pumilus</i>	1	-	1	1	-	1	.00
F	<i>Ipomopsis aggregata</i>	4	-	-	2	-	-	-
F	<i>Lactuca serriola</i>	_b 118	_a -	_a -	49	-	-	-
F	<i>Lesquerella ludoviciana</i>	_{ab} 3	_b 8	_a -	1	4	-	-
F	<i>Medicago sativa</i>	_b 11	_a -	_a -	7	-	-	-
F	<i>Phlox longifolia</i>	-	-	1	-	-	1	.00
F	<i>Salsola iberica</i> (a)	_c 91	_b 12	_a -	39	6	-	-
F	<i>Sanguisorba minor</i>	_b 8	_a -	_a -	4	-	-	-
F	<i>Taraxacum officinale</i>	3	-	-	1	-	-	-
F	<i>Tragopogon dubius</i>	1	-	-	1	-	-	-
Total for Forbs		328	61	16	148	32	8	0.07

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 24 , Study no: 12

Type	Species	Strip Frequency '97	Average Cover % '97
B	<i>Artemisia pygmaea</i>	-	.18
B	<i>Artemisia tridentata vaseyana</i>	1	-
B	<i>Chrysothamnus nauseosus albicaulis</i>	9	.30
B	<i>Gutierrezia sarothrae</i>	4	.21
B	<i>Juniperus osteosperma</i>	1	.85
B	<i>Opuntia</i> spp.	6	.24
B	<i>Pinus edulis</i>	3	.15
B	<i>Purshia tridentata</i>	1	-
Total for Browse		25	1.94

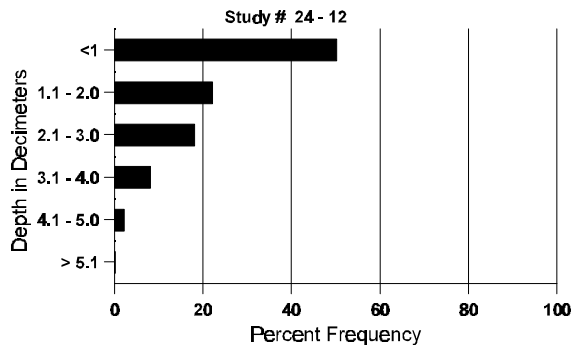
BASIC COVER --
Herd unit 24 , Study no: 12

Cover Type	Nested Frequency '97	Average Cover %		
		'87	'91	'97
Vegetation	272	6.75	4.00	16.23
Rock	173	7.25	4.25	2.74
Pavement	324	9.75	28.25	18.25
Litter	393	59.00	51.50	41.13
Cryptogams	8	0	0	.09
Bare Ground	289	17.25	12.00	21.42

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 12

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
17.8	52.4 (17.7)	N/A	57.3	24.1	18.6	2.0	24.6	188.8	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 24 , Study no: 12

Type	Quadrat Frequency '97
Rabbit	8
Elk	20
Deer	21

BROWSE CHARACTERISTICS --

Herd unit 24 , Study no: 12

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																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'97	20		-			
Chrysothamnus nauseosus albicaulis																		
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'97	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	'87	2	-	-	-	-	-	-	-	-	2	-	-	-	66	19	13	2
	'91	2	-	-	-	-	-	-	-	-	2	-	-	-	66	28	17	2
	'97	5	-	-	-	-	-	-	-	-	5	-	-	-	100	32	45	5
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'97	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
X	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+ 0%							
'91		00%			00%			00%			+70%							
'97		00%			00%			09%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	0%			
												'91	66		0%			
												'97	220		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				
Chrysothamnus viscidiflorus viscidiflorus												
M	87	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	0	13	20	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
	'87	00%		00%		00%		None				
	'91	00%		00%		00%		None				
	'97	00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'87	0	Dec:	-			
						'91	0		-			
						'97	0		-			
Gutierrezia sarothrae												
Y	87	3	-	-	-	-	-	-	3	-	-	3
	91	-	1	-	-	-	-	-	1	-	-	1
	97	-	-	-	-	-	-	-	0	-	-	0
M	87	11	-	-	-	-	-	-	11	-	-	11
	91	23	2	1	-	-	-	-	24	-	2	26
	97	10	-	-	-	-	-	-	10	-	-	10
D	87	-	-	-	-	-	-	-	0	-	-	0
	91	-	1	-	-	-	-	-	33	-	1	1
	97	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
	'87	00%		00%		00%		+50%				
	'91	14%		04%		11%		-79%				
	'97	00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'87	466	Dec:	0%			
						'91	932		4%			
						'97	200		0%			
Juniperus osteosperma												
Y	87	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
	'87	00%		00%		00%		None				
	'91	00%		00%		00%		Appeared				
	'97	00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'87	0	Dec:	-			
						'91	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				
Opuntia spp.																		
Y	87	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	33	3	7	
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100	3	13	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			-50%							
'91		00%			00%			00%			+73%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	-			
												'91	33		-			
												'97	120		-			
Pinus edulis																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			+ 0%							
'91		00%			00%			00%			+45%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	33	Dec:	-			
												'91	33		-			
												'97	60		-			
Purshia tridentata																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	18	40	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			None							
'91		00%			00%			00%			Appeared							
'97		100%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'91	0		-			
												'97	20		-			

SUMMARY

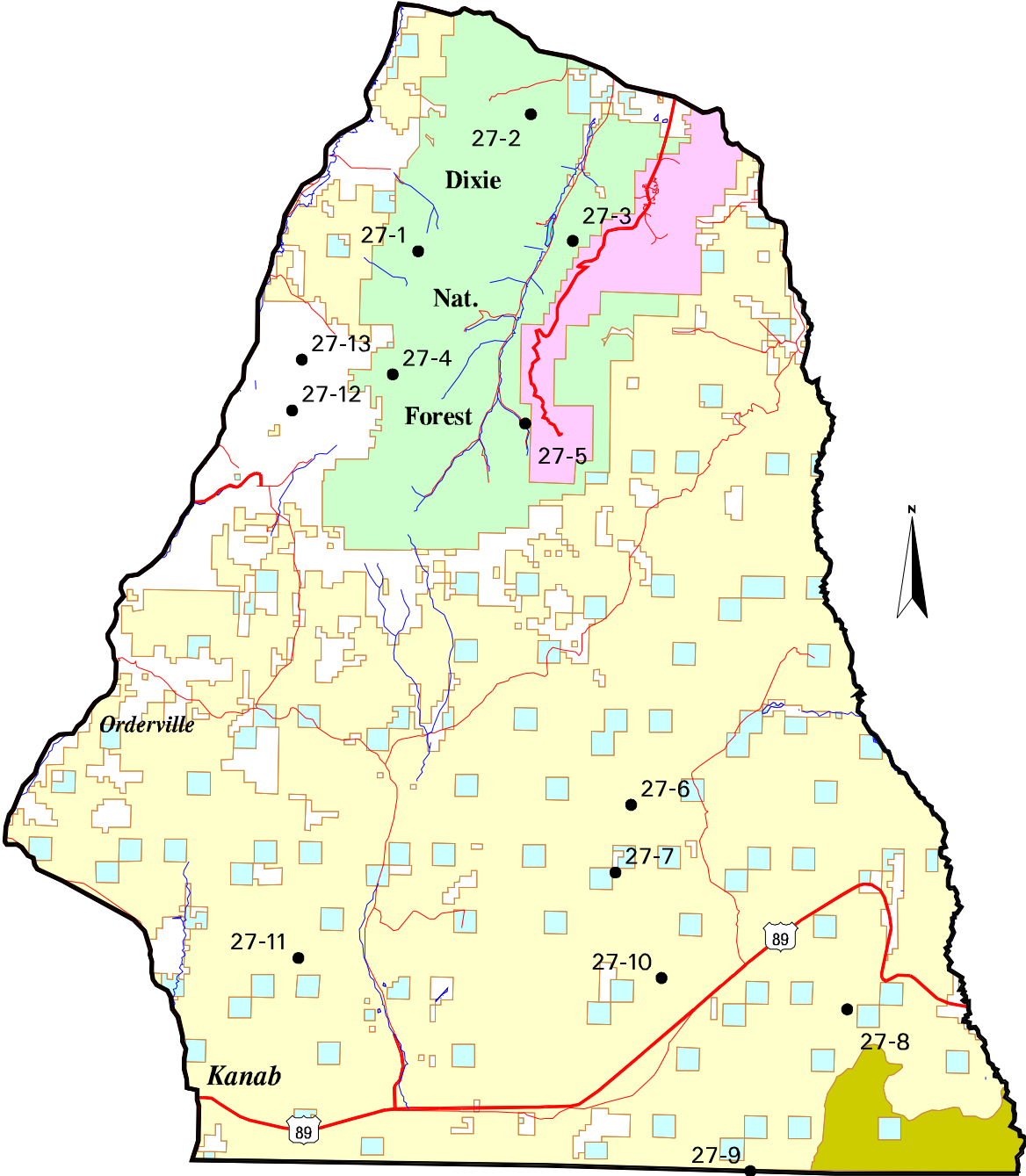
WILDLIFE MANAGEMENT UNIT - 24 - MT DUTTON

The overall trend for the herd unit is improved since 1991. The three low elevation winter range sites, North Pole Canyon (#1), Deer Creek Bench (#2), and North Bull Rush (#3) had downward trends in every category in 1991, currently only North Pole Canyon shows stable to upward trends in all categories. Cow Creek (#7), Prospect seeding (#8), and Barnhurst Ridge (#10), higher elevation winter range sites also showed downward trends in all categories in 1991, now all have stable soil trends, yet all still have slightly downward trends for browse. Only Barnhurst Ridge (#10) has a downward trend for herbaceous species. One common factor on more than half of the sites in the unit is a poor herbaceous understory, especially for forbs. Many sites have very few forbs which are important spring forage for wildlife. A trend summary table follows.

Site	1991			1997		
	Soil	Browse	Grasses & Forbs	Soil	Browse	Grasses & forbs
24-1 North Pole Canyon	0	-	-	0	+	0
24-2 Deer Creek Bench	-	-	-	+	0/-	+
24-3 North Bull Rush	-	-	-	0	-	0
24-4 Mud Springs Chaining	-	+	0	0	0	0
24-5 Suicide	-	+	+	0	+	-
24-6 Table Mountain	+	+	+	0	+	0
24-7 Cow Creek	-	-	-	0	-	0
24-8 Prospect Seeding	0	-	-	0	-	+
24-9 Mud Spring	-	+	0	0	-	0
24-10 Barnhurst Ridge	-	-	0	0	-	-
24-12 Marshall Basin	-	0	0	0	+	0












(+) = upward trend, (-) = downward trend, (0) = stable trend, (NR) = not read

Management Unit 27

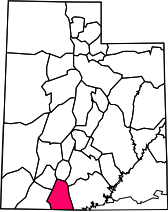


Map Scale 1:475,200 (1" = 7.5 miles)

Legend

- | | | |
|--|---|--|
|  Forest Service |  Bryce Canyon Nat. Park |  Primary Road |
|  BLM |  Federal Wildlife Refuge |  Secondary Road |
|  State of Utah |  Water Body |  Perennial Stream |
|  Private Land |  Transect Location | |

Unit Location



HERD UNIT 27 (52) - PAUNSAUGUNT

Boundary Description

Kane and Garfield counties - Boundary begins at highway US-89A and the Utah-Arizona state line; then north on US-89A to Highway US-89; then north on US-89 to Highway SR-12; then east on SR-12 to the Paria River; then south along the Paria River to the Arizona-Utah state line; then west along this state line to US-89A and beginning point.

Management Unit Description

The Paunsaugunt wildlife management unit encompasses approximately 280,471 acres of summer range and 205,284 acres of winter range for deer, of which only 26% and 7% respectively occurs on private land. Forty-two percent of the unit's area is considered deer winter range with a vast majority (85%) occurring on land managed by the BLM. The Paunsaugunt Plateau provides the bulk of the summer range in the unit with an average elevation of 9,000 feet. The southern rim of the plateau is delineated by the Pink Cliffs of Bryce Canyon National Park and the Sunset Cliffs to the west. Terrain of the transitional and/or winter range is characterized by gently sloping terraces interspersed by extensive cliff formations. The Skutumpah Terrace lies between the Pink Cliffs and White Cliffs; the Wygaret Terrace, Nephi Pasture, and No Man's Mesa lie between the White and Vermillion Cliffs. The bulk of the winter range is found on the Wygaret Terrace.

Key Areas

The key areas that have been identified on the summer range are the mixed mountain brush community in the upper reaches of Proctor Canyon, a high elevation black sagebrush-grass community between Ahlstrom Hollow and Johnson Bench, the ponderosa pine type on Whiteman Bench, the conifer clear-cut with its associated aspen resurgence below the Sunset Cliffs near Sand Pass, and the grass meadow type in Podunk Creek. Three studies were established in 1987 on deer winter range which are all on BLM land. Sagebrush is the dominant vegetation type on the two Nephi Pasture sites, and black sagebrush predominates on the Five Mile Mountain study site. An additional five study sites were established in 1997 to include important areas previously missed by trend studies. These include critical winter ranges on the south end of the unit on Buckskin Mountain, Telegraph Flat, and Crocodile. Two additional sites at Moon's Landing and Heaton, on the west side of the unit, sample mountain brush and sagebrush/bitterbrush winter/transitional ranges at around 8,000 feet. All of the new sites support large concentrations of deer.

Livestock Grazing

Trend studies on Whiteman Bench (#3) and Podunk Creek (#5) lie within the East Fork C & H allotment which is managed by the Powell Ranger District, Dixie National Forest. This allotment has been grazed by domestic livestock since Panguitch Valley was settled in 1866 (AMP - East Fork C & H, 1980). Use was extremely heavy by both cattle and sheep. The East Fork bottom land was the most productive and consequently received the most use. Streams were degraded and riparian vegetation was eliminated. In 1960, the permittees and Forest Service signed a Range Improvement Agreement which called for a 25% reduction in AUMs and a Forest Service commitment to perform watershed improvement and range revegetation work. The present grazing system was implemented in 1975 and involves a seven pasture combination deferred rotation system. A total of 443 cows, owned by 12 permittees, use the allotment from about June 16 to about October 5. The Whiteman Bench site is located in the Tropic Reservoir Unit which is grazed for only 5 days in late September. The Podunk Creek site is located in the Upper East Fork Unit which is grazed annually between the end of July to the end of August, depending on the rotation, with 443 head of cattle.

The Proctor Canyon site (#1) is located in the Hatch Cattle Allotment. Very heavy sheep use occurred in this area around 1900 (AMP, Hatch Allotment, 1981). By the 1920's, the range was seriously overgrazed causing the depletion of vegetation and soils. Grazing pressure was reduced in the 1930's. By 1943, all the sheep were removed and cattle numbers were reduced. Although range studies showed that the allotment was still overutilized during the 1950's, cattle numbers remained the same through 1964. Allotment boundary changes and reductions have resulted in a total of 45 head using the allotment for the June 16 to September 15 season. The allotment is split into two units, and a deferred- rotation system is in place. Proctor Canyon is grazed early one year (6/16 - 8/15) and then later the next year (7/16 - 9/15) to effect two grazing treatments; grazing at range readiness one year and at late plant flowering through seed ripe the second year. Although 9,648 acres are included in this allotment, only 571 are considered suitable range for livestock. The steeper slopes provide an abundance of browse forage for mule deer; and consequently, winter range does not appear to limit deer numbers on this portion of the unit. Concentrated use by livestock on the small more productive portions of the unit will limit their value as summer range habitat for wildlife, especially in periods of drought.

The Ahlstrom Hollow study site (#2) is located in the Blue Fly Allotment which is currently assigned for 190 cattle between June 10th to October 10th. This allotment has a similar grazing history to that of the previous two. Excessive use by sheep was followed by reductions, and then in 1962, cattle replaced the sheep. A five pasture deferred rotation system was in place from 1930 to 1962, then a 2 pasture rest rotation system was initiated. The trend study is located in the south pasture of this allotment.

The Sand Pass trend study (#4) is located in the Kanab Creek C & H Allotment (AMP, Kanab Creek C & H, 1979). This allotment experienced similar patterns of use since the late 1800's. Sheep use was followed by cattle in the 1950's. A series of allotment boundary changes and livestock reductions have taken place. The current allotment boundary was established in 1962. A three-pasture deferred rotation system is currently in place which is grazed by 60 head of cattle annually from June 11 to October 10. The Sand Pass trend study is located in the upper Unit #1 which is grazed with a deferred rest rotation grazing plan.

The two Nephi Pasture study sites (#7 & #8) are located in the Vermillion-Nephi Pasture BLM Allotment. Prior to 1970, 210 cattle used the unit from mid-April to mid-September. Since 1970, the numbers have been reduced to 190 and the starting date delayed to June 1. No earlier records are available. However, as was the case for the entire herd unit, excessive use by sheep occurred. This lower elevation range was used as winter sheep range prior to 1950. The Nephi Pasture study sites currently are part of a 9 pasture deferred rotation grazing system that is grazed in the winter. The new study site at Telegraph Flat is also part of the Vermillion Allotment. The Five Mile Mountain study site is also on BLM land and is grazed by cattle during the winter from November 1st to April 30th as part of a single pasture unit. The new site at Crocodile is within the Oak Springs Allotment which receives summer use on a deferred rotation system. The Buckskin Mountain site, on the Arizona border, is part of the Mollies Nipple Allotment which receives winter use.

Herd Unit Management Objectives

This unit was previously combined with the adjacent Kaiparowits unit. Together they made up herd unit 60 A&B. In 1992, herd unit boundaries were reevaluated with the Paunsaugunt unit being changed to unit 52. In 1996, unit boundaries were again reevaluated and elk and deer herd units combined. The current boundary is unchanged from 1992, but the unit number was changed to 27. The current management objectives are to achieve a target population size of 6,500 wintering deer with a post season buck to doe ratio of 30:100, with 50% of these bucks being three point or better and 66% of the bucks harvested being 4 point or better. Management objectives for elk are to a target winter herd size of 200 elk with a post season bull cow ratio of 16 bulls to 100 cows with at least 8 of these bulls being 2 ½ years or older. Bull harvest objectives are to provide opportunity for a 60% bull harvest success with 40% of the harvest being 2 ½ year or older bulls.

Fawn production was low on the unit prior to 1992 and had declined steadily since 1987. Low fawn numbers are a factor which limited deer numbers in the past on the unit (Gardiner, 1983). Inadequate summer range seems to be the key factor limiting fawn production. This has been exacerbated by years of drought. The long period of heavy use by sheep during the early part of this century, has reduced the forb component on the summer ranges and consequently, the productivity of these ranges as fawning habitat. Another factor is the gradual domination of seral aspen stands by conifers. This has greatly impacted deer summer range. Habitat improvement efforts should be directed towards converting areas that have shown good potential for aspen and reestablish them to productive seral stage plant communities again and seeding these areas with herbaceous species. Grazing systems in place on summer ranges, i.e. deferred-rotation and rest-rotation with cattle only, will tend to favor the production of forbs which should constitute a habitat improvement in most areas. Since a low of 51 fawns/100 does was estimated in 1992, fawn production had increased to 74 fawns/100 does by the next season (1992-93). Over the next four seasons, the average fawn/doe ratio was 71 fawns/100 does.

Study Site Description

Eight study sites were originally established in 1987 and reread in 1992. These include five summer range study sites which occur on Forest Service land on the Paunsaugunt Plateau. Three sites sample winter range on BLM administered land. During the 1997 season, three additional winter range sites were established at Buckskin Mountain (27-9), Telegraph Flat (27-10) and Crocodile (27-11). Two new study sites were also placed on winter/transitional range on the west site of the unit at Moon's Landing (27-12) and Heaton (27-13).

Trend Study 27-1-97

Study site name: Proctor Canyon .

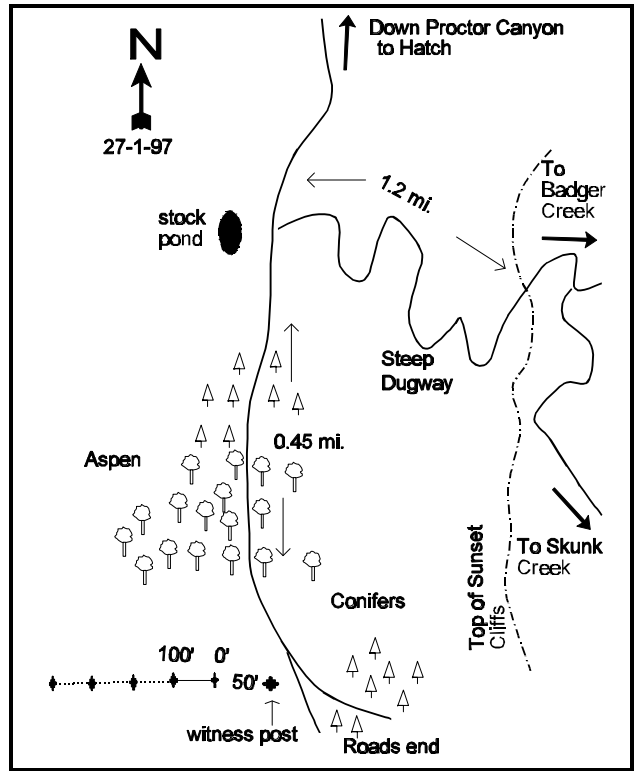
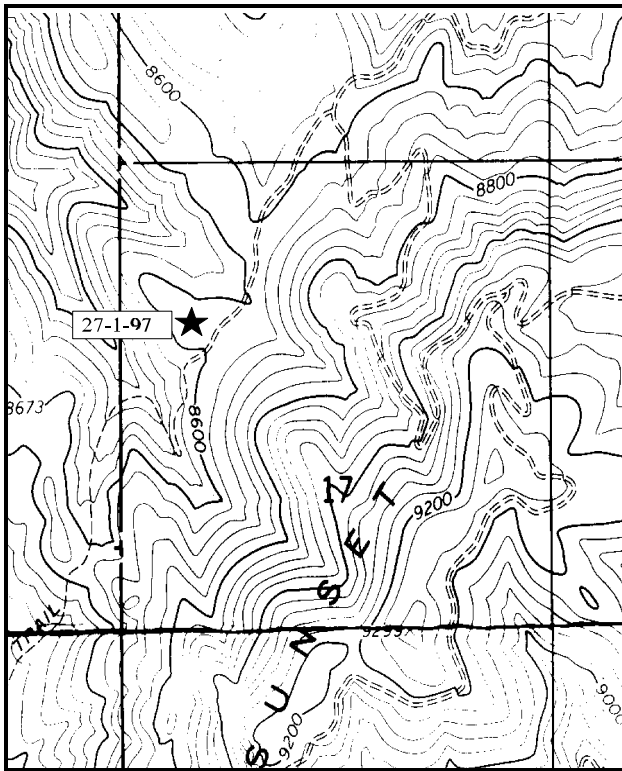
Range type: Mixed Mountain Brush .

Compass bearing: frequency baseline 297 degrees..

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

At the south end of Tropic Reservoir, turn west off the East Fork Sevier Road and proceed up Badger Creek 2.45 miles. Keep left at the fork and continue towards Proctor Canyon 3.5 miles to a fork at the top of the mountain. Go right towards Hatch for 1.2 miles, down a narrow, rocky dugway, to a fork in the aspens. Turn hard left towards Big Hollow/Camp Eli, and go 0.45 miles to a clearing and the witness post. The frequency baseline starts near the top of the hill and runs west-northwest. It is the same location as the first line of the line-intercept transect 52-1-81. The trend study is marked by 2-foot tall green fenceposts. The 0-foot baseline stake is marked with a red browse tag #7161 50 feet west of the witness post.



Map Name: Tropic Reservoir

Diagrammatic Sketch

Township 37S, Range 4 1/2W, Section 17

UTM 4161083.071 N, 380143.221 E

DISCUSSION

Trend Study No. 27-1(52-1)

The Proctor Canyon study is located on big game summer range on the west side of the Paunsaugunt Plateau below the Sunset Cliffs. The small open ridge top where the study is located is a mixed mountain brush community surrounded by dense conifer forest and aspen stands. It is representative of larger, but more inaccessible, open, sagebrush ridges to the northwest. Elevation of the site is approximately 8,600 feet with a northwest aspect and slope that varies from 1-3%. One-half mile to the north, in the same cattle allotment, is a seeded area and stock pond. Deer sign, consisting of pellet groups and antler drops, were noted in 1992, along with a few elk pellet groups. Quadrat frequency of deer pellet groups increased by nearly two fold since the initial reading in 1992 (12 to 22), while elk pellet group frequency remained at similar but low levels. There was evidence of recent livestock use noted in 1997.

The soil on the ridge is fairly deep with an effective rooting depth estimated at 14 inches. It is a light colored loamy sand with a neutral pH (7.1). Phosphorus may be limiting to plant growth at only 8 ppm, where 10 ppm is considered the minimum necessary for normal plant growth and development. Percent organic matter is also relatively low at 1.5%. Vegetative cover is good on the site, confining erosion to the bare interspaces. The road and steeper side hills show evidence of gullying and other surface erosion features.

The browse composition is diverse with 13 shrub species encountered in 1992. The most abundant key browse species consists of bitterbrush and black sagebrush which account for 47% of the browse cover. Serviceberry and currant are also prominent due to their larger size. At the edge of the aspen and conifer stands, young ponderosa pine and Rocky Mountain juniper are abundant. Of the 13 browse species encountered on the transect, serviceberry and bitterbrush provide the bulk of the forage utilized by big game. Eighty-six percent of the serviceberry and 68% of the bitterbrush were classified as heavily hedged (>60% of twigs browsed) in 1987. Use of black sagebrush was also heavy with 45% of the shrubs counted displaying heavy use. Heavy use declined in 1992 and 1997. In 1992, only 8% of serviceberry, 31% of the bitterbrush, and 3% of the black sagebrush showed heavy use. During the 1997 reading, heavy and moderate use remained similar to 1992 estimates for these three key species. In 1987, 43% of the serviceberry sampled displayed poor vigor increasing to 94% by 1992. The shrubs were apparently suffering from Cedar-apple rust. During the 1997 reading, all plants displayed good vigor.

It appears that during the 1987 reading, there was trouble identifying the different rabbitbrush species. In 1992, the majority of the rabbitbrush was classified as mountain low rabbitbrush (*Chrysothamnus viscidiflorus lanceolatus*), and dwarf rabbitbrush (*Chrysothamnus depressus*, with lesser amounts of Parry rabbitbrush (*Chrysothamnus parryi attenuatus*). These three species combined for an estimated density of 8,520 plants/acre in 1992, 59% of which was stickyleaf low rabbitbrush. During the 1997 reading, density of Parry rabbitbrush remained similar to 1992 estimates while density of stickyleaf low and dwarf rabbitbrush declined 31% and 69% respectively.

Complementing the diverse shrub overstory is a wide variety of herbaceous species. Grasses are fairly abundant with 11 species encountered in 1992 and 1997. The most common species include: Kentucky bluegrass, junegrass, Letterman needlegrass, and needle-and-thread grass. Thirty-one species of forbs were encountered in 1992 and 33 species in 1997. Redroot eriogonum, dusty penstemon, Pacific aster, cinquefoil, and skyrocket gilia seem to be the preferred forb species. All grasses combined account for 30% of the total vegetation cover on the site in 1992, but only 14% in 1997. Average forb cover also declined from 11% in 1992 to only 6% in 1997.

1992 TREND ASSESSMENT

Percent cover of bare ground has increased slightly from 17% to 20% while litter cover declined by 37% (65% to 41%). There are several open sandy areas on the site where erosion is occurring along with a few active gullies nearby. Some soil pedestaling is also evident. Overall, erosion is not a major problem on the site with trend for soil being slightly down. Heavy utilization of the key browse species has declined significantly since 1987. Vigor is good on all species except serviceberry which is suffering from Cedar-apple rust. Percent decadence of black sagebrush has declined to 11%. Age class analysis indicates that the key species serviceberry, black sagebrush, and bitterbrush have healthy populations. The abundance of the less desirable dwarf, Parry, and mountain low rabbitbrush is a concern on this site. Continued increases in these shrubs could come at the expense of the more desirable shrub species. Overall, the browse trend is slightly up. The trend for herbaceous understory is stable with a slight increase in the sum of nested frequency of grasses and a slight decrease in the sum of nested frequency of forbs.

TREND ASSESSMENT

soil - slightly down

browse - slightly up

herbaceous understory - stable

1997 TREND ASSESSMENT

Percent bare ground has steadily increased on this site since 1987. Currently, nearly 22% of the ground surface is exposed and erosion is occurring in localized areas. Litter cover has increased since 1992 but vegetative cover has declined from 63% to 53%. More importantly from a watershed standpoint, sum of nested frequency for grasses and forbs has declined by 22%. Trend for soil is considered slightly down. Trend for the key browse species, serviceberry, black sagebrush and bitterbrush is also slightly down. Utilization is similar to 1992 with moderate to heavy use on serviceberry and bitterbrush and mostly light use on black sagebrush. Density of serviceberry declined 52% since 1992. The number of mature plants increased slightly while the proportion of young plants declined from 62% to only 17%. Black sagebrush declined 17% in population density since 1992 with a similar decline in young plants and an increase in percent decadency. Bitterbrush density declined 51% since 1992, and young plants dropped from 740 plants/acre to 140 by 1997. Percent decadence is still low however, and the current number of seedlings and young appear to be adequate to maintain the population. On the beneficial side, the combined density of the less desirable dwarf, Parry and stickyleaf low rabbitbrush declined from 8,520 plants/acre in 1992 to 4,720 in 1997. Age class analysis of these species indicates mostly mature populations with few seedlings or young. Trend for the herbaceous understory is slightly down with the sum of nested frequency of grasses and forbs both declining. Average cover of grasses has gone down from almost 19% in 1992 to only about 8% in 1997. Forb cover has also declined considerably (11% to 6%). Composition of the grasses is also changing on the site. Needle-and-thread grass along with Kentucky bluegrass have increased significantly in nested frequency since 1992. Currently, these two species account for 65% of the total grass cover. Slender wheatgrass, Prairie Junegrass, and letterman needlegrass have all declined significantly. Common forb species on the site including thistle, Pacific aster, redroot eriogonum, longleaf phlox, and silverweed cinquefoil, are all weedy increasers.

TREND ASSESSMENT

soil - slightly down

browse - slightly down

herbaceous understory - slightly down

HERBACEOUS TRENDS --

Herd unit 27, Study no: 1

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'97	'87	'92	'97	'92	'97
G	<i>Agropyron spicatum</i>	6	25	27	3	8	10	.16	.07
G	<i>Agropyron trachycaulum</i>	c185	b112	a40	68	44	16	1.71	.13
G	<i>Bouteloua gracilis</i>	34	15	13	12	5	6	.36	.15
G	<i>Bromus anomalus</i>	a8	b39	a1	4	18	1	.75	.00
G	<i>Carex spp.</i>	b64	a24	a11	26	12	5	.87	.10
G	<i>Koeleria cristata</i>	a54	b144	a78	21	52	32	2.99	.61
G	<i>Poa fendleriana</i>	b88	b78	a45	32	27	18	2.52	.54
G	<i>Poa pratensis</i>	a-	b39	c101	-	15	34	2.99	2.25
G	<i>Stipa columbiana</i>	a-	a1	b14	-	1	6	.03	.08
G	<i>Stipa comata</i>	a17	b96	b124	9	36	46	3.22	3.13
G	<i>Stipa lettermani</i>	b133	ab115	a83	55	44	30	2.85	1.20
Total for Grasses		589	688	537	230	262	204	18.50	8.28
F	<i>Achillea millefolium</i>	74	40	55	27	18	22	.82	.58
F	<i>Antennaria rosea</i>	-	3	3	-	1	1	.15	.15
F	<i>Androsace septentrionalis (a)</i>	-	8	2	-	4	1	.02	.00
F	<i>Arabis spp.</i>	-	1	2	-	1	1	.00	.00
F	<i>Artemisia dracunculus</i>	40	33	23	14	14	11	1.12	.66
F	<i>Artemisia ludoviciana</i>	15	7	6	5	3	3	.06	.06
F	<i>Aster chilensis</i>	b95	ab64	a43	33	26	18	.67	.21
F	<i>Astragalus humistratus</i>	16	29	28	7	14	10	.42	.22
F	<i>Astragalus tenellus</i>	b27	a5	a8	14	2	3	.06	.01
F	<i>Castilleja linariaefolia</i>	a-	ab2	b11	-	1	4	.00	.05
F	<i>Calochortus nuttallii</i>	-	7	4	-	3	2	.01	.01
F	<i>Chaenactis douglasii</i>	7	1	-	3	1	-	.00	-
F	<i>Chenopodium fremontii (a)</i>	-	-	1	-	-	1	-	.00
F	<i>Chenopodium leptophyllum (a)</i>	-	-	3	-	-	1	-	.00
F	<i>Cirsium wheeleri</i>	37	40	35	18	18	14	1.17	.43
F	<i>Cordylanthus kingii (a)</i>	a-	b56	a13	-	24	7	1.53	.16
F	<i>Crepis acuminata</i>	-	-	2	-	-	1	-	.00
F	Cruciferae	5	-	-	3	-	-	-	-
F	<i>Erigeron eatonii</i>	a-	a-	b11	-	-	5	-	.12
F	<i>Erigeron flagellaris</i>	c148	b63	a6	54	24	2	.52	.01
F	<i>Erigeron pumilus</i>	1	5	10	1	2	5	.15	.03
F	<i>Eriogonum racemosum</i>	36	44	48	16	20	22	1.02	.34

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'97	'87	'92	'97	'92	'97
F	<i>Eriogonum umbellatum</i>	23	44	28	10	17	13	1.06	1.16
F	<i>Fritillaria atropurpurea</i>	-	-	4	-	-	2	-	.01
F	<i>Gayophytum ramosissimum</i> (a)	-	-	3	-	-	1	-	.00
F	<i>Hymenoxys richardsonii</i>	_b 13	_b 21	_a -	5	11	-	.23	-
F	<i>Ipomopsis aggregata</i>	6	15	6	3	7	2	.08	.01
F	<i>Linum lewisii</i>	_a 4	_{ab} 20	_b 18	2	8	9	.26	.05
F	<i>Lotus utahensis</i>	4	-	-	1	-	-	-	-
F	<i>Lychnis drummondii</i>	_a -	_b 10	_{ab} 1	-	4	1	.02	.00
F	<i>Machaeranthera canescens</i>	12	16	13	6	8	9	.06	.12
F	<i>Oenothera caespitosa</i>	-	2	-	-	1	-	.03	-
F	<i>Oenothera pallida</i>	-	3	-	-	1	-	.00	-
F	<i>Orthocarpus</i> spp. (a)	6	-	-	3	-	-	-	-
F	<i>Penstemon comarrhenus</i>	_b 50	_{ab} 41	_a 37	26	20	16	.15	.21
F	<i>Phlox longifolia</i>	_a 37	_b 65	_{ab} 56	16	33	25	.45	.27
F	<i>Potentilla anersina</i>	_b 65	_a 23	_a 30	29	11	14	.87	.65
F	<i>Polygonum douglasii</i> (a)	_a -	_b 78	_b 58	-	32	25	.28	.12
F	<i>Senecio douglasii</i>	6	-	-	3	-	-	-	-
F	<i>Taraxacum officinale</i>	_b 42	_a 1	_a 4	17	1	2	.00	.01
F	<i>Tragopogon dubius</i>	_b 31	_{ab} 15	_a 9	14	7	4	.08	.02
Total for Forbs		800	762	581	330	337	257	11.38	5.77

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 27, Study no: 1

Type	Species	Strip Frequency		Average Cover %	
		'92	'97	'92	'97
B	Amelanchier utahensis	22	21	3.45	2.30
B	Artemisia nova	33	28	4.94	4.74
B	Artemisia tridentata vaseyana	0	1	-	.88
B	Chrysothamnus depressus	22	14	1.22	1.36
B	Chrysothamnus parryi attenuatus	11	8	.24	.01
B	Chrysothamnus viscidiflorus viscidiflorus	73	60	4.99	4.16
B	Gutierrezia sarothrae	10	3	.33	.03
B	Juniperus scopulorum	-	-	4.28	3.40
B	Mahonia repens	1	1	-	.00
B	Opuntia spp.	3	0	-	-
B	Pinus ponderosa	1	1	.00	-
B	Purshia tridentata	60	52	22.88	22.12
B	Ribes cereum inebrians	6	3	1.74	1.78
B	Rosa woodsii	14	10	.85	.78
B	Symphoricarpos oreophilus	21	18	2.37	3.02
B	Tetradymia canescens	26	17	1.06	.21
Total for Browse		303	237	48.40	44.83

BASIC COVER --

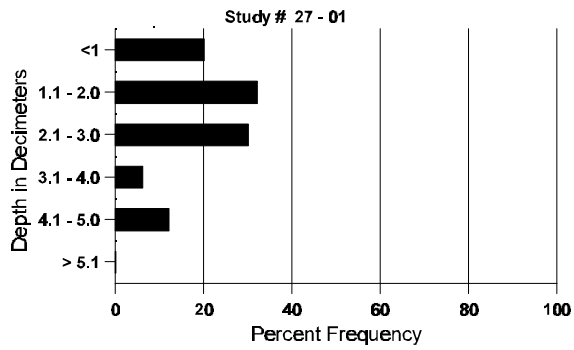
Herd unit 27, Study no: 1

Cover Type	Nested Frequency		Average Cover %		
	'92	'97	'87	'92	'97
Vegetation	339	345	11.00	63.12	53.09
Rock	19	30	2.25	2.82	.37
Pavement	15	101	5.25	0	1.62
Litter	294	393	64.50	40.95	50.03
Cryptogams	8	68	0	.16	.83
Bare Ground	181	239	17.00	20.06	21.83

SOIL ANALYSIS DATA --
Herd Unit 27, Study no: 01

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.4	49.0 (17.7)	7.1	80.0	7.1	12.9	1.5	8.0	54.4	.4

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 27, Study no: 1

Type	Quadrat Frequency	
	'92	'97
Rabbit	6	1
Elk	3	2
Deer	12	22
Cattle	-	2

BROWSE CHARACTERISTICS --

Herd unit 27, Study no: 1

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	87	-	-	1	-	-	-	-	-	-	1	-	-	-	66		1	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	4	-	-	-	-	-	-	1	-	3	-	266		4	
	92	1	22	-	7	-	-	1	-	-	2	-	19	10	620		31	
	97	-	-	-	4	-	-	-	-	-	4	-	-	-	80		4	
M	87	1	-	2	-	-	-	-	-	-	3	-	-	-	200	52	49	3
	92	1	7	4	2	-	-	-	-	-	1	-	13	-	280	-	-	14
	97	3	5	1	1	9	1	-	-	-	14	6	-	-	400	44	41	20
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	4	-	-	-	-	-	-	-	-	-	2	3	100		5	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			86%			43%			+53%							
'92		66%			08%			94%			-52%							
'97		58%			08%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	466	Dec:	0%				
											'92	1000		10%				
											'97	480		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 nova</i>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	87	3	3	1	-	-	-	-	-	-	7	-	-	-	466			7
	92	21	-	-	4	-	-	-	-	-	25	-	-	-	500			25
	97	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
M	87	4	10	13	-	-	-	-	-	-	27	-	-	-	1800	14	19	27
	92	42	9	-	3	-	3	-	-	-	57	-	-	-	1140	-	-	57
	97	42	8	-	-	-	-	-	-	-	50	-	-	-	1000	14	27	50
D	87	2	7	10	-	-	-	-	-	-	17	-	-	2	1266			19
	92	8	2	-	-	-	-	-	-	-	10	-	-	-	200			10
	97	17	-	-	-	-	-	-	-	-	12	-	-	5	340			17
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	140			7
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		38%			45%			04%			-48%							
'92		12%			03%			00%			-17%							
'97		11%			00%			07%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	3532	Dec:	36%				
											'92	1840		11%				
											'97	1520		22%				
<i>Artemisia tridentata vaseyana</i>																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	27	43	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'92		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'92	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				
Chrysothamnus depressus																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	14	-	-	8	-	-	-	-	-	22	-	-	-	440		22	
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	87	-	1	1	-	-	-	-	-	-	2	-	-	-	133	4	7	2
	92	112	-	-	9	-	-	1	-	-	120	-	2	-	2440	-	-	122
	97	36	-	-	-	-	3	-	-	-	39	-	-	-	780	4	10	39
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		50%			50%			00%			+95%							
'92		00%			00%			01%			-69%							
'97		00%			07%			02%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	133	Dec:	0%				
											'92	2880		0%				
											'97	900		2%				
Chrysothamnus parryi attenuatus																		
S	87	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	7	1	-	-	-	-	-	-	-	8	-	-	-	533		8	
	92	5	-	-	4	-	-	-	-	-	9	-	-	-	180		9	
	97	6	-	-	1	-	-	-	-	-	7	-	-	-	140		7	
M	87	35	5	-	-	-	-	-	-	-	40	-	-	-	2666	17	16	40
	92	11	-	-	8	-	1	-	-	-	20	-	-	-	400	-	-	20
	97	8	-	-	1	-	-	-	-	-	9	-	-	-	180	12	7	9
D	87	5	2	1	-	-	-	-	-	-	8	-	-	-	533		8	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		14%			02%			00%			-84%							
'92		00%			03%			00%			-45%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	3732	Dec:	14%				
											'92	580		0%				
											'97	320		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>Chrysothamnus viscidiflorus viscidiflorus</i>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	64	4	-	18	-	-	2	-	-	88	-	-	-	1760		88	
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	88	-	-	57	-	-	-	-	-	145	-	-	-	2900	-	-	
	97	149	-	-	20	-	-	-	-	-	169	-	-	-	3380	16	21	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	12	1	-	7	-	-	-	-	-	16	-	3	1	400		20	
	97	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			Appeared							
'92		02%			00%			02%			-31%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	0%				
											'92	5060		8%				
											'97	3500		1%				
<i>Gutierrezia sarothrae</i>																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	2	-	-	-	-	-	1	-	-	3	-	-	-	60		3	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	5	-	-	-	-	-	-	-	-	5	-	-	-	333	7	6	
	92	26	-	-	-	-	-	-	-	-	26	-	-	-	520	-	-	
	97	10	-	-	-	-	-	-	-	-	10	-	-	-	200	7	3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+43%							
'92		00%			00%			00%			-66%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	333	Dec:	-				
											'92	580		-				
											'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				
Mahonia repens																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	-	-	-	1	-	-	-	-	-	1	-	-	-	20	3	5	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			Appeared							
'92		00%			00%			00%			+ 0%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	20		-			
												'97	20		-			
Opuntia spp.																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	2	-	-	1	-	-	-	-	-	3	-	-	-	60		3	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			Appeared							
'92		00%			00%			00%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	60		-			
												'97	0		-			
Pinus ponderosa																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			Appeared							
'92		100%			00%			00%			+ 0%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	20		-			
												'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				
Purshia tridentata																		
S	87	4	1	-	-	-	-	-	-	-	5	-	-	-	333		5	
	92	2	-	-	2	-	-	5	-	-	9	-	-	-	180		9	
	97	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
Y	87	-	2	6	-	-	-	-	-	-	8	-	-	-	533		8	
	92	10	14	2	9	-	-	2	-	-	37	-	-	-	740		37	
	97	1	4	1	1	-	-	-	-	-	7	-	-	-	140		7	
M	87	3	8	21	-	-	-	-	-	-	32	-	-	-	2133	22 35	32	
	92	2	69	47	7	1	4	-	-	-	130	-	-	-	2600	- -	130	
	97	9	22	11	-	18	13	-	-	-	73	-	-	-	1460	27 56	73	
D	87	-	-	1	-	-	-	-	-	-	1	-	-	-	66		1	
	92	1	3	1	1	-	-	-	-	-	6	-	-	-	120		6	
	97	-	1	3	-	-	-	-	-	-	3	-	-	1	80		4	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		24%			68%			00%			+21%							
'92		50%			31%			00%			-51%							
'97		54%			33%			01%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	2732	Dec:	2%			
												'92	3460		3%			
												'97	1680		5%			
Ribes cereum inebrians																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	2	-	-	2	-	-	-	40		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	8	-	-	-	-	-	8	-	-	-	160		8	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	92	3	-	-	2	-	-	-	-	-	5	-	-	-	100	- -	5	
	97	2	-	-	2	-	-	-	-	-	4	-	-	-	80	61 72	4	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			Appeared							
'92		00%			00%			07%			-71%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%			
												'92	280		7%			
												'97	80		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				
Rosa woodsii																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	10	-	-	80	-	-	1	-	-	91	-	-	-	1820		91	
	97	10	-	-	19	-	-	-	-	-	29	-	-	-	580		29	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	-	-	-	3	-	-	-	-	-	3	-	-	-	60	-	-	
	97	1	-	-	30	-	-	-	-	-	31	-	-	-	620	14	15	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			Appeared							
'92		00%			00%			00%			-36%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	1880		-			
												'97	1200		-			
Symphoricarpos oreophilus																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	18	-	-	19	-	-	-	-	-	37	-	-	-	740		37	
	97	2	-	-	-	2	-	-	-	-	4	-	-	-	80		4	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	3	1	-	19	-	-	2	-	-	24	-	-	1	500	-	-	
	97	6	-	-	13	-	-	-	-	-	19	-	-	-	380	17	42	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
	97	-	-	-	1	-	-	-	-	-	-	-	-	1	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			Appeared							
'92		02%			00%			02%			-62%							
'97		08%			00%			04%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%			
												'92	1260		2%			
												'97	480		4%			

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 canescens																		
S	87	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	4	2	-	-	-	-	-	-	-	6	-	-	-	400		6	
	92	14	-	-	9	-	-	-	-	-	23	-	-	-	460		23	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	87	5	5	3	-	-	-	-	-	-	13	-	-	-	866	9 10	13	
	92	6	-	-	9	-	-	-	-	-	15	-	-	-	300	- -	15	
	97	13	-	-	2	-	-	-	-	-	15	-	-	-	300	15 14	15	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		37%			16%			00%			-35%							
'92		00%			00%			00%			-51%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	1266	Dec:	0%				
											'92	820		7%				
											'97	400		15%				

Trend Study 27-2-97

Study site name: Ahlstrom Hollow .

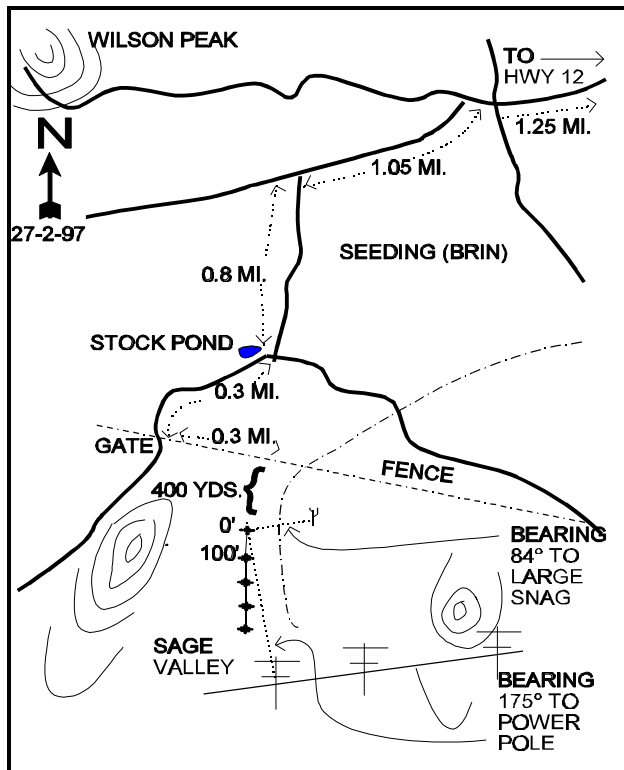
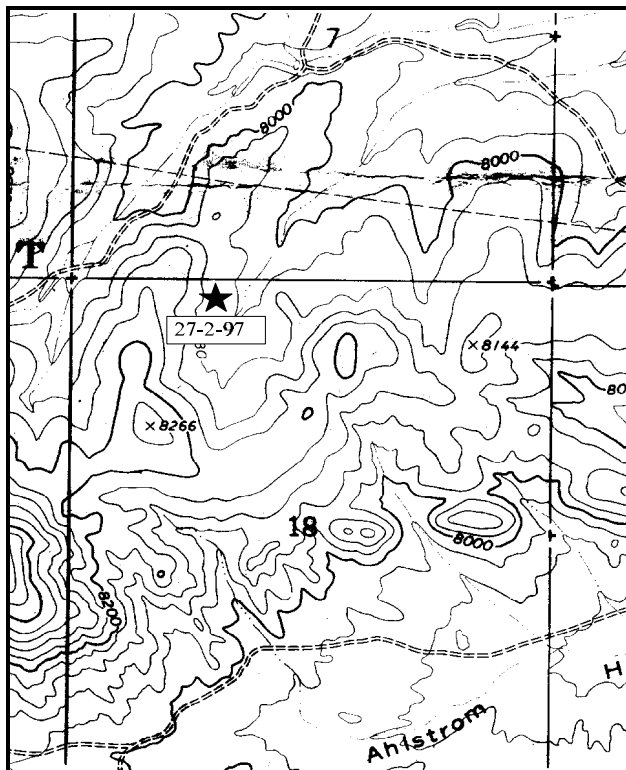
Range type: Black Sagebrush .

Compass bearing: frequency baseline 190 degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

From the Bryce Canyon area, take SR 12 west towards Red Canyon. From the Forest Service boundary sign and mile marker 9, go 0.6 miles further west. Turn left onto Wilson Peak Rd #111, cross a cattleguard and go 1.2 miles to the Ahlstrom Hollow road intersection. Pass this 90° intersection and continue 0.05 miles on the Wilson Peak Road to a dirt road going off to the left at a 45° angle. Go down this road 1.05 miles to a fork. Bear left and continue 0.8 miles to a fork by a stock pond. Turn right and go 0.3 miles to a fence. Park here. Walk east along the fence line up and over a ridge and down to the middle of the next valley. At the bottom of this valley, turn and walk up (south) along the bottom for about 400 yards to the start of the baseline, a 2-foot fencepost tagged #7150.



Map Name: Wilson Peak

Diagrammatic Sketch

Township 36S, Range 4W, Section 18

UTM 4170893.575 N, 388204.962 E

DISCUSSION

Trend Study No. 27-2 (52-2)

Although named Ahlstrom Hollow, this study is actually situated in a drainage north of the wide, open, revegetated valley that is Ahlstrom Hollow. The small valley sampled by this trend study is above Johnson Bench; an area seeded mainly with smooth brome and other grasses. This particular black sagebrush-rabbitbrush valley shows little evidence of the seeding treatments done in the early 1950's, other than the remnants of smooth brome. Surrounded by pinyon-juniper woodland and mountain mahogany ridges, the valley supports a mixture of black sagebrush, rabbitbrush, and grasses with a scattered population of bitterbrush. The area is used by deer, elk, and cattle.

The valley drains to the northeast via an intermittent wash. Located on the west side of the valley at 8,080 feet, the study area has an east-southeast aspect and a slope that varies from 8-12%. The presence of black sagebrush throughout the whole valley would normally indicate shallow soils of about 8-10 inch range. However, the soil on the site is relatively deep with an average effective rooting depth (see methods) of almost 18 inches. Texture analysis indicates it to be a sandy loam with a high percentage of gravel in the profile and a mildly alkaline pH (7.4). At this relatively high elevation and moderately deep soils, one would expect to find mountain big sagebrush. It may be that the gravelly nature of the soil or some subsurface physical or physiological barrier makes this a marginal site for mountain big sagebrush. Most likely it is the mildly alkaline pH of the soil. The soil appears to be more shallow around the edges of the valley. There is evidence of past erosion and serious gully formation, especially on the surrounding hillsides. The percent bare ground was quite high in 1992 at just over 31%, but is currently lower at about 23%. At the present time, there appears to be adequate vegetative and litter cover to slow and spread overland flow and consequently reduce the erosion hazard to the drainage bottoms.

Black sagebrush is the dominant shrub over most of the valley, although rabbitbrush is prevalent in the bottoms and appeared to be spreading in 1992. The black sagebrush had a relatively high density of 16,200 plants/acre in 1992. Over half of the plants were classified as mature (56%), 21% were classified as young and a biotic potential (percentage of seedlings to the population) of 6%. Biotic potential in 1987 was 27%, but this kind of variation would be expected because conditions for reproduction are highly inconstant through time for all shrubs. During the 1997 reading, density of black sagebrush declined to 9,680 plants/acre, a 40% drop. Seedlings were found in similar numbers to 1992 estimates, but the number of young, mature, and decadent plants all declined. Percent decadency has only gone from 11% in 1987, to 23% in 1992, and 14% in 1997. Utilization has declined since 1987, when moderate to heavy use was noted on 46% of the shrubs. During the 1992 reading, moderate use was noted on 22% of the sagebrush and in 1997 use was mostly light.

A few bitterbrush were encountered on the frequency belts even though it appears to be more common in the lower part of the valley. Bitterbrush is a preferred forage species, and over half (60%) were heavily hedged in 1992. Currently, 50% show heavy use with an additional 50% displaying moderate use. The plants are large, spreading, and vigorous.

Low and dwarf rabbitbrush are also common on the site with a combined density of 6,464 plants/acre in 1987. This density declined slightly to 6,000 plants/acre in 1992 and significantly declined in 1997 to only 2,800 plants/acre. Dwarf rabbitbrush density remained similar to 1992 estimates but stickyleaf low rabbitbrush density declined 78%. Age class distribution indicates that both species have a mostly mature populations with poor recruitment. The few curlleaf mountain mahogany plants found on the site but not sampled, were heavily hedged. This would be expected due to their high preference and low numbers.

Grasses are an important component of this range. Seven grass species were found on the site in 1987 and

1992. Only a few remnant individual smooth brome plants were found in 1987, but none were encountered in 1992 or 1997. Similar to the Proctor Canyon site, grass cover declined significantly between 1992 and 1997. Sum of nested frequency of grasses did not decline however. Currently, the most abundant grasses include; mutton bluegrass, needle-and-thread and prairie Junegrass. The grasses appeared vigorous, and all had produced seed during the season of rest from livestock grazing in 1987. Forbs are diverse but not particularly abundant. Many of the more palatable forb species had been utilized by big game during the 1987 reading. They selected lupine, penstemon, and buckwheat. Forb cover averaged 6% in 1992, but declined in 1997 to 3.7%. Most forbs are found only rarely. The more common species include: owlclover, pussytoes, and longleaf phlox.

1992 TREND ASSESSMENT

Trend for soil is considered slightly down for this site because there are small areas throughout the site that show signs of detectable soil movement, broken soil cover and active gullies nearby, especially on the surrounding hillsides. Percent bare ground has also increased from 14% to 31%, while litter cover declined from 66% to 32%. The health and vigor for the black sagebrush is good with a relatively high density. Trend for browse is up. Trend for herbaceous understory is slightly down with nested frequency for the grasses decreasing substantially with them making up 72% of the herbaceous cover. The forbs had a slight increase in their nested frequency value, but not enough to compensate for the loss to the grasses.

TREND ASSESSMENT

soil - slightly down

browse - up

herbaceous understory - slightly down

1997 TREND ASSESSMENT

Trend for soil is up slightly since 1992 due to a 26% increase in litter cover and a 29% decline in percent bare ground. Trend for the black sagebrush is considered stable even though density has declined 40% since 1992. Density of black sagebrush was extremely high in 1992 at 16,200 plants/acre. The current estimated population density is similar to 1987 levels at 9,680 plants/acre. This is a more manageable density for a black sagebrush site and reduces intraspecific competition. Recruitment is adequate with 11% of the population consisting of young plants and a reproductive potential (percentage of seedlings to the population) of 12%. Percent decadence has also declined from 23% in 1992 to only 14% currently. Utilization is mostly light and vigor good on all but 31% of the decadent shrubs. Trend for the herbaceous understory is also stable. Sum of nested frequency of grasses has remained similar even though percent cover (effected by the timing of precipitation) of grasses has declined sharply by 46%. Frequency of forbs increased slightly but cover was also lower compared to 1992. Nested frequency of prairie Junegrass (dependant on early season precipitation) declined significantly while frequency of needle-and-thread increased significantly. This same trend was found on the Proctor Canyon site.

TREND ASSESSMENT

soil - up slightly

browse - stable

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 27, Study no: 2

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'97	'87	'92	'97	'92	'97
G	Agropyron trachycaulum	a8	a12	b21	4	4	13	.42	.11
G	Bouteloua gracilis	b96	a69	a64	40	23	27	2.23	.72
G	Bromus inermis	2	-	-	2	-	-	-	-
G	Bromus tectorum (a)	-	-	3	-	-	1	-	.00
G	Koeleria cristata	b148	b134	a89	61	53	37	3.09	.98
G	Oryzopsis hymenoides	-	-	-	-	-	-	.00	-
G	Poa fendleriana	a129	b232	b201	49	84	71	7.53	2.88
G	Poa secunda	c229	a5	b36	75	2	16	.01	.81
G	Stipa comata	b130	a80	ab111	60	38	41	1.95	1.31
G	Stipa lettermani	a-	b29	b34	-	11	14	.68	.58
Total for Grasses		742	561	559	291	215	220	15.94	7.42
F	Agoseris glauca	-	-	1	-	-	1	-	.00
F	Ambrosia spp.	-	3	-	-	3	-	.06	-
F	Antennaria rosea	7	6	8	2	4	3	.04	.33
F	Androsace septentrionalis (a)	-	5	3	-	4	1	.04	.00
F	Arabis spp.	a-	b6	c12	-	5	6	.02	.03
F	Aster chilensis	-	-	3	-	-	1	-	.00
F	Aster spp.	-	-	4	-	-	2	-	.01
F	Comandra pallida	-	-	1	-	-	1	-	.00
F	Cryptantha bakeri	60	12	20	33	8	9	.06	.05
F	Cruciferae	6	3	-	3	1	-	.00	-
F	Cymopterus spp.	-	-	1	-	-	1	-	.00
F	Erigeron eatonii	ab14	b27	a2	8	12	1	.33	.01
F	Erigeron pumilus	ab11	a1	b22	6	1	11	.15	.20
F	Eriogonum racemosum	6	13	14	3	6	7	.18	.16
F	Eriogonum umbellatum	20	12	18	9	7	10	.11	.20
F	Euphorbia robusta	b11	a3	a4	7	2	2	.18	.06
F	Gayophytum ramosissimum (a)	-	-	14	-	-	6	-	.03
F	Heterotheca villosa	b15	a3	a2	7	1	1	.15	.03
F	Holosteum umbellatum (a)	-	-	3	-	-	1	-	.00
F	Lappula occidentalis (a)	-	-	5	-	-	2	-	.01
F	Lotus utahensis	b34	ab21	a13	15	11	5	.33	.25
F	Microsteris gracilis (a)	-	-	61	-	-	25	-	.17
F	Oenothera spp.	-	-	3	-	-	1	-	.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'97	'87	'92	'97	'92	'97
F	Orthocarpus spp. (a)	a ²¹	b ¹²¹	b ¹¹¹	12	54	58	2.70	1.43
F	Penstemon comarrhenus	b ³⁶	a ¹⁴	a ¹²	18	4	5	1.01	.05
F	Penstemon spp.	a ⁻	a ⁻	b ⁸	-	-	4	-	.07
F	Phlox longifolia	a ²⁹	b ⁶⁶	b ⁷²	14	30	35	.30	.35
F	Polygonum douglasii (a)	a ⁻	b ²⁵	b ²⁶	-	12	15	.06	.07
F	Taraxacum officinale	a ⁻	b ⁷	b ⁸	-	4	5	.39	.05
F	Tragopogon dubius	2	-	5	2	-	2	-	.01
F	Trifolium kingii	a ⁻	ab ⁶	b ⁹	-	2	5	.01	.02
F	Unknown forb-perennial	1	-	-	1	-	-	-	-
Total for Forbs		273	354	465	140	171	226	6.19	3.65

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 27, Study no: 2

Type	Species	Strip Frequency		Average Cover %	
		'92	'97	'92	'97
B	Artemisia nova	98	98	24.25	21.39
B	Artemisia tridentata vaseyana	1	0	-	-
B	Chrysothamnus depressus	33	31	.67	-
B	Chrysothamnus viscidiflorus	52	27	4.70	1.90
B	Juniperus osteosperma	1	2	.15	.85
B	Leptodactylon pungens	49	42	2.34	.64
B	Opuntia spp.	2	1	.03	.00
B	Purshia tridentata	5	2	.38	.03
B	Tetradymia canescens	14	11	.09	.24
Total for Browse		255	214	32.63	25.07

CANOPY COVER --

Herd unit 27, Study no: 2

Species	Percent Cover '97
Juniperus osteosperma	2

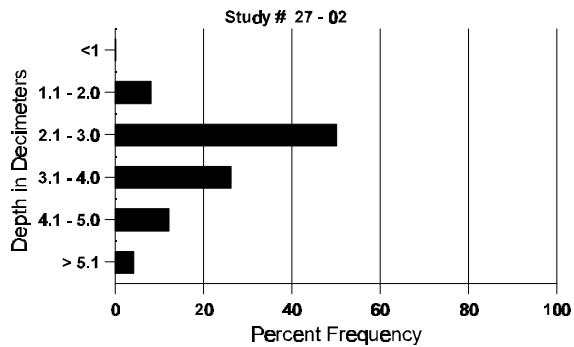
BASIC COVER --
Herd unit 27, Study no: 2

Cover Type	Nested Frequency		Average Cover %		
	'92	'97	'87	'92	'97
Vegetation	334	340	5.50	47.05	38.87
Rock	-	21	1.25	7.93	.07
Pavement	126	221	12.75	0	7.14
Litter	310	391	66.25	31.65	42.92
Cryptogams	8	51	0	.41	.46
Bare Ground	217	295	14.25	31.40	22.36

SOIL ANALYSIS DATA --
Herd Unit 27, Study no: 02

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
17.6	52.0 (17.4)	7.4	66.4	19.1	14.6	2.5	15.9	86.4	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 27, Study no: 2

Type	Quadrat Frequency	
	'92	'97
Rabbit	30	11
Elk	22	7
Deer	6	14
Cattle	3	6

BROWSE CHARACTERISTICS --

Herd unit 27, 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											
<i>Artemisia nova</i>																
S	87	38	1	-	-	-	-	-	39	-	-	-	2600		39	
	92	33	-	-	14	-	-	4	-	-	-	-	1020		51	
	97	54	-	-	3	-	-	-	-	-	-	-	1140		57	
Y	87	27	7	1	-	-	-	-	-	33	2	-	-	2333		35
	92	119	28	1	7	3	-	12	-	170	-	-	-	3400		170
	97	55	-	-	-	-	-	-	-	55	-	-	-	1100		55
M	87	43	33	16	-	-	-	-	-	91	1	-	-	6133	16 20	92
	92	327	115	5	2	-	-	-	-	448	-	-	3	9020	- -	451
	97	346	15	-	-	-	-	-	-	361	-	-	-	7220	16 27	361
D	87	7	7	2	-	-	-	-	-	16	-	-	-	1066		16
	92	148	30	9	-	-	-	2	-	160	-	6	23	3780		189
	97	56	9	-	-	-	-	-	-	44	-	6	15	1360		68
X	87	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	-	-	-	-	-	-	-	-	-	-	-	-	420		21
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>					
'87		33%			13%			00%			+41%					
'92		22%			02%			04%			-40%					
'97		05%			00%			04%								
Total Plants/Acre (excluding Dead & Seedlings)										'87	9532	Dec:	11%			
										'92	16200		23%			
										'97	9680		14%			
<i>Artemisia tridentata vaseyana</i>																
Y	87	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	1	-	-	-	-	1	-	-	20		1	
	97	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>					
'87		00%			00%			00%			Appeared					
'92		00%			00%			00%			Died out					
'97		00%			00%			00%								
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	-			
										'92	20		-			
										'97	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 depressus																	
S	87	8	-	4	-	-	-	-	-	12	-	-	-	800		12	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	4	-	-	-	-	-	-	-	4	-	-	-	266		4	
	92	27	3	-	19	-	-	1	-	50	-	-	-	1000		50	
	97	1	-	-	1	-	-	-	-	2	-	-	-	40		2	
M	87	27	8	6	-	-	-	-	-	41	-	-	-	2733	4 10	41	
	92	38	2	1	3	-	-	2	-	46	-	-	-	920	- -	46	
	97	90	-	-	3	-	-	-	-	93	-	-	-	1860	10 10	93	
D	87	1	-	1	-	-	-	-	-	2	-	-	-	133		2	
	92	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>% Change</u>									
'87		17%		15%		00%		-39%									
'92		05%		01%		00%		- 1%									
'97		00%		00%		00%											
Total Plants/Acre (excluding Dead & Seedlings)										'87	3132	Dec:	4%				
										'92	1920		0%				
										'97	1900		0%				
Chrysothamnus viscidiflorus																	
S	87	11	-	-	-	-	-	-	-	11	-	-	-	733		11	
	92	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	1	6	-	-	-	-	-	-	7	-	-	-	466		7	
	92	35	-	-	44	-	-	1	-	80	-	-	-	1600		80	
	97	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	27	9	2	-	-	-	-	-	38	-	-	-	2533	16 18	38	
	92	75	8	1	30	-	-	3	1	118	-	-	-	2360	- -	118	
	97	38	-	-	1	-	-	-	-	38	-	-	-	780	14 20	39	
D	87	4	1	-	-	-	-	-	-	5	-	-	-	333		5	
	92	4	-	-	2	-	-	-	-	4	-	-	2	120		6	
	97	5	-	-	-	-	-	-	-	4	-	1	-	100		5	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>% Change</u>									
'87		32%		04%		00%		+18%									
'92		04%		.49%		.98%		-78%									
'97		00%		00%		02%											
Total Plants/Acre (excluding Dead & Seedlings)										'87	3332	Dec:	10%				
										'92	4080		3%				
										'97	900		11%				

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																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	-	-	-	1	-	-	-	-	-	1	-	-	-	20	-	1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			Appeared							
'92		100%			00%			00%			+50%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	20		-			
												'97	40		-			
Leptodactylon pungens																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	18	-	-	1	-	-	2	-	-	21	-	-	-	420		21	
	97	9	-	-	2	-	-	-	-	-	11	-	-	-	220		11	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	178	-	-	43	-	-	6	-	-	227	-	-	-	4540	-	227	
	97	122	-	-	4	-	-	-	-	-	126	-	-	-	2520	6	126	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	4	-	-	-	-	-	-	-	-	-	-	1	3	80		4	
	97	2	-	-	-	-	-	-	-	-	-	-	-	2	40		2	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			Appeared							
'92		00%			00%			02%			-45%							
'97		00%			00%			01%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%			
												'92	5040		2%			
												'97	2780		1%			

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	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
	97	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
M	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133	3	8	2
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			-10%							
'92		00%			00%			00%			-83%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	133	Dec:	0%				
											'92	120		17%				
											'97	20		0%				
Purshia tridentata																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	1	-	-	1	1	-	-	4	-	-	-	80		4	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	1	-	-	-	1	-	-	-	20	-	-	1
	97	-	1	1	-	-	-	-	-	-	2	-	-	-	40	21	43	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			Appeared							
'92		00%			60%			00%			-60%							
'97		50%			50%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'92	100		-				
											'97	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				
Tetradymia canescens																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10	
	97	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
M	87	1	3	-	-	-	-	-	-	-	4	-	-	-	266	9	9	4
	92	3	3	1	3	-	-	-	-	-	10	-	-	-	200	-	-	10
	97	11	-	-	1	-	-	-	-	-	12	-	-	-	240	9	11	12
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		75%			00%			00%			+37%							
'92		14%			05%			00%			- 5%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	266	Dec:	0%			
												'92	420		5%			
												'97	400		0%			

Trend Study 27-3-97

Study site name: Whiteman Bench.

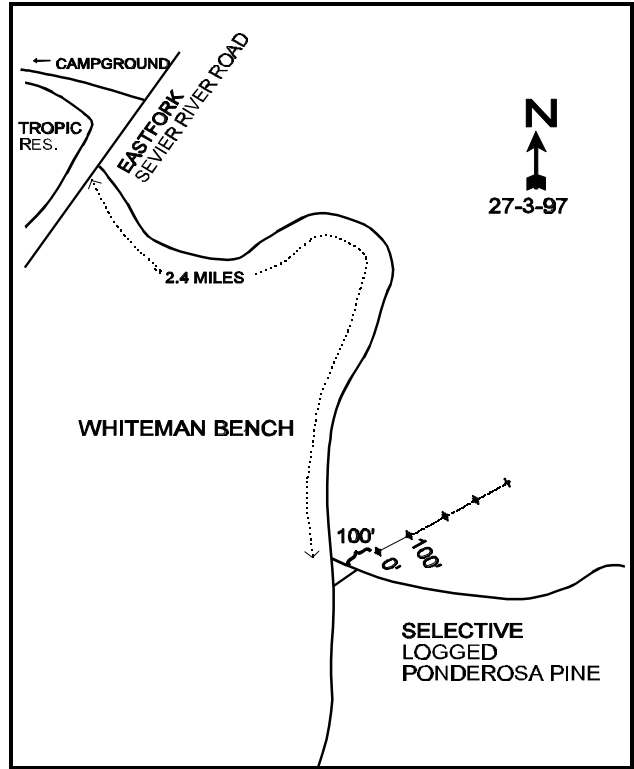
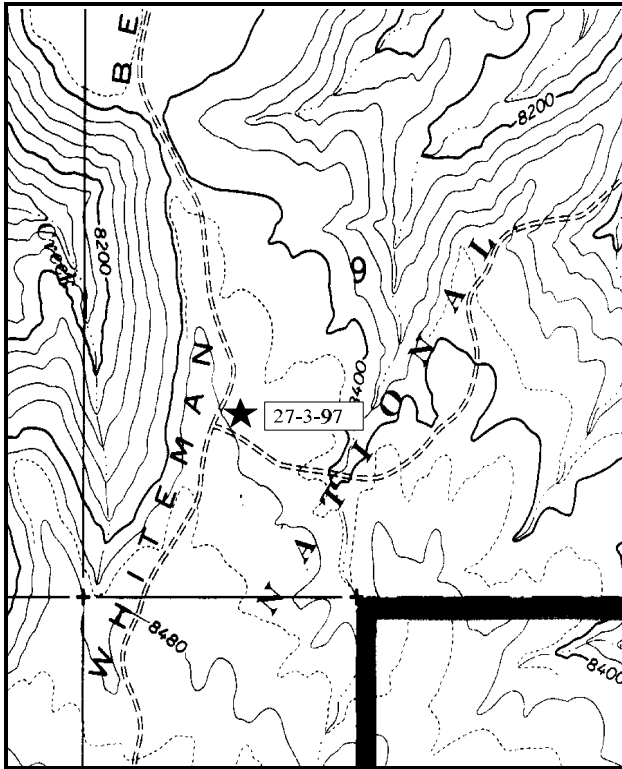
Range type: Selective Logged-Ponderosa

Compass bearing: frequency baseline 60 degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

East of the Tropic Reservoir Dam on the E. Fork Sevier River Road, take the Whiteman Bench road east for 2.40 miles to a fork in the road. Stop here. Walk east 18 paces to the first stake, a red-painted fencepost 18" high marked with browse tag #7153. The frequency baseline runs NE from here. This is also the location of line intercept transect 52-11-81.



Map Name: Bryce Point

Diagrammatic Sketch

Township 37S, Range 4W, Section 9

UTM 4161824.153 N 391201.922 E

DISCUSSION

Trend Study No. 27-3 (52-3)

Whiteman Bench is a large, level bench area east of Tropic Reservoir. Most of the bench is covered with ponderosa pine in varying stages of growth due to logging activities. Age distribution for ponderosa is currently (1997) 75% mature, 25% young, with no seedlings encountered. The study samples a moderate aged stand of ponderosa that was clear cut 20+ years ago. The open ponderosa forest is at a relatively low density of 60 mature trees/acre which was estimated in 1997. The understory is a mixture of shrubs and grasses. The area is utilized as summer range by deer and elk. There is little livestock use at this time in the timbered areas of the East Fork Allotment.

The site is nearly level with a slope of 2-3% and an elevation of 8,400 feet. Due to the flat terrain, erosion is not deleterious. There was some soil movement but little net soil loss observed in 1987. In 1992, erosion was thought to have increased with vegetational pedestaling, especially in the open meadows. There is adequate litter cover associated with the trees and shrubs, especially the buildup of needles beneath the ponderosa pine. There are spots where erosion pavement and rocks are frequent on the surface. There is a high concentration of rocks four to six inches below the surface. The soil is moderately shallow with an estimated effective rooting depth (see methods) of 13 inches. Soil texture is a clay loam with a considerable amount of cobble rock in the profile. Phosphorus may be limiting to plant growth at 7.6 ppm, where 10 ppm is considered minimum for normal plant development.

The ponderosa canopy is fairly open, although the trees appear to have increased in size since the site was first photographed in 1981. Overhead canopy cover ranges from zero to 12% with an average of 4% cover over the whole site in 1997. It appears to have little effect on the shrub understory. The most abundant and important browse species are black sagebrush, bitterbrush, and dwarf rabbitbrush. Dwarf rabbitbrush currently accounts for 50% of the total browse cover with a density ranging from 8,199 plants/acre in 1987 to a high of 21,840 in 1992. Currently, there are an estimated 13,380 mostly mature plants/acre. These are small plants averaging only 5 inches in height. Bitterbrush currently accounts for 20% of the browse cover with a density of 620 plants/acre. This preferred browse species has declined 66% in density since 1992 due mainly to a drop in the number of young plants from 820 plants/acre in 1992 to 80 by 1997. Mature plants also declined in density from 820 plants/acre to 440. Utilization has been moderate to heavy since 1987 with generally good vigor. Percent decadency has also remained closely the same since 1992. Current recruitment is adequate to maintain the population.

Population density of black sagebrush has also declined since 1992, even though the amount of moderate and heavy utilization declined. Recruitment is currently poor, but percent decadency has declined from 39% in 1992 to 19% in 1997. Most of the scattered snowberry, horsebrush, and currant showed signs of moderate to heavy use in 1992, but currently are only lightly utilized. Parry rabbitbrush is also fairly common, but does not seem to be used as a forage.

The herbaceous understory is not particularly abundant on this site. Grasses and forbs combined to produce just under 16% total cover in 1992, but only 8% in 1997. In 1997, eight grass species and 16 forb species were found on the site. The most abundant grasses include mutton bluegrass, needle-and-thread, and Letterman needlegrass. The forb composition is dominated by fendler sandwort, pacific aster, redroot eriogonum, and rock goldenrod.

1992 TREND ASSESSMENT

Percent bare ground is 21%, but average percent bare ground has increased substantially from 9% in 1987. There was also more evidence of plant pedestaling, especially in the meadows. This all points to a downward trend for soils for this site. The browse trend is slightly up with good densities and vigor for most species. Only black sagebrush has high rates of decadency, but biotic potential is very high at 52% and percent young age class is also high at 26%. This should compensate for any possible losses in the future. Trend for browse is slightly up. Trend for the herbaceous understory is mixed. Sum of nested frequency of perennial grasses has declined while frequency of perennial forbs has increased. Since forbs account for 57% of the herbaceous cover, the overall herbaceous understory trend is considered stable.

TREND ASSESSMENT

soil - down

browse - slightly up

herbaceous understory - stable

1997 TREND ASSESSMENT

Trend for soil is considered slightly down. Percent bare ground cover declined slightly but vegetative cover also declined 30%. More importantly, from a watershed standpoint, is the fact that nested frequency of grasses and forbs declined. This is also shown by the ratio of protective cover to bare soil, which clearly illustrates that there is less protection for the soils at this time. Trend for browse is down slightly. The three key species on this site, black sagebrush, dwarf rabbitbrush, and bitterbrush, have all declined substantially in population density. However, moderate to heavy utilization of black sagebrush and dwarf rabbitbrush has declined, vigor is generally good, and percent decadence is low. Bitterbrush however, still shows similar amounts of moderate and heavy use between years. Percent decadency is currently low at 16%, but the level of decadence has increased steadily since 1987. Trend for the herbaceous understory is down. Sum of nested frequency for grasses and forbs has declined substantially since 1992. The only grass species to show an increase in nested frequency since 1992 is western wheatgrass. All others declined. In addition, all forb species showed a decline in nested frequency since 1992.

TREND ASSESSMENT

soil - slightly down

browse - slightly down

herbaceous understory - down

HERBACEOUS TRENDS --

Herd unit 27, Study no: 3

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'97	'87	'92	'97	'92	'97
G	Agropyron smithii	a-	b36	c72	-	15	28	.25	.33
G	Carex spp.	57	47	35	24	25	17	.64	.74
G	Koeleria cristata	12	31	26	5	11	10	.42	.22
G	Oryzopsis hymenoides	b21	a3	a-	9	1	-	.01	-
G	Poa fendleriana	b209	ab148	a75	86	59	34	3.20	.93
G	Poa secunda	-	-	3	-	-	1	-	.00
G	Sitanion hystrix	c87	b30	a9	44	16	4	.14	.05
G	Stipa comata	a19	b57	b53	8	24	25	1.04	.61
G	Stipa spp.	3	4	-	1	2	-	.03	-
G	Stipa lettermani	b93	b88	a51	41	40	24	.93	.50
Total for Grasses		501	444	324	218	193	143	6.68	3.42
F	Agoseris glauca	-	2	-	-	2	-	.01	-
F	Antennaria rosea	2	7	3	2	2	1	.03	.00
F	Androsace septentrionalis (a)	-	2	-	-	1	-	.00	-
F	Arabis demissa	10	15	11	4	8	5	.04	.02
F	Arenaria fendleri	a33	b93	b64	16	37	27	2.65	.48
F	Artemisia ludoviciana	5	3	-	2	1	-	.03	-
F	Arabis pulchra	a-	b11	a-	-	4	-	.02	-
F	Aster chilensis	a25	b71	a29	11	28	12	.51	.10
F	Astragalus humistratus	b11	b6	a-	6	4	-	.05	-
F	Astragalus spp.	-	-	-	-	-	-	-	.00
F	Calochortus nuttallii	-	1	-	-	1	-	.00	-
F	Cirsium spp.	-	1	1	-	1	1	.03	.03
F	Cordylanthus kingii (a)	a-	b21	a4	-	9	2	.09	.01
F	Crepis acuminata	-	3	4	-	1	2	.03	.01
F	Cruciferae	8	-	-	4	-	-	-	-
F	Cryptantha spp.	-	1	-	-	1	-	.00	-
F	Erysimum asperum	b18	a-	a-	8	-	-	-	-
F	Erigeron flagellaris	a7	b19	a1	3	8	1	.34	.00
F	Erigeron spp.	5	-	-	2	-	-	-	-
F	Erigeron pumilus	5	-	3	2	-	1	-	.00
F	Eriogonum racemosum	24	38	29	14	23	13	.29	.15
F	Eriogonum umbellatum	-	3	-	-	1	-	.03	-
F	Hymenoxys richardsonii	-	-	-	-	-	-	.03	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'97	'87	'92	'97	'92	'97
F	<i>Ipomopsis aggregata</i>	6	4	5	2	2	2	.01	.01
F	<i>Lychnis drummondii</i>	-	1	-	-	1	-	.00	-
F	<i>Orthocarpus</i> spp. (a)	5	-	-	2	-	-	-	-
F	<i>Penstemon caespitosus</i>	-	7	3	-	3	1	.09	.00
F	<i>Penstemon</i> spp.	5	6	3	3	5	1	.05	.03
F	<i>Petrorhiza pumila</i>	88	112	95	42	47	39	4.47	3.85
F	<i>Phlox longifolia</i>	a-	b15	a-	-	9	-	.04	-
F	<i>Potentilla crinita</i>	a-	b15	a-	-	8	-	.19	-
F	<i>Polygonum douglasii</i> (a)	a-	b31	b29	-	15	13	.07	.11
F	<i>Taraxacum officinale</i>	-	-	1	-	-	1	-	.00
F	<i>Tragopogon dubius</i>	4	-	-	2	-	-	-	-
F	Unknown forb-perennial	1	-	-	1	-	-	-	-
Total for Forbs		262	488	285	126	222	122	9.16	4.86

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 27, Study no: 3

Type	Species	Strip Frequency		Average Cover %	
		'92	'97	'92	'97
B	<i>Artemisia nova</i>	35	32	2.03	1.16
B	<i>Chrysothamnus depressus</i>	98	89	8.31	7.23
B	<i>Chrysothamnus parryi attenuatus</i>	36	3	.41	.03
B	<i>Gutierrezia sarothrae</i>	12	1	.04	-
B	<i>Mahonia repens</i>	3	0	.04	.00
B	<i>Pinus ponderosa</i>	6	4	11.14	2.20
B	<i>Purshia tridentata</i>	39	24	5.21	2.91
B	<i>Ribes cereum inebrians</i>	4	1	-	-
B	<i>Symphoricarpos oreophilus</i>	8	9	.85	.81
B	<i>Tetradymia canescens</i>	20	8	.24	.06
Total for Browse		261	171	28.30	14.41

CANOPY COVER --

Herd unit 27, Study no: 3

Species	Percent Cover '97
<i>Pinus ponderosa</i>	4

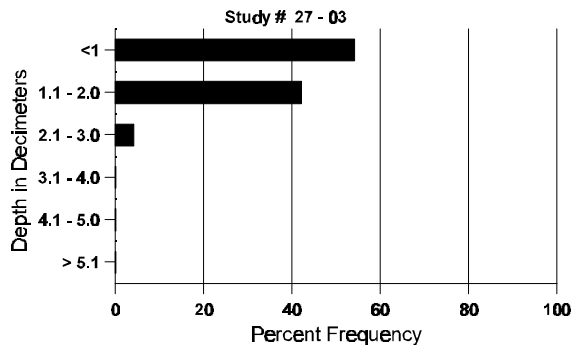
BASIC COVER --
Herd unit 27, Study no: 3

Cover Type	Nested Frequency		Average Cover %		
	'92	'97	'87	'92	'97
Vegetation	306	309	2.00	42.34	29.83
Rock	75	232	8.75	12.57	8.37
Pavement	42	213	4.25	0	4.80
Litter	257	382	75.75	49.28	47.95
Cryptogams	32	63	.25	.99	1.81
Bare Ground	138	234	9.00	20.97	17.22

SOIL ANALYSIS DATA --
Herd Unit 27, Study no: 03

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.0	48.8 (15.0)	6.9	36.36	32.1	31.6	3.6	7.6	163.2	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 27, Study no: 3

Type	Quadrat Frequency	
	'92	'97
Rabbit	6	-
Elk	3	8
Deer	6	7

BROWSE CHARACTERISTICS --

Herd unit 27, Study no: 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					
Artemisia nova													
S	87	4	-	-	-	-	-	-	4	-	4		
	92	4	-	-	1	-	-	48	-	-	53		
	97	-	-	-	-	-	-	-	-	-	0		
Y	87	9	-	-	-	-	-	-	9	-	9		
	92	10	6	-	8	2	-	-	24	-	26		
	97	4	-	-	3	-	-	-	7	-	7		
M	87	59	2	-	-	-	-	-	47	-	61		
	92	16	17	1	2	-	-	-	36	-	36		
	97	49	-	-	-	-	-	-	46	-	49		
D	87	2	-	-	-	-	-	-	-	-	2		
	92	16	17	2	2	2	-	-	22	-	39		
	97	13	-	-	-	-	-	-	7	-	13		
X	87	-	-	-	-	-	-	-	-	-	0		
	92	-	-	-	-	-	-	-	-	-	0		
	97	-	-	-	-	-	-	-	-	-	15		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'87		03%		00%		22%		-16%					
'92		44%		03%		19%		-32%					
'97		00%		00%		13%							
Total Plants/Acre (excluding Dead & Seedlings)										'87	2399	Dec:	3%
										'92	2020		39%
										'97	1380		19%
Ceanothus fendleri													
Y	87	6	-	-	-	-	-	-	6	-	6		
	92	-	-	-	-	-	-	-	-	-	0		
	97	-	-	-	-	-	-	-	-	-	0		
M	87	7	-	-	-	-	-	-	7	-	7		
	92	-	-	-	-	-	-	-	-	-	0		
	97	-	-	-	-	-	-	-	-	-	0		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'87		00%		00%		00%		Died out					
'92		00%		00%		00%		None					
'97		00%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'87	433	Dec:	-
										'92	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				
Chrysothamnus depressus																		
S	87	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	92	21	-	-	5	-	-	13	-	-	39	-	-	-	780		39	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	87	23	1	-	-	-	-	-	-	-	24	-	-	-	800		24	
	92	128	21	-	6	-	-	12	-	-	167	-	-	-	3340		167	
	97	39	-	-	-	-	-	-	-	-	39	-	-	-	780		39	
M	87	219	2	-	-	-	-	-	-	-	219	-	2	-	7366	4	7	221
	92	710	86	22	18	-	-	12	-	-	838	-	10	-	16960	-	-	848
	97	603	-	-	13	-	-	-	-	-	616	-	-	-	12320	5	13	616
D	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	92	19	46	-	4	8	-	-	-	-	47	-	28	2	1540		77	
	97	13	1	-	-	-	-	-	-	-	6	-	-	8	280		14	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		01%			00%			.81%			+62%							
'92		15%			02%			04%			-39%							
'97		.14%			00%			01%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	8199	Dec:	0%			
												'92	21840		7%			
												'97	13380		2%			
Chrysothamnus parryi attenuatus																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	92	21	2	1	-	1	-	-	-	-	24	-	1	-	500		25	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	29	-	-	-	-	-	-	-	-	29	-	-	-	966	6	5	29
	92	15	5	-	2	-	-	-	-	-	22	-	-	-	440	-	-	22
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	7	10	2
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	3	13	10	-	-	-	-	-	-	21	-	5	-	520		26	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			+22%							
'92		29%			15%			08%			-95%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	1132	Dec:	0%			
												'92	1460		36%			
												'97	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>Gutierrezia sarothrae</i>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	1	-	-	2	-	-	-	40		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	87	15	-	-	-	-	-	-	-	-	15	-	-	-	500	6	5	15
	92	18	-	-	-	-	-	-	-	-	17	-	1	-	360	-	-	18
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			-24%							
'92		05%			00%			05%			-84%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	500	Dec:	-			
												'92	380		-			
												'97	60		-			
<i>Mahonia repens</i>																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	92	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	61	-	-	-	-	-	-	-	-	61	-	-	-	2033		61	
	92	13	-	-	-	-	-	-	-	-	13	-	-	-	260		13	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	2	-	-	-	-	-	-	-	-	2	-	-	-	66	5	9	2
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			-87%							
'92		00%			00%			00%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	2099	Dec:	-			
												'92	280		-			
												'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				
Pinus ponderosa																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	2	-	-	-	-	-	-	-	-	1	-	1	-	66		2	
	92	1	-	-	-	-	-	-	1	-	2	-	-	-	40		2	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	-	-	-	-	-	-	-	3	-	3	-	-	-	100	367 144	3	
	92	2	-	-	-	-	-	-	2	-	4	-	-	-	80	- -	4	
	97	-	-	-	-	-	-	2	1	-	3	-	-	-	60	- -	3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			20%			-28%							
'92		00%			00%			00%			-33%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	166	Dec:	-			
												'92	120		-			
												'97	80		-			
Purshia tridentata																		
S	87	7	-	-	-	-	-	-	-	-	7	-	-	-	233		7	
	92	2	-	-	4	-	-	1	-	-	7	-	-	-	140		7	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	87	7	4	2	-	-	-	-	-	-	12	-	1	-	433		13	
	92	25	8	-	5	2	-	1	-	-	41	-	-	-	820		41	
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	87	1	18	-	-	-	-	-	-	-	19	-	-	-	633	15 23	19	
	92	5	22	12	-	2	-	-	-	-	41	-	-	-	820	- -	41	
	97	7	13	2	-	-	-	-	-	-	22	-	-	-	440	14 41	22	
D	87	1	1	-	-	-	-	-	-	-	1	-	1	-	66		2	
	92	2	1	3	1	-	2	-	-	-	5	-	4	-	180		9	
	97	2	3	-	-	-	-	-	-	-	5	-	-	-	100		5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		68%			06%			06%			+38%							
'92		38%			19%			04%			-66%							
'97		52%			06%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	1132	Dec:	6%			
												'92	1820		10%			
												'97	620		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											
Ribes cereum inebrians																
S	87	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	1	-	-	-	-	-	-	-	1		1	
	97	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	4	-	-	-	-	1	-	-	-	-	5		5	
	97	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	3	-	-	-	-	-	-	-	-	-	-	3	26	29	3
	92	-	2	-	-	-	-	-	-	-	-	-	2	-	-	2
	97	1	-	-	-	-	-	-	-	-	-	-	1	39	57	1
D	87	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	-	-	1		1	
	97	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>								
'87		00%		00%		00%		+38%								
'92		75%		00%		00%		-88%								
'97		00%		00%		00%										
Total Plants/Acre (excluding Dead & Seedlings)										'87	100	Dec:	0%			
										'92	160		13%			
										'97	20		0%			
Symphoricarpos oreophilus																
S	87	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	-	-	1		1	
	97	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	5	1	2	-	-	-	-	-	-	-	-	8		8	
	97	3	-	-	-	-	-	-	-	-	-	-	3		3	
M	87	-	-	3	-	-	-	-	-	-	-	-	3	15	20	3
	92	2	1	3	-	-	-	-	-	-	-	-	6	-	-	6
	97	7	1	-	1	-	-	-	-	-	-	-	9	17	41	9
D	87	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	1	-	-	-	-	-	-	-	-	1		1	
	97	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>								
'87		00%		100%		00%		+67%								
'92		13%		40%		00%		-20%								
'97		08%		00%		00%										
Total Plants/Acre (excluding Dead & Seedlings)										'87	100	Dec:	0%			
										'92	300		7%			
										'97	240		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				
Tetradymia canescens																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	1	-	-	-	-	-	-	-	-	-	-	1	-	33		1	
	92	6	3	-	1	-	-	2	-	-	12	-	-	-	240		12	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33	8	6	1
	92	9	-	-	-	-	-	-	-	-	9	-	-	-	180	-	-	9
	97	7	-	-	-	-	-	-	-	-	7	-	-	-	140	7	8	7
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	2	3	1	-	-	-	-	-	-	6	-	-	-	120		6	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			50%			+88%							
'92		22%			04%			00%			-63%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	0%			
												'92	540		22%			
												'97	200		0%			

Trend Study 27-4-97

Study site name: Sand Pass .

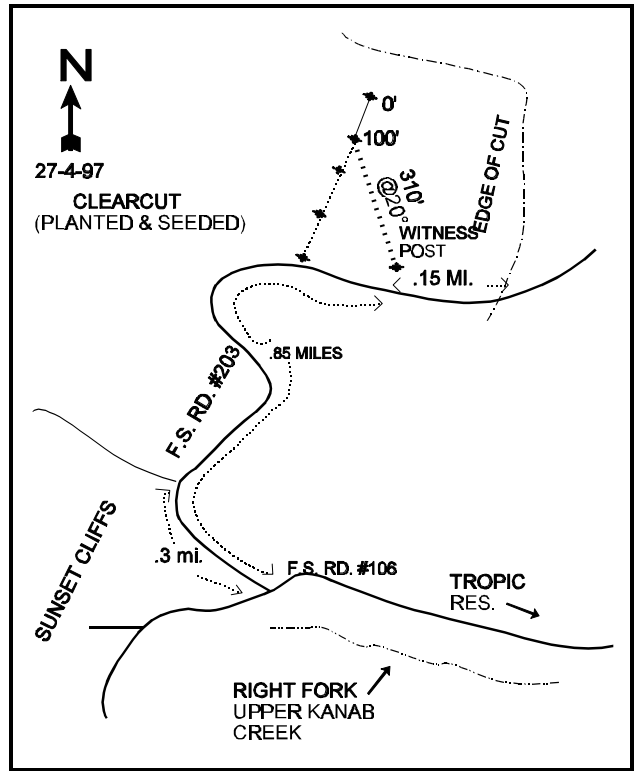
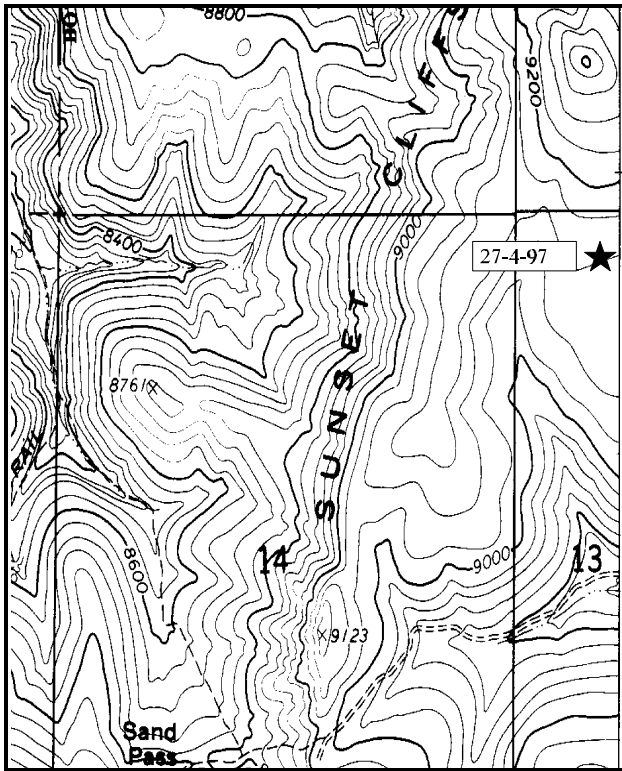
Range type: Clearcut-Mixed Conifer .

Compass bearing: frequency baseline 225 degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

From Badger Creek turnoff on the south end of Tropic Reservoir, travel south on the East Fork of the Sevier River Road (F.S. road 105) for about 4.35 miles to Kanab Creek. Turn right onto the Kanab Creek Road and go 4.5 miles to a fork. Bear right towards North Fork Kanab Creek and travel 2.6 miles to another fork. Bear right up a hill and drive 0.9 miles through a clearcut to the witness post (4' green fencepost) on the left side of the road. If you go too far, the road curves around the ridge at the edge of the clearcut. The transect is in the clearcut above the road. Walk 100 yards bearing 20° to the 100-foot end of the baseline. The 0-foot stake is marked by a browse tag, #7156.



Map Name: George Mountain

Diagrammatic Sketch

Township 38S, Range 5W, Section 13

UTM 4152274.496 N, 378316.580 E

DISCUSSION

Trend Study No. 27-4 (52-4)

The Sand Pass study is found in a band of conifers on the slopes below Sand Pass and the Sunset Cliffs that were clear cut and then replanted and seeded in 1972. Remnants of the mixed conifer type exist on top and in the drainages. Scattered clumps of aspen are an important component of the area. Ponderosa pine and Douglas fir were transplanted, but at the present time the clear cut is dominated by shrubs. In the Kanab Creek Allotment, few cattle make it this far out of the drainages. The area is used as summer range by deer and elk.

The study area is typical of the high, previously heavily timbered areas of the Paunsaugunt Plateau. The hillside site has a southwest exposure and a moderate slope of 15% with an elevation of 8,600 feet. There appears to have been initially some soil erosion after the clear cut, but now vegetation and litter cover appear to have stabilized the soil over most of the slope. Seeding of perennial grasses on the road cuts and bare areas have helped minimize excessive soil loss. However, there are a few problem areas remaining. The soil, derived from Wasatch limestone parent material, is relatively shallow with an estimated effective rooting depth (see methods) of just over 12 inches. Soil texture is a clay with a slightly acid pH (6.5). It contains a large concentration of rocks and fragments throughout the profile and on the surface. Phosphorus may be limiting to plant growth at only 6.4 ppm, where 10 ppm is considered minimal for normal plant development. The young conifers planted on the site 20 years ago average six to ten feet in height. The density for the planted conifer species was estimated at 300 plants per acre in 1987. Point-quarter data from 1997 estimate 21 ponderosa pine trees/acre with an average diameter of 5.7 inches, 13 white fir trees/acre averaging 4.8 inches in diameter, and 59 Douglas fir trees/acre with an average diameter of 3.7 inches. Some aspen also occur on the site. Shrub density strip data from 1997 estimates 180 aspen trees/acre, over half of which were classified as mature.

Currently, the dominant vegetation on the site is a mixture of shrubs. The prevalent key species are: wax currant, Wood's rose, snowberry, Fendler ceanothus, and serviceberry. These species have a combined density of 10,160 plants/acre in 1997 which represents 65% of the browse cover. Of these key species, wax currant is the most abundant shrub with a relatively consistent density of 1,620 plants/acre in 1997. These shrubs provide 29% of the shrub cover on the site. Mature plants are large, averaging over four feet in height with a crown diameter of over five feet. Use has been light to moderate since 1987 with good vigor. Snowberry appears to have a balanced population with moderate to heavy use reported on 88% of the shrubs in 1987. Heavy use has since declined and is currently mostly light use. Wood's rose and Fendler ceanothus populations increased dramatically in 1992 due to a large increase in young plants. Numbers have since declined. Fendler ceanothus has displayed consistently heavy use since 1987 when all plants sampled were classified as heavily hedged. Current use is heavy on 40% of the shrubs. Recruitment is poor yet vigor is good. Greenleaf manzanita appears to be increasing on the site from a density of 133 plants/acre in 1987 to 680 in 1997. Oregon grape has declined in density from a high of 36,799 plants/acre in 1987 to 13,300 by 1997.

Herbaceous species are not abundant on this site due to the abundant shrub and tree overstories. Grasses combined to produce only 5% total cover in 1992, declining to 3% by 1997. The most common native species are: bottlebrush squirrel-tail, a *Carex*, intermediate wheatgrass, fringed brome, and Letterman needlegrass. Seeded species, restricted mainly to road cuts, include: Kentucky bluegrass, crested wheatgrass, intermediate wheatgrass, and timothy. Forbs are diverse and make up 66% of the herbaceous understory in 1997. Elkweed, common on the more open rocky openings, has been heavily used by wildlife in the past. Penstemon, Oregon fleabane, redroot buckwheat, and groundsel are often utilized when available.

1992 TREND ASSESSMENT

The soil trend for this site should be examined closely because of the total vegetative cover, the majority is made up of browse (66%). Shrub cover does not protect soils as well as herbaceous cover, especially from the effects of high intensity summer storms. Because the forb and grass nested frequency values are both declining with percent bare ground and percent rock-pavement both increasing, trend for soils is slightly down. Browse trend for this site is slightly up. Percent decadence for key species is low with good biotic potentials and good percentages of young plants indicating a healthy increasing population of shrubs. The trend for the herbaceous understory of grasses and forbs is downward. Nested frequency values for both show significant decreases, especially for the forbs.

TREND ASSESSMENT

soil - slightly down

browse - slightly up

herbaceous understory - down

1997 TREND ASSESSMENT

The soil trend continues to be slightly down. Percent bare ground declined slightly, but this is due mainly to an increase in rock and pavement cover. Vegetative cover declined slightly and sum of nested frequency of grasses and forbs declined by 32%. In addition, litter cover also declined from 54% to 47%. Trend for browse appears stable for the key species. Use remains mostly light to moderate and vigor good. Trend for the herbaceous understory is down due to a decline in the sum of nested frequency for both grasses and forbs. This will likely be a continuing trend as shrubs and trees become more dominant on the site.

TREND ASSESSMENT

soil - slightly down

browse - stable

herbaceous understory - down

HERBACEOUS TRENDS --

Herd unit 27, Study no: 4

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'97	'87	'92	'97	'92	'97
G	Agropyron intermedium	a-	b52	c20	-	23	9	.66	.12
G	Agropyron trachycaulum	-	5	9	-	2	3	.06	.01
G	Bromus ciliatus	b58	ab55	a35	29	21	15	1.02	.44
G	Bromus inermis	-	5	1	-	2	1	.06	.00
G	Carex spp.	b67	a44	a42	36	25	18	.69	.75
G	Oryzopsis hymenoides	1	2	3	1	1	2	.03	.03
G	Phleum pratense	-	-	6	-	-	2	-	.06
G	Poa fendleriana	b32	a30	ab23	13	14	11	.57	.40
G	Sitanion hystrix	c202	b119	a26	80	47	11	1.22	.25
G	Stipa columbiana	a-	a-	b12	-	-	4	-	.02
G	Stipa comata	-	6	-	-	2	-	.18	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'97	'87	'92	'97	'92	'97
G	<i>Stipa lettermani</i>	47	35	39	20	15	16	.61	.84
Total for Grasses		407	353	216	179	152	92	5.11	2.95
F	<i>Achillea millefolium</i>	-	1	2	-	1	1	.00	.00
F	<i>Antennaria rosea</i>	-	-	1	-	-	1	-	.00
F	<i>Androsace septentrionalis</i> (a)	-	-	9	-	-	5	-	.02
F	<i>Arabis holboellii</i>	_b 11	_a -	_a -	5	-	-	-	-
F	<i>Aster</i> spp.	-	-	46	-	-	17	-	.80
F	<i>Astragalus</i> spp.	5	7	9	4	3	4	.06	.10
F	<i>Cirsium wheeleri</i>	137	110	131	65	51	59	3.85	2.95
F	<i>Draba subalpina</i>	_a -	_c 72	_b 21	-	27	8	.16	.04
F	<i>Erigeron</i> spp.	-	-	-	-	-	-	-	.03
F	<i>Erigeron speciosus</i>	_c 73	_b 55	_a -	32	23	-	1.07	-
F	<i>Frasera speciosa</i>	_b 45	_{ab} 25	_a 9	21	12	6	.42	.38
F	<i>Gentiana calycosa</i>	-	-	2	-	-	1	-	.03
F	<i>Geranium caespitosum</i>	3	6	-	1	3	-	.04	-
F	<i>Lithophragma</i>	-	-	2	-	-	1	-	.03
F	<i>Lomatium</i> spp.	59	36	28	22	18	11	.18	.10
F	<i>Penstemon caespitosus</i>	-	-	2	-	-	1	-	.03
F	<i>Penstemon</i> spp.	40	41	34	14	18	15	.48	.25
F	<i>Polygonum douglasii</i> (a)	-	-	2	-	-	1	-	.00
F	<i>Senecio multilobatus</i>	_c 78	_b 39	_a -	38	16	-	1.13	-
F	<i>Solidago sparsiflora</i>	_a 11	_b 54	_a 13	5	23	5	.63	.49
F	<i>Taraxacum officinale</i>	_b 42	_a 17	_a 23	22	8	10	.09	.12
F	<i>Thlaspi</i> spp.	100	-	-	40	-	-	-	-
F	<i>Tragopogon dubius</i>	_b 9	_{ab} 3	_a -	4	1	-	.00	-
F	Unknown forb-perennial	_b 11	_{ab} 1	_a -	5	1	-	.03	-
F	<i>Viguiera multiflora</i>	_a -	_a -	_b 8	-	-	4	-	.36
Total for Forbs		624	467	342	278	205	150	8.19	5.77

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --
Herd unit 27, Study no: 4

Type	Species	Strip Frequency		Average Cover %	
		'92	'97	'92	'97
B	Amelanchier alnifolia	4	2	.06	.03
B	Arctostaphylos patula	10	15	1.00	3.34
B	Ceanothus fendleri	11	7	.73	2.52
B	Chrysothamnus parryi attenuatus	-	-	-	.03
B	Clematis columbiana	3	8	1.45	.48
B	Haplopappus zionis	10	0	.21	-
B	Juniperus communis	3	3	.33	.15
B	Mahonia repens	90	89	4.41	3.72
B	Pachistima myrsinites	36	30	1.03	1.10
B	Pinus flexilis	1	0	-	-
B	Pinus ponderosa	3	0	1.61	-
B	Populus tremuloides	1	4	-	-
B	Pseudotsuga menziesii	12	10	.37	-
B	Ribes cereum inebrians	44	40	7.78	7.13
B	Rosa woodsii	63	44	3.30	2.21
B	Symphoricarpos oreophilus	45	37	4.01	4.21
Total for Browse		336	289	26.34	24.95

CANOPY COVER --
Herd unit 27, Study no: 4

Species	Percent Cover '97
Populus tremuloides	3
Pseudotsuga menziesii	2
Ribes cereum inebrians	2

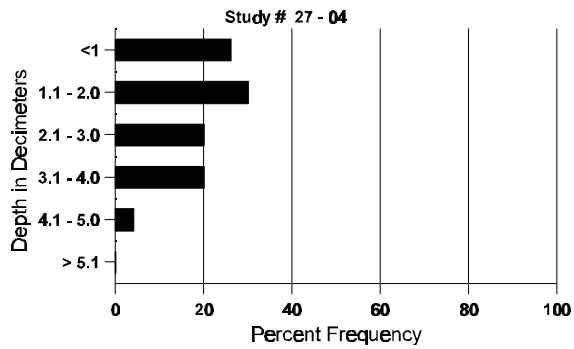
BASIC COVER --
Herd unit 27, Study no: 4

Cover Type	Nested Frequency		Average Cover %		
	'92	'97	'87	'92	'97
Vegetation	320	317	6.00	36.34	34.04
Rock	75	206	4.50	8.79	8.46
Pavement	27	205	1.25	0	3.47
Litter	254	386	66.75	53.79	47.12
Cryptogams	-	33	.50	0	.45
Bare Ground	164	252	21.00	23.40	20.55

SOIL ANALYSIS DATA --
Herd Unit 27, Study no: 04

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.6	48.2 (14.8)	6.5	31.0	27.2	41.8	3.4	6.4	115.2	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 27, Study no: 4

Type	Quadrat Frequency	
	'92	'97
Rabbit	8	5
Elk	2	1
Deer	16	20

BROWSE CHARACTERISTICS --

Herd unit 27, Study no: 4

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					
Amelanchier alnifolia													
Y	87	-	-	-	-	-	-	-	0	-	0		
	92	2	-	-	1	-	-	1	-	80	4		
	97	-	-	-	5	-	-	-	-	100	5		
M	87	-	-	-	-	-	-	-	0	-	0		
	92	-	-	-	-	-	-	-	0	-	0		
	97	-	-	1	-	-	-	-	20	14 8	1		
D	87	-	-	-	-	-	-	-	0	-	0		
	92	2	-	-	-	-	-	-	40	-	2		
	97	-	-	-	-	-	-	-	0	-	0		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'87		00%		00%		00%		Appeared					
'92		00%		00%		00%		+ 0%					
'97		00%		17%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'87	0	Dec:	0%
										'92	120		33%
										'97	120		0%
Arctostaphylos patula													
S	87	-	-	-	-	-	-	-	0	-	0		
	92	2	-	-	-	-	-	-	40	-	2		
	97	3	-	-	1	-	-	-	80	-	4		
Y	87	-	-	-	-	-	-	-	0	-	0		
	92	1	-	-	-	-	-	-	20	-	1		
	97	1	-	-	-	-	-	-	20	-	1		
M	87	2	-	-	-	-	-	-	133	23 71	2		
	92	10	-	-	-	-	-	-	200	-	10		
	97	32	-	-	-	-	-	-	640	22 55	32		
D	87	-	-	-	-	-	-	-	0	-	0		
	92	-	-	-	-	-	-	-	0	-	0		
	97	1	-	-	-	-	-	-	20	-	1		
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>					
'87		00%		00%		00%		+40%					
'92		00%		00%		00%		+68%					
'97		00%		00%		03%							
Total Plants/Acre (excluding Dead & Seedlings)										'87	133	Dec:	0%
										'92	220		0%
										'97	680		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				
<i>Ceanothus fendleri</i>																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	15	-	-	-	-	-	-	-	-	15	-	-	-	300		15	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	19	45	30	-	-	-	-	-	-	94	-	-	-	1880		94	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	1	-	-	-	-	-	-	1	-	-	-	66	17	65	1
	92	5	73	34	-	1	-	-	-	-	113	-	-	-	2260	-	-	113
	97	12	-	8	-	-	-	-	-	-	20	-	-	-	400	9	47	20
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	5	-	-	1	-	-	-	3	-	-	3	120		6	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			100%			00%			+98%							
'92		56%			33%			01%			-91%							
'97		00%			40%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	0%			
												'92	4260		3%			
												'97	400		0%			
<i>Clematis columbiana</i>																		
S	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	6	-	-	-	-	-	-	-	-	6	-	-	-	400		6	
	92	2	-	-	7	-	-	-	-	-	9	-	-	-	180		9	
	97	3	-	-	2	-	-	-	-	-	5	-	-	-	100		5	
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	29	4	1
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20	-	-	1
	97	3	-	-	1	-	-	3	-	-	7	-	-	-	140	18	25	7
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			-57%							
'92		00%			00%			00%			+17%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	466	Dec:	-			
												'92	200		-			
												'97	240		-			

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				
Haplopappus zionis																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	57	-	-	2	-	-	-	-	-	59	-	-	-	1180		59	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	22	46	4	-	-	-	-	-	-	71	-	1	-	1440		72	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	1	17	20	-	-	-	-	-	-	37	-	1	-	760	-	38	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	1	-	-	-	-	-	-	-	-	-	1	-	20		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			Appeared							
'92		58%			22%			03%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%			
												'92	2220		1%			
												'97	0		0%			
Juniperus communis																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	4	-	-	4	-	-	-	80		4	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	92	3	-	-	-	-	-	-	-	-	2	-	1	-	60	-	3	
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100	16	37	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			Appeared							
'92		00%			00%			33%			+50%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	60		-			
												'97	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				
Mahonia repens																		
S	87	94	-	-	-	-	-	-	-	-	94	-	-	-	6266		94	
	92	228	3	-	43	-	-	29	-	-	303	-	-	-	6060		303	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	87	542	-	-	-	-	-	-	-	-	539	3	-	-	36133		542	
	92	810	11	-	144	11	-	185	-	-	1161	-	-	-	23220		1161	
	97	139	-	-	3	-	-	27	-	-	165	-	-	-	3380		169	
M	87	10	-	-	-	-	-	-	-	-	10	-	-	-	666	4	4	10
	92	282	9	-	163	-	-	148	-	-	602	-	-	-	12040	-	-	602
	97	365	-	-	101	-	-	30	-	-	491	-	-	5	9920	4	5	496
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	1	8	-	-	-	-	-	9	-	-	-	180		9	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			- 4%							
'92		02%			.05%			00%			-62%							
'97		00%			00%			.75%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	36799	Dec:	0%				
											'92	35440		1%				
											'97	13300		0%				
Pachistima myrsinites																		
S	87	9	-	-	-	-	-	-	-	-	9	-	-	-	600		9	
	92	30	-	-	2	-	-	1	-	-	33	-	-	-	660		33	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	87	29	-	-	-	-	-	-	-	-	29	-	-	-	1933		29	
	92	185	19	5	8	-	-	65	-	-	282	-	-	-	5640		282	
	97	35	-	-	6	-	-	2	-	-	43	-	-	-	860		43	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	14	-	2	2	-	5	9	-	-	32	-	-	-	640	-	-	32
	97	30	-	-	41	-	-	11	-	-	82	-	-	-	1640	5	6	82
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			+69%							
'92		06%			04%			00%			-60%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	1933	Dec:	0%				
											'92	6300		0%				
											'97	2500		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				
Pinus flexilis																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			Appeared							
'92		00%			00%			00%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	20		-			
												'97	0		-			
Pinus ponderosa																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	92	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			-77%							
'92		00%			00%			00%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	266	Dec:	-			
												'92	60		-			
												'97	0		-			
Populus tremuloides																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	2	2	-	-	-	-	-	-	-	1	-	3	-	80		4	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100	-	-	5
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			Appeared							
'92		00%			00%			00%			+89%							
'97		22%			00%			33%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	20		-			
												'97	180		-			

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				
Pseudotsuga menziesii																		
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	92	7	2	-	1	-	-	2	-	-	12	-	-	-	240		12	
	97	7	-	-	-	-	-	1	-	-	7	-	1	-	160		8	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			+73%							
'92		17%			00%			00%			- 8%							
'97		00%			00%			09%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	66	Dec:	-				
											'92	240		-				
											'97	220		-				
Ribes cereum inebrians																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	22	-	-	1	14	-	1	-	-	38	-	-	-	760		38	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	87	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8	
	92	10	2	1	5	-	-	4	-	-	22	-	-	-	440		22	
	97	1	-	-	2	-	-	-	-	-	3	-	-	-	60		3	
M	87	17	1	-	-	-	-	-	-	-	17	-	1	-	1200	35	27	
	92	24	13	8	1	11	-	-	-	-	57	-	-	-	1140	-	-	
	97	60	3	-	5	7	-	-	-	-	75	-	-	-	1500	53	67	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	2	1	1	-	-	-	-	-	-	3	-	1	-	80		4	
	97	3	-	-	-	-	-	-	-	-	2	-	-	1	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		04%			00%			04%			- 4%							
'92		33%			12%			01%			- 2%							
'97		12%			00%			01%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	1733	Dec:	0%				
											'92	1660		5%				
											'97	1620		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				
Rosa woodsii																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	92	51	-	-	3	-	-	16	-	-	70	-	-	-	1400		70	
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	87	12	6	1	-	-	-	-	-	-	19	-	-	-	1266		19	
	92	355	174	4	66	-	-	78	-	-	672	-	5	-	13540		677	
	97	175	-	-	14	-	-	25	-	-	214	-	-	-	4280		214	
M	87	4	6	-	-	-	-	-	-	-	10	-	-	-	666	9	6	10
	92	30	10	13	4	4	-	5	-	-	66	-	-	-	1320	-	-	66
	97	52	4	-	17	-	-	8	-	-	81	-	-	-	1620	11	9	81
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	2	6	-	-	-	-	-	8	-	-	-	160		8	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		41%			03%			00%			+87%							
'92		25%			03%			.66%			-61%							
'97		01%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	1932	Dec:	0%				
											'92	15020		1%				
											'97	5900		0%				
Symphoricarpos oreophilus																		
S	87	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	92	19	-	-	22	-	1	13	-	-	55	-	-	-	1100		55	
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	87	2	1	-	-	-	-	-	-	-	2	-	1	-	200		3	
	92	27	5	3	20	4	-	10	-	-	69	-	-	-	1380		69	
	97	13	-	-	3	-	-	-	-	-	16	-	-	-	320		16	
M	87	-	6	5	-	-	-	-	-	-	11	-	-	-	733	15	27	11
	92	21	27	16	2	-	3	2	-	-	65	-	6	-	1420	-	-	71
	97	56	4	-	23	6	-	-	-	-	89	-	-	-	1780	18	33	89
D	87	-	1	1	-	-	-	-	-	-	-	-	1	1	133		2	
	92	2	2	1	7	2	-	-	-	-	14	-	-	-	280		14	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		50%			38%			19%			+65%							
'92		26%			15%			04%			-31%							
'97		09%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	1066	Dec:	12%				
											'92	3080		9%				
											'97	2120		1%				

Trend Study 27-5-97

Study site name: Podunk Creek .

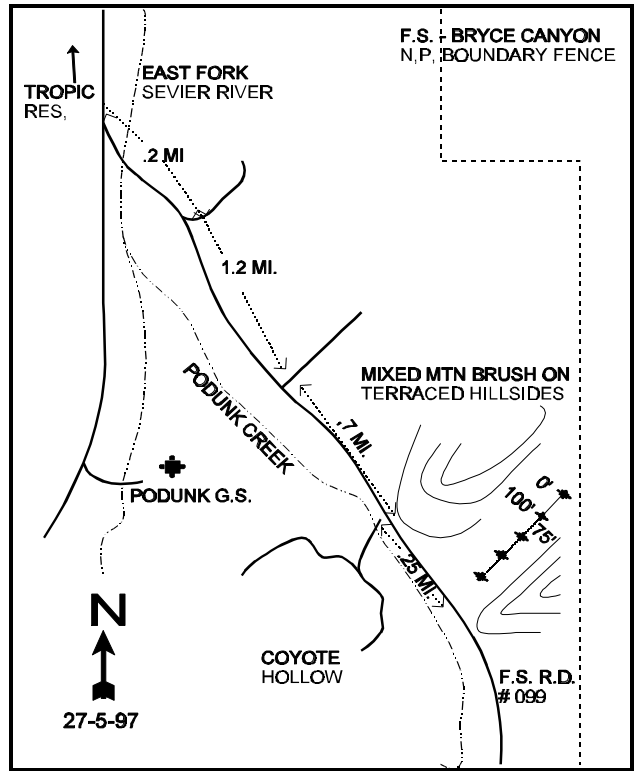
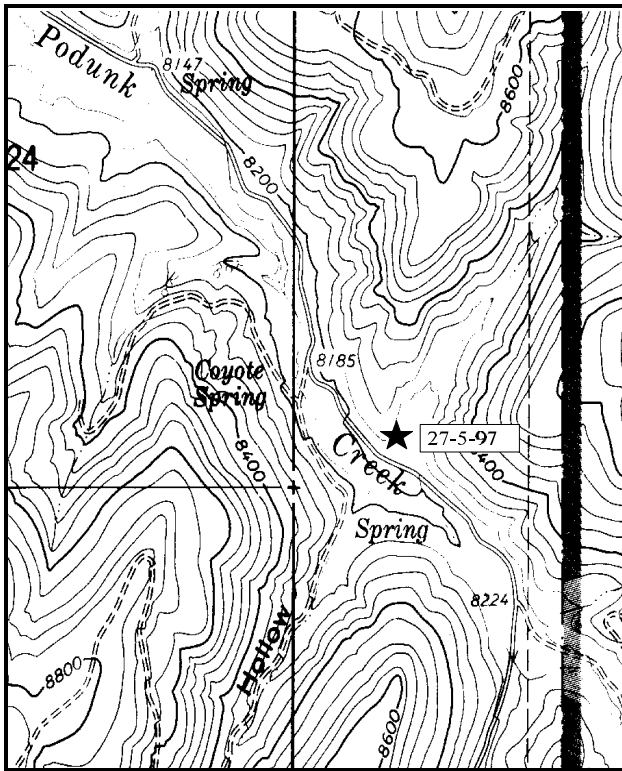
Range type: Dry Meadow .

Compass bearing: frequency baseline 185 degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

Travel about 7 miles south from Tropic Reservoir on the East Fork of the Sevier River Road to a major fork. Turn left towards Podunk Creek and the park boundary. Travel 2.1 miles SE on the main road up Podunk Creek to a fork at Coyote Hollow. Stay left on USFS road #099 and continue about 0.2 miles to a point in the middle of the valley to the north. The transect is in the bottom of this seeded meadow valley. The end of the baseline can be found 125 feet north of the road. The study is marked by short fenceposts. The 0-foot baseline stake is 375 feet north of the end stake, as the study runs from there back southwest.



Map Name: Podunk Creek

Diagrammatic Sketch

Township 38S, Range 4W, Section Unsurveyed.

UTM 4148750.476 N, 387798.969 E

DISCUSSION

Trend Study No. 27-5 (52-5)

The Podunk Creek study is located in a narrow valley off of Podunk Creek. It samples a contour-trenched and seeded dry meadow. Due to serious erosion and gully formation caused by overgrazing in the early part of this areas grazing history, watershed rehabilitation treatments were undertaken in the 1960's all along the East Fork of the Sevier River drainage. The treatment here successfully established a dense stand of perennial grasses, stopped overland flows and erosion, and helped heal the adjacent gully. Erosion is now almost non-existent due to the contoured trenching treatment and the dense grass and litter cover.

The valley slopes gently (about 3%) to the south into Podunk Creek. Elevation at the site is 7,900 feet. The soil is moderately deep with an effective rooting depth (see methods) of almost 19 inches. Soil texture analysis indicates it to be a clay loam with a neutral pH (7.2). Percent organic matter is relatively high at 4.1%, the highest amount on the unit. This upper part of the East Fork watershed is grazed by cattle in late summer. Use has been moderate to heavy over the years due to proximity of the site to water. There is little sign of big game use as seen in the low quadrat frequency of deer and elk pellet groups. Livestock quadrat frequency has almost quadrupled since 1992.

Browse is not a significant component of this community and it appears that no shrubs occurred in the density plots in 1987. The surrounding hills are dominated by mixed conifer and aspen with no evidence of forest invading into the meadow. The much larger sample size used in 1992 and 1997 picked up a small number of shrubs. The only fairly common species found on the study in 1997 were Vasey rabbitbrush (4,060 plants/acre), rubber rabbitbrush (480 plants/acre), low rabbitbrush (80 plants/acre), and a few broom snakeweed. These shrubs show occasional use but are mostly unutilized.

A very dense stand of grasses characterizes the meadow. Smooth brome is the most abundant species with a quadrat frequency of 100% and a cover value of 22% in 1997. Smooth brome is a vigorous, rhizomatous species which is a sod former and provides excellent ground cover. Letterman needlegrass, Kentucky bluegrass, and Mountain muhly are also common. Kentucky bluegrass has displayed a significant decline in nested frequency since 1992. During the 1992 reading, it had a quadrat frequency of 77% and a average cover of over 7%. It currently has a quadrat frequency of only 19% and a cover value of about 2%. This decrease is most likely due to the recent drought. The other common grasses have remained at similar levels since 1992. Due to heavy livestock use in 1987, little seed production was observed that summer. Use was only moderate in 1992 and 1997 with grasses showing good seed production.

Forbs provide a fair forage source making up 18% of the total vegetative cover in 1997. The most numerous species include: western aster, trailing fleabane, redroot eriogonum, and northwest cinquefoil. Most of these species are low growing increasers.

1992 TREND ASSESSMENT

The trend for soils is stable even with an average cover value of 27% for bare ground. With most other communities, this high of a value for bare ground could indicate possible future problems. However, because the herbaceous cover makes up 96% of the total cover, the soils have excellent protection from high intensity summer storms. The trend for browse is not important on this summer range for it only makes up 4% of the total vegetative cover. However, trend for browse for this site appears stable, but almost non-existent. The herbaceous understory is very vigorous and is dominated by one species (smooth brome). Trend for grasses and forbs is slightly up for both with regard to their sum of nested frequency values.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - slightly up

1997 TREND ASSESSMENT

Trend for soil is stable even though percent cover of vegetation declined somewhat. However, percent liter cover increased substantially. Percent bare ground is still relatively low at 22% and there does not appear to be an erosion problem. Trend for the small browse component appears up slightly although not an important aspect on this summer range. Trend for the herbaceous understory is down slightly. Sum of nested frequency of grasses and forbs has declined by 31%. However, nested frequency of the dominant species, smooth brome, has not changed significantly since 1987. The most obvious change is the significant decline in the nested frequency of Kentucky bluegrass. Quadrat frequency was 77% with an average cover value of over 7% in 1992. Currently, it has a quadrat frequency of only 19% and an average cover value of less than one percent.

TREND ASSESSMENT

soil - stable

browse - up slightly

herbaceous understory - down slightly

HERBACEOUS TRENDS --

Herd unit 27, Study no: 5

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'97	'87	'92	'97	'92	'97
G	Agropyron intermedium	_b 18	_a -	_a -	6	-	-	-	-
G	Bromus inermis	356	348	357	99	96	100	31.07	22.11
G	Koeleria cristata	10	15	-	3	6	-	.27	-
G	Muhlenbergia montana	_{ab} 60	_b 75	_a 85	30	31	34	1.50	1.56
G	Poa fendleriana	1	2	-	1	1	-	.15	-
G	Poa pratensis	_b 227	_b 248	_a 44	70	77	19	7.19	.22
G	Poa secunda	4	-	-	1	-	-	-	-
G	Stipa columbiana	-	-	3	-	-	1	-	.00
G	Stipa comata	-	3	-	-	1	-	.03	-
G	Stipa lettermani	152	178	167	67	70	71	4.14	1.66
Total for Grasses		828	869	656	277	282	225	44.36	25.55
F	Antennaria rosea	-	8	6	-	3	2	.56	.30
F	Androsace septentrionalis (a)	-	24	-	-	12	-	.11	-
F	Artemisia dracunculus	_a -	_a -	_b 8	-	-	4	-	.36
F	Arenaria spp.	_b 10	_a -	_a -	4	-	-	-	-
F	Astragalus convallarius	_a -	_b 164	_a 1	-	59	1	3.01	.00
F	Aster occidentalis	_b 40	_a -	_c 124	20	-	43	-	1.39
F	Astragalus spp.	2	-	-	2	-	-	.00	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'97	'87	'92	'97	'92	'97
F	Castilleja linariaefolia	-	-	3	-	-	1	-	.00
F	Cruciferae	5	-	-	3	-	-	-	-
F	Equisetum spp.	2	-	-	2	-	-	-	-
F	Erigeron flagellaris	_c 298	_b 194	_a 53	97	75	22	4.52	.65
F	Erigeron spp.	_a -	_a -	_b 18	-	-	8	-	.11
F	Eriogonum racemosum	17	18	29	8	9	15	.75	.64
F	Hymenoxys richardsonii	_{ab} 4	_b 6	_a -	1	4	-	.09	-
F	Polygonum douglasii (a)	-	-	5	-	-	4	-	.02
F	Potentilla gracilis	36	82	51	17	28	16	6.46	2.15
F	Polygonum spp.	-	14	-	-	7	-	.03	-
F	Senecio spartioides	_b 9	_{ab} 4	_a -	4	1	-	.01	-
F	Taraxacum officinale	3	-	-	1	-	-	-	-
F	Tragopogon dubius	3	7	-	3	3	-	.09	-
F	Unknown forb-perennial	2	-	-	1	-	-	-	-
F	Vicia americana	-	2	-	-	1	-	.00	-
Total for Forbs		431	523	298	163	202	116	15.67	5.65

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --

Herd unit 27, Study no: 5

Type	Species	Strip Frequency		Average Cover %	
		'92	'97	'92	'97
B	Chrysothamnus nauseosus albicaulis	0	12	-	1.09
B	Chrysothamnus parryi parryi	5	0	.78	.15
B	Chrysothamnus vaseyi	34	44	1.75	3.19
B	Chrysothamnus viscidiflorus	6	2	.18	.30
B	Gutierrezia sarothrae	1	1	-	.15
Total for Browse		46	59	2.71	4.88

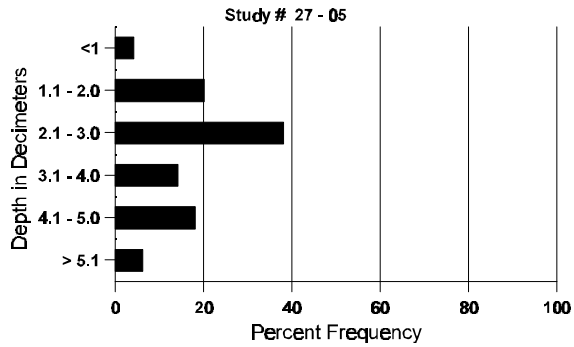
BASIC COVER --
Herd unit 27, Study no: 5

Cover Type	Nested Frequency		Average Cover %		
	'92	'97	'87	'92	'97
Vegetation	387	376	19.75	53.47	39.04
Rock	86	130	1.25	5.67	.96
Pavement	59	264	3.50	0	4.96
Litter	281	392	52.00	28.00	39.34
Cryptogams	-	-	0	.00	0
Bare Ground	224	328	23.50	27.11	22.03

SOIL ANALYSIS DATA --
Herd Unit 27, Study no: 05

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
18.5	52.0 (17.7)	7.2	31.7	37.7	30.6	4.1	24.5	332.8	.7

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 27, Study no: 5

Type	Quadrat Frequency	
	'92	'97
Elk	-	3
Deer	3	4
Cattle	6	23

BROWSE CHARACTERISTICS --

Herd unit 27, Study no: 5

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 nauseosus albicaulis</i>																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	14	-	-	-	-	-	-	-	-	14	-	-	-	280			14
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	10	-	-	-	-	-	-	-	-	10	-	-	-	200	16	19	10
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'92		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	0		-			
												'97	480		-			
<i>Chrysothamnus parryi parryi</i>																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	1	-	-	-	-	-	-	-	2	-	-	-	40			2
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	19	21	0
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	1	-	-	-	-	-	-	-	1	1	-	-	40			2
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			Appeared							
'92		33%			00%			00%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%			
												'92	120		33%			
												'97	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			
Chrysothamnus vaseyi																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	22	-	-	-	-	-	-	-	-	22	-	-	-	440		22
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	109	-	-	-	-	-	-	-	-	109	-	-	-	2180	-	109
	97	202	-	-	-	-	-	-	-	-	200	2	-	-	4040	6 12	202
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	12	-	-	-	-	-	-	-	-	8	-	4	-	240		12
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>						
'87		00%			00%			00%			Appeared						
'92		00%			00%			03%			+30%						
'97		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	0%			
											'92	2860		8%			
											'97	4060		0%			
Chrysothamnus viscidiflorus																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	92	9	-	-	-	-	-	-	-	-	9	-	-	-	180	-	9
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	10 11	2
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	3	3	-	-	-	-	-	-	-	6	-	-	-	120		6
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>						
'87		00%			00%			00%			Appeared						
'92		18%			00%			00%			-76%						
'97		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	0%			
											'92	340		35%			
											'97	80		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				
Eriogonum microthecum																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	17	18	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'87	00%			00%			00%			None							
	'92	00%			00%			00%			None							
	'97	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	0		-			
												'97	0		-			
Gutierrezia sarothrae																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	'97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	15	20	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
	'87	00%			00%			00%			Appeared							
	'92	00%			00%			00%			+ 0%							
	'97	00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	20		-			
												'97	20		-			

Trend Study 27-6-97

Study site name: Nephi Pasture I .

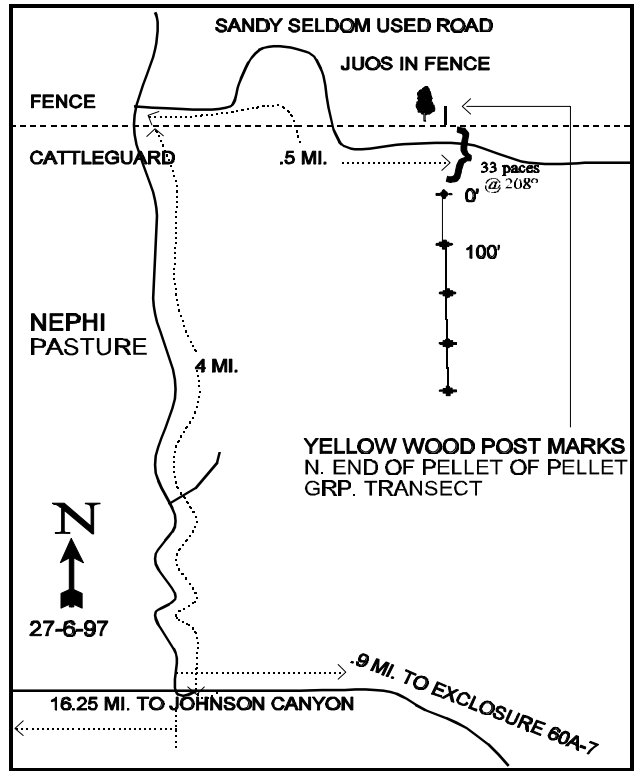
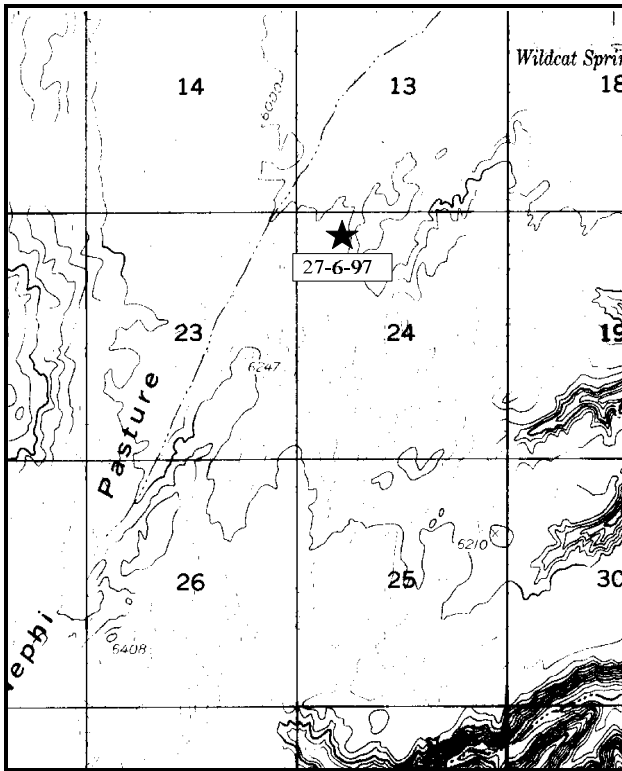
Range type: Big Sagebrush .

Compass bearing: frequency baseline 165 degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

From Kanab, take US 89 east for 9.4 miles to the Johnson Canyon turnoff. Turn left and travel up Johnson Canyon 9.75 miles to the Lock Ridge-Nephi Pasture road. Turn right. Go 3.6 miles to a cattleguard. Go 0.8 miles to a fork, bear right (There are lots of forks, stay on main Nephi Pasture road). Go 1.25 miles to a fork, keep right. Go 0.85 miles to a fork by a cattleguard, continue straight. Continue 1.2 miles to a cattleguard. Continue 4.7 miles to a fork, bear right. Go 0.7 miles to a cattleguard, and continue 2.8 miles to an intersection. Turn left (straight goes to Nephi Point and the Nephi Pasture enclosure) and follow this road 4 miles to a cattleguard. Turn right and follow the road up the fence 0.5 miles to a yellow-painted wood post marking the pellet group transect and range trend study. The 0-foot baseline stake is 33 paces @ 208°M south of the yellow post. The trend study is marked by short fenceposts, and runs south along the pellet group transect.



Map Name: Buckskin Mountain

Diagrammatic Sketch

Township 41S, Range 4W, Section 24

UTM 4121457.335 N,395377.311 E

DISCUSSION

Trend Study No. 27-6 (52-6)

The Nephi Pasture I study is an important spring-fall range for deer, but it receives the most use in light winters. Most of this area below the White Cliffs is a sagebrush/grass or pinyon-juniper woodland. The study samples a basin big sagebrush community with scattered mixed browse associated with a sparse herbaceous understory. Although cattle were present in the lower end of Nephi Pasture in 1987, there was little sign or forage on the site. Water is limited in this area in the summer. Deer pellet group frequency was 30% in 1992 and a high of 49% in 1997.

Elevation at the study site is approximately 6,000 feet. The slope is 5-8% with a northwest exposure. There is some snow cover in winter, but most of the annual precipitation comes during the summer monsoons as high intensity thunderstorms. Consequently, the loose, excessively drained sandy soil is susceptible to soil movement as evidenced with gullies in the drainages. It is also susceptible to wind erosion. Soil depth on the stabilized dunes is moderately deep with an effective rooting depth (see methods) of nearly 16 inches. There are some areas with sandstone occurring at a depth of 10 to 12 inches. Organic matter is very low at less than one percent. Shrubs and grasses either have exposed roots or a buildup of soil, but cover appears adequate to help minimize soil loss from the site.

Due to competition for moisture in the sandy soils, basin big sagebrush is somewhat limited in its density of about 3,000 plants per acre (1 per 15 ft²) in 1987 and 1992. It currently constitutes 67% of the browse cover. Forty-six percent of these moderately sized plants were classified as decadent in 1987 and 25% of the population appearing to have poor vigor. Percent decadence had gone up to 51% by 1992 with only 8% of the population classified with poor vigor. During the 1997 reading, density declined by 30%. However, the number of mature plants has remained stable at about 1,200 plants/acre. The decline comes from a drop in the number of young and decadent plants. Percent decadence has declined to 40% with poor vigor on 30% of the sagebrush. Some individuals are hedged, but overall use is light to moderate. Currently, the dead to live ratio is 1:1.8, or 36% are dead. With the percentage of decadent plants that are now classified as dying, this would raise the dead to live ratio to 1:1.2, or 45% would be dead in the future. This is an obvious indication of further decreases in sagebrush density.

The most preferred browse on the site is antelope bitterbrush. These scattered plants (460 plants/ acre) are moderately to heavily used, but still only 39% were considered decadent in 1997, more importantly none were classified as dead. The bitterbrush displayed vigorous annual growth in 1992 with above normal spring-summer precipitation. The large serviceberry are more scattered, less common and loosely aggregated. With the increased sample size, serviceberry was the population estimate most effected. The available parts of these plants were heavily browsed in 1987. Use is more light to moderate in 1992 and 1997.

The only other woody species sampled on the site was the increaser, broom snakeweed, which occurs in dense patches. The occasional oak clumps showed moderate to heavy use on the outermost branches in 1987. A few of the mature juniper scattered around the slope are highlined.

The most common grass, Sandhill muhly, forms large rings in the open areas. It is of low forage quality and an increaser with heavy grazing. This increaser currently accounts for 69% of the grasses cover and 52% of the total herbaceous cover. Sand dropseed was found along the baseline in 1987 with a quadrat frequency of 11%, but in 1997 it went down to only 5%. The low nested frequency values for both grasses and forbs help describe how really poor the condition is for the herbaceous understory. Overall, grass forage is very limited. Forbs are even more restricted, but the fairly common peavine, toadflax, eriogonum, and globemallow provide some spring forage.

1992 TREND ASSESSMENT

Soil trend for this site would have to be considered down and in poor condition because of the relatively high percentage of bare ground (40%). Total vegetative cover is relatively low at only 34%, but only 18% of that comes from the herbaceous understory, which is the most protective portion of the vegetative cover for high intensity summer storms. The browse trend is slightly down for basin big sagebrush with a slight decrease in density, but more importantly, percent decadency has increased from 46% to 51%. Also, biotic potential (percentage of seedlings to the population) and percentage of the population in the young age class has decreased substantially since 1987. The herbaceous understory is almost nonexistent and they both had decreasing values for nested frequency for perennial species.

TREND ASSESSMENT

soil - down, and poor condition

browse - slightly down

herbaceous understory - down and poor composition

1997 TREND ASSESSMENT

Trend for soil is considered stable (with some slight improvement) but still in poor condition. Percent bare ground declined slightly, however vegetative and litter cover also declined. Erosion is not currently a serious problem on the site. Overall trend for browse would be down. Trend for browse is slightly down for bitterbrush and down for basin big sagebrush (which makes up 67% of the browse cover). Bitterbrush has declined slightly in density. Utilization remains at 1992 levels but a larger proportion of the shrubs display poor vigor. Percent decadence has increased from 33% to 39% and recruitment is poor. Basin big sagebrush shows these same trends. Even though percent decadence has declined due to a die off of decadent plants, 71% of the decadent plants were currently classified as dying. This would mean that an additional 600 plants/acre would be lost and the percentage of dead plants would increase from 36% to 45%. Trend for the herbaceous understory is stable yet depleted. The increase in nested sum of frequency for grasses comes from the a significant increase in the nested frequency of the small annual, sixweeks fescue. Unlike other sites on the unit, grass and forb cover values are similar compared to 1992 estimates.

TREND ASSESSMENT

soil - stable, but in poor condition

browse - down

herbaceous understory - stable, but depleted and very poor

HERBACEOUS TRENDS --

Herd unit 27, Study no: 6

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'97	'87	'92	'97	'92	'97
G	<i>Agropyron smithii</i>	_b 9	_a -	_a -	4	-	-	-	-
G	<i>Bouteloua gracilis</i>	3	-	3	1	-	1	-	.03
G	<i>Muhlenbergia pungens</i>	_b 122	_a 85	_a 97	45	31	32	3.97	3.78
G	<i>Oryzopsis hymenoides</i>	1	10	9	1	4	5	.15	.10
G	<i>Poa fendleriana</i>	-	2	-	-	1	-	.03	-
G	<i>Poa secunda</i>	6	-	-	2	-	-	-	-
G	<i>Sitanion hystrix</i>	15	17	20	7	8	8	.63	.16
G	<i>Sporobolus cryptandrus</i>	19	9	9	11	4	5	.42	.07
G	<i>Vulpia octoflora</i> (a)	_a -	_b 12	_c 168	-	4	62	.02	1.29
Total for Grasses		175	135	306	71	52	113	5.22	5.45
F	<i>Astragalus</i> spp.	3	-	-	1	-	-	-	-
F	<i>Calochortus nuttallii</i>	3	-	6	1	-	3	-	.01
F	<i>Comandra pallida</i>	_b 49	_a 18	_b 44	21	10	19	.16	.85
F	<i>Delphinium bicolor</i>	-	-	2	-	-	1	-	.03
F	<i>Descurainia</i> spp. (a)	_a -	_a 5	_b 47	-	2	24	.01	.35
F	<i>Eriogonum cernuum</i> (a)	_a 6	_b 70	_a 15	2	32	7	.23	.03
F	<i>Gilia</i> spp. (a)	-	-	9	-	-	4	-	.02
F	<i>Lathyrus brachycalyx</i>	65	74	58	31	34	27	.38	.47
F	<i>Lappula occidentalis</i> (a)	-	-	3	-	-	1	-	.03
F	<i>Penstemon</i> spp.	1	-	-	1	-	-	-	-
F	<i>Sphaeralcea parvifolia</i>	1	3	-	1	2	-	.01	-
F	<i>Townsendia</i> spp.	-	1	-	-	1	-	.00	-
Total for Forbs		128	171	184	58	81	86	0.79	1.81

Values with different subscript letters are significantly different at $\alpha = 0.10$ (annuals excluded)

BROWSE TRENDS --
Herd unit 27, Study no: 6

Type	Species	Strip Frequency		Average Cover %	
		'92	'97	'92	'97
B	Amelanchier utahensis	8	7	3.50	2.25
B	Artemisia tridentata tridentata	68	59	19.74	14.50
B	Gutierrezia sarothrae	27	45	1.37	1.79
B	Juniperus osteosperma	2	2	.98	.63
B	Opuntia spp.	0	2	-	-
B	Purshia tridentata	17	17	2.87	2.33
Total for Browse		122	132	28.48	21.52

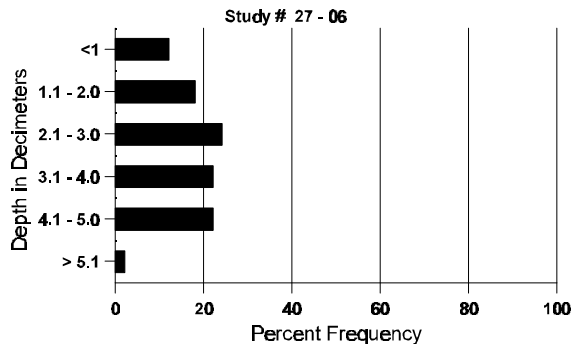
BASIC COVER --
Herd unit 27, Study no: 6

Cover Type	Nested Frequency		Average Cover %		
	'92	'97	'87	'92	'97
Vegetation	251	287	8.00	33.87	29.81
Rock	11	20	.50	1.13	.27
Pavement	11	72	2.00	0	.73
Litter	272	392	60.50	48.39	43.54
Cryptogams	39	63	1.00	1.53	1.53
Bare Ground	249	320	28.00	39.89	34.83

SOIL ANALYSIS DATA --
Herd Unit 27, Study no: 06

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.8	59.6 (13.3)	6.5	88.4	4.1	7.56	.6	13.0	57.6	.3

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 27, Study no: 6

Type	Quadrat Frequency	
	'92	'97
Rabbit	48	27
Deer	30	49
Cattle	-	1

BROWSE CHARACTERISTICS --

Herd unit 27, 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				
Amelanchier utahensis																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	1	1	-	-	-	-	-	-	-	1	-	1	-	40			2
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	7	1	-	11	-	-	3	-	-	14	-	8	-	440			22
	97	7	-	-	3	-	-	-	-	-	10	-	-	-	200			10
M	87	-	-	1	-	-	-	-	-	-	1	-	-	-	66	55	59	1
	92	-	-	-	1	-	-	1	-	-	1	1	-	-	40	-	-	2
	97	3	1	-	-	-	-	1	-	-	5	-	-	-	100	95	111	5
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	1	-	-	-	-	-	-	-	-	-	-	1	20			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			100%			00%			+87%							
'92		08%			00%			36%			-40%							
'97		07%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	66	Dec:	0%			
												'92	500		4%			
												'97	300		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				
Artemisia tridentata tridentata																		
S	87	15	-	-	1	-	-	-	-	-	15	-	1	-	1066		16	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	97	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2	
Y	87	2	3	-	2	-	-	-	-	-	5	1	1	-	466		7	
	92	5	4	-	3	-	-	-	-	-	12	-	-	-	240		12	
	97	2	-	-	1	-	-	-	-	-	3	-	-	-	60		3	
M	87	16	2	3	-	-	-	-	-	-	18	1	2	-	1400	44 32	21	
	92	35	22	-	4	-	-	-	-	-	61	-	-	-	1220	- -	61	
	97	43	9	2	2	4	-	-	-	-	57	-	3	-	1200	39 47	60	
D	87	13	9	2	-	-	-	-	-	-	13	1	5	5	1600		24	
	92	51	20	1	5	-	-	-	-	-	64	1	7	5	1540		77	
	97	29	5	1	2	1	4	-	-	-	11	-	1	30	840		42	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	1180		59	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		27%			10%			25%			-13%							
'92		31%			.66%			08%			-30%							
'97		18%			07%			32%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	3466	Dec:	46%			
												'92	3000		51%			
												'97	2100		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	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	92	17	-	-	-	-	-	-	-	-	17	-	-	-	340		17
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4
	92	5	-	-	5	-	-	1	-	-	11	-	-	-	220		11
	97	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6
M	87	17	-	-	-	-	-	-	-	-	17	-	-	-	1133	8 10	17
	92	42	2	-	17	-	-	-	-	-	61	-	-	-	1220	- -	61
	97	163	-	-	6	-	-	-	-	-	169	-	-	-	3380	11 10	169
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	1	-	1	-	-	-	-	-	-	2	-	-	-	40		2
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			+ 5%						
'92		03%			01%			00%			+58%						
'97		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	1399	Dec:	0%			
											'92	1480		3%			
											'97	3500		0%			
Juniperus osteosperma																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	92	-	-	-	1	-	-	-	-	-	1	-	-	-	20	- -	1
	97	-	-	-	-	-	-	2	-	-	2	-	-	-	40	- -	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'87		00%			00%			00%			Appeared						
'92		00%			00%			00%			+ 0%						
'97		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-			
											'92	40		-			
											'97	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				
Opuntia spp.																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	3	7	1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'92		00%			00%			00%			Appeared							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	0		-			
												'97	40		-			
Purshia tridentata																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	2	5	-	10	-	-	-	-	-	17	-	-	-	340		17	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	92	1	1	-	1	-	-	-	-	-	3	-	-	-	60		3	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	-	2	-	-	-	-	-	-	-	2	-	-	-	133	31	22	2
	92	-	9	3	2	1	-	-	-	-	14	-	1	-	300	-	-	15
	97	-	2	1	2	5	3	-	-	-	13	-	-	-	260	30	49	13
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	2	2	3	1	-	-	-	-	9	-	-	-	180		9	
	97	1	3	2	1	2	-	-	-	-	5	-	-	4	180		9	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		100%			00%			00%			+63%							
'92		52%			19%			04%			-15%							
'97		52%			26%			17%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	199	Dec:	0%			
												'92	540		33%			
												'97	460		39%			

Trend Study 27-7-97

Study site name: Nephi Pasture Enclosure .

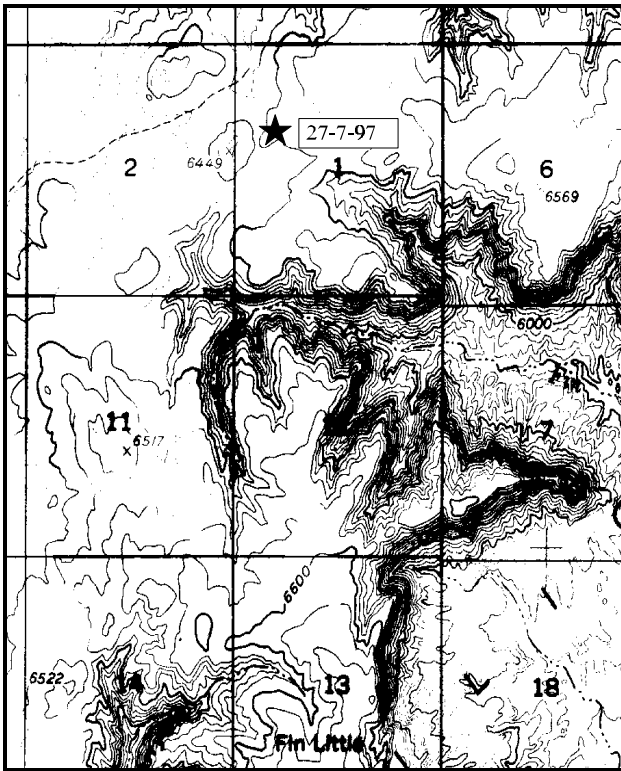
Range type: Mixed Mountain Brush .

Compass bearing: frequency baseline 4 degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

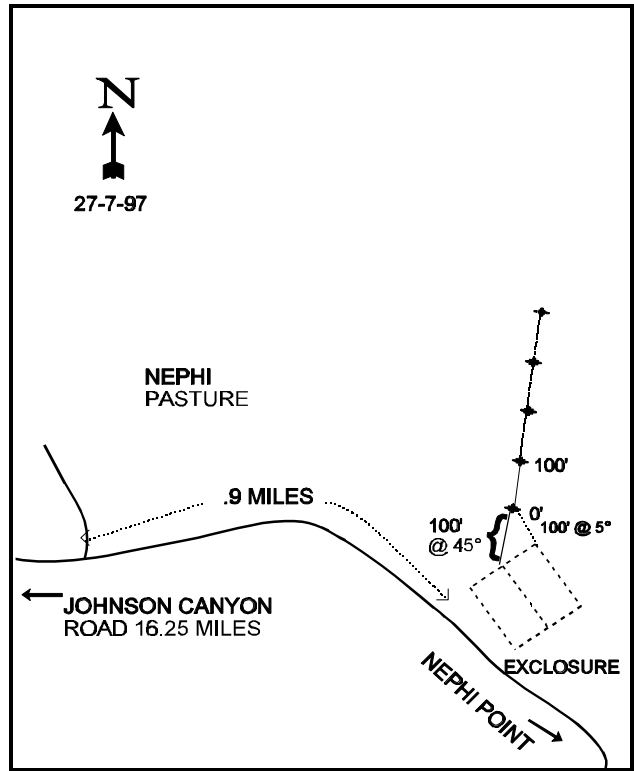
LOCATION DESCRIPTION

From Kanab, take US 9 east for 9.4 miles to Johnson Canyon. Travel north up Johnson Canyon 9.75 miles to the Lock Ridge-Nephi Pasture Road. Turn right. Go 16.25 miles (see 27-6-87 for more detail) on the main road to a major intersection in Nephi Pasture. Continue straight towards Nephi Point, going 0.9 miles to an enclosure. Walk east along the fence on the north side of the enclosure to the inner fence. From the northeast corner of the tallest fence, walk 100 feet NE to the 1st baseline stake, a cut fencepost tagged #7808. The study runs up the hill bearing 20°.



Map Name: Buckskin Mountain

Township 42S, Range 4W, Section 1



Diagrammatic Sketch

UTM 4116620.717 N, 394255.781 E

DISCUSSION

Trend Study No. 27-7 (52-7)

The Nephi Pasture Exclosure study is located about 4 miles south of the Nephi Pasture I study. This exclosure study samples a very similar type of site. Basin big sagebrush is dominant, but bitterbrush is also a relatively common shrub. Both sites are in the Vermillion-Nephi Pasture Allotment, which allows 190 cattle during the winter. The area was identified by the BLM as an Upland Sand (11-13 inches precipitation) site and a mountain big sagebrush/Indian ricegrass habitat type. On this study, the sagebrush was identified during the readings as basin big sagebrush, not mountain big sagebrush, because of its size and growth form, and in addition to the depth of the soils on the site.

The study is set up on the side of a gently sloping (7%) ridge with a west-southwest aspect. Elevation at the site is 6,400 feet. Typical of all of the Nephi Pasture area, the soil is composed largely of fine sand, formed by aeolian derived sandstone parent materials. The soil is moderately deep with an effective rooting depth (see methods) estimated at nearly 21 inches with no rock fragments apparent in the profile. Organic matter is very limited at only 0.7%. There is evidence of wind and surface water erosion but erosion does not appear to be serious due to the sandy texture of the soil combined with the gentle terrain.

Serviceberry, basin big sagebrush, and antelope bitterbrush dominate the shrub component on this site. These key species combine to produce 71% of the vegetative cover on the site in 1997. Mature serviceberry plants are very large averaging 7 feet in height. Available parts of these shrubs have moderate to heavily hedged growth forms. The increased density reported in 1992 may be due to observer differences in counting the rhizomatous shrub in very sandy soil. Clumps of several stems in the same area were considered only one plant in 1997. Vigor is good on most plants and percent decadency is relatively low at only 12% in 1997. The basin big sagebrush numbers approximately 1,700 plants/acre in 1997. It exhibits generally light to moderate use, while averaging 3 to 4 feet in height with some up to 6 feet. Twenty-five percent of the sagebrush were classified as young with a biotic potential (percentage of seedlings to the population) of 2%. Density has declined by 38% since 1992. Dead plants currently number nearly as many as mature and decadent plants combined (1,200 plants/acre). This will continue because currently 93% of the decadent plants were classified as dying. With these added to the percentage of dead plants, the percentage of dead plants in the population will increase from 42% to 58%. A decline in density can be seen in all age classes. The proportion of plants displaying poor vigor has also increased from 24% to 43% between 1992 and 1997. Percent decadence has increased from 33% to 46%. This population of sagebrush continues to die-off.

Bitterbrush has a relatively stable density which has ranged from 1,700 plants/acre in 1992 to 1,240 by 1997. This preferred shrub is sought out by grazing animals with all observed plants being heavily hedged in 1987. Heavy use has since declined to 80% in 1992 and 55% in 1997. Vigor is generally good with low percent decadence. Recruitment has declined since 1987 and 1992, but this variation in reproduction would be expected for this highly variable and hostile habitat for seedling establishment. Broom snakeweed occurs in scattered patches and appears to have a stable, mostly mature population.

The herbaceous understory is rather sparse. Perennial grass cover only totaled 2% in 1992 and 4.5% by 1997. Forb cover was only 2% in 1992 and 3% in 1997. Cheatgrass is found, but in very low numbers. There has been light grazing of the palatable grasses, mainly sand dropseed and western wheatgrass. Forbs include penstemon, bastard toadflax, and redroot eriogonum, but none are especially common.

1992 TREND ASSESSMENT

Percent bare ground is now estimated at 27%, down from almost 39% in 1987. Percent litter cover is a little lower than 1987 estimates. Trend for soil is considered slightly up but still in poor condition. Because the sample size is much larger now, many of the estimates for browse species have increased from the 1987 survey. Therefore, percent decadence, form class, and vigor should be the parameters most important for trend evaluation. The key species for the site in order of dominance (percent of total plant cover) are: serviceberry (33%), basin big sagebrush (32%) and bitterbrush (18%). The basin big sagebrush is the browse with the highest percent decadence, but is not higher than expected with the site condition and the length of the current drought. The key species also all have some evidence of reproduction and a good percent young age class plants. The trend for browse would be considered stable. For the herbaceous understory, annuals in the past were ignored in the surveys. Now, if we “ignore” the annuals and look at the trend for only perennial species, the sum of nested frequencies would indicate a stable trend.

TREND ASSESSMENT

soil - up slightly

browse - stable to slightly down

herbaceous understory - stable, but depleted

1997 TREND ASSESSMENT

Trend for soil is considered stable even with a slight increase in percent bare ground. Nested frequency of vegetation and litter increased as did the sum of nested frequency of grasses and forbs. There is some evidence of soil pedestaling but much of this appears to be caused by livestock trailing around shrubs. Erosion is not currently a problem on the site. Trend for the key browse species is mixed. Bitterbrush and serviceberry appear to be stable with moderate to heavy use, good vigor and low decadence. The increase in density between 1992 and 1997 appear to be observer differences due to the lack of dead plants. This rhizomatous shrub can be difficult to count when in dense clusters. Several stems coming from the same general area were considered one plant in 1997. Basin big sagebrush appears to have a declining trend with a reduced population density, moderate to heavy use, reduced vigor and increasing decadence. In addition, the large number of dead plants counted in 1997 indicate a definite die-off. A decline in density can also be seen in all age classes. Since sagebrush accounts for one third of the shrub cover, the browse trend is considered slightly down. The herbaceous trend is stable but still depleted. Sum of nested frequency of grasses increased but this was due to a significant increase in the nested frequencies of cheatgrass and sixweeks fescue. The most common native grass, bottlebrush squirreltail, increased slightly. Sum of nested frequency of forbs also increased slightly due mainly to a significant increase in the nested frequency of toadflax.

TREND ASSESSMENT

soil - stable

browse - slightly down, down for sagebrush

herbaceous understory - stable, but poor

HERBACEOUS TRENDS --

Herd unit 27, Study no: 7

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'97	'87	'92	'97	'92	'97
G	Agropyron smithii	b ₂₄	a ₄	b ₄₈	12	2	21	.03	.29
G	Bromus tectorum (a)	a ₋	a ₃	b ₁₁₂	-	1	37	.00	2.35
G	Oryzopsis hymenoides	11	25	21	4	10	9	.34	.10
G	Poa secunda	a ₈	ab ₁₂	b ₁₆	3	5	6	.10	.39
G	Sitanion hystrix	54	58	62	24	25	25	.51	.83
G	Sporobolus cryptandrus	24	33	14	13	16	7	.63	.06
G	Stipa comata	22	24	25	10	12	12	.32	.14
G	Vulpia octoflora (a)	a ₋	b ₂₇	c ₇₃	-	12	31	.11	.33
Total for Grasses		143	186	371	66	83	148	2.06	4.51
F	Arabis spp.	-	-	5	-	-	3	-	.04
F	Astragalus spp.	8	2	1	4	1	1	.00	.00
F	Calochortus nuttallii	-	-	1	-	-	1	-	.01
F	Chaenactis douglasii	-	2	1	-	2	1	.01	.00
F	Collomia linearis (a)	-	-	3	-	-	1	-	.00
F	Comandra pallida	ab ₇₂	a ₅₈	b ₁₁₇	35	29	48	.50	1.79
F	Collinsia parviflora (a)	-	-	1	-	-	1	-	.15
F	Cruciferae	-	16	-	-	7	-	.03	-
F	Delphinium bicolor	-	-	3	-	-	1	-	.00
F	Descurainia spp. (a)	a ₋	b ₁₆	b ₃₀	-	8	14	.40	.12
F	Eriogonum cernuum (a)	a ₋	c ₃₃	b ₁₀	-	17	5	.24	.05
F	Erigeron spp.	-	-	1	-	-	1	-	.00
F	Eriogonum racemosum	a ₁	a ₋	b ₇	1	-	3	-	.04
F	Euphorbia glyptosperma (a)	b ₁₇	b ₈	a ₋	8	4	-	.04	-
F	Frasera speciosa	-	-	2	-	-	1	-	.00
F	Gilia spp. (a)	-	-	24	-	-	10	-	.12
F	Lappula occidentalis (a)	-	-	4	-	-	4	-	.04
F	Lupinus spp.	-	-	1	-	-	1	.03	.03
F	Microsteris gracilis (a)	a ₋	b ₂₁	b ₃₁	-	9	11	.04	.15
F	Oenothera pallida	-	3	-	-	1	-	.03	-
F	Penstemon spp.	-	10	-	-	5	-	.22	-
F	Phlox austromontana	a ₋	b ₁₄	b ₂₂	-	7	11	.30	.20
F	Plantago patagonica (a)	a ₋	c ₈₈	b ₄₆	-	36	22	.40	.18
F	Polygonum douglasii (a)	a ₋	b ₁₅	b ₂₆	-	6	9	.03	.04
F	Senecio multilobatus	4	-	1	2	-	1	-	.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'97	'87	'92	'97	'92	'97
F	Sphaeralcea parvifolia	_b 12	_{ab} 3	_a 1	7	2	1	.01	.00
F	Unknown forb-annual	-	3	-	-	2	-	.01	-
Total for Forbs		114	292	338	57	136	151	2.32	3.04

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 27, Study no: 7

Type	Species	Strip Frequency		Average Cover %	
		'92	'97	'92	'97
B	Amelanchier utahensis	23	13	12.05	8.44
B	Artemisia tridentata tridentata	58	58	11.92	5.20
B	Chrysothamnus viscidiflorus	0	1	-	.00
B	Gutierrezia sarothrae	34	32	1.53	.26
B	Leptodactylon pungens	3	5	.06	.06
B	Opuntia spp.	1	0	-	-
B	Purshia tridentata	36	34	6.50	6.59
Total for Browse		155	143	32.08	20.58

BASIC COVER --

Herd unit 27, Study no: 7

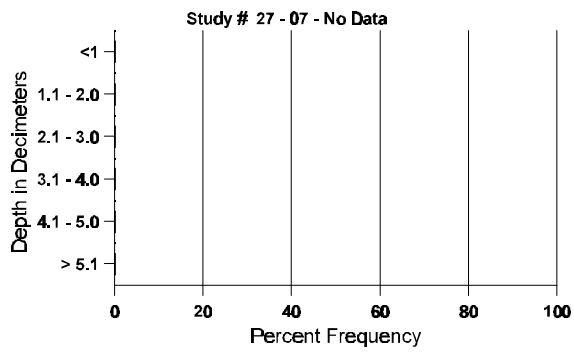
Cover Type	Nested Frequency		Average Cover %		
	'92	'97	'87	'92	'97
Vegetation	71	300	.75	34.50	27.35
Rock	-	13	0	.04	.05
Pavement	-	9	0	0	.02
Litter	236	388	59.75	54.40	47.79
Cryptogams	21	78	1.00	2.00	1.93
Bare Ground	187	282	38.50	26.89	35.68

SOIL ANALYSIS DATA --

Herd Unit 27, Study no: 07

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
20.8	60.0 (16.9)	5.9	87.0	7.4	5.6	.7	11.9	38.4	.2

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 27, Study no: 7

Type	Quadrat Frequency	
	'92	'97
Rabbit	49	20
Deer	26	32
Cattle	3	5

BROWSE CHARACTERISTICS --

Herd unit 27, 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				
Amelanchier utahensis																		
S	87	-	-	1	-	-	-	-	-	-	1	-	-	-	66			1
	92	-	-	-	-	-	-	6	-	-	6	-	-	-	120			6
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	-	-	1	-	-	-	-	-	-	1	-	-	-	66			1
	92	3	-	1	-	4	1	13	-	-	22	-	-	-	440			22
	97	-	-	-	5	-	-	-	-	-	5	-	-	-	100			5
M	87	-	-	2	-	-	-	-	-	-	2	-	-	-	133	60	56	2
	92	-	-	4	-	5	1	10	2	-	22	-	-	-	440	-	-	22
	97	-	1	3	-	5	-	-	1	-	9	1	-	-	200	83	86	10
D	87	-	-	1	-	-	-	-	-	-	-	-	-	1	66			1
	92	-	-	2	-	-	-	3	-	-	-	-	2	3	100			5
	97	-	-	-	-	2	-	-	-	-	-	-	-	2	40			2
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			100%			25%			+73%							
'92		18%			18%			10%			-65%							
'97		47%			18%			12%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	265	Dec:	25%			
												'92	980		10%			
												'97	340		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					
<i>Artemisia tridentata tridentata</i>													
S	87	1	-	-	-	-	-	-	1	66		1	
	92	9	-	-	-	-	1	-	10	200		10	
	97	1	-	-	-	-	-	-	1	20		1	
Y	87	5	2	-	-	-	-	-	7	466		7	
	92	24	2	-	7	-	-	7	37	800	3	40	
	97	16	-	-	-	-	-	-	16	320	-	16	
M	87	2	11	6	-	-	-	-	19	1266	34	35	19
	92	36	10	2	3	-	-	-	49	1020	-	-	51
	97	6	15	7	1	-	1	-	28	600	36	45	30
D	87	-	2	-	-	-	-	-	2	133			2
	92	33	6	-	2	2	-	2	12	900	3	30	45
	97	8	29	1	-	1	-	-	2	780	2	35	39
X	87	-	-	-	-	-	-	-	-	0			0
	92	-	-	-	-	-	-	-	-	0			0
	97	2	-	-	-	-	-	-	-	1200			60
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>% Change</u>					
'87		54%		21%		00%		+31%					
'92		15%		01%		24%		-38%					
'97		53%		11%		46%							
Total Plants/Acre (excluding Dead & Seedlings)										'87	1865	Dec:	7%
										'92	2720		33%
										'97	1700		46%
<i>Chrysothamnus viscidiflorus</i>													
S	87	1	-	-	-	-	-	-	1	66		1	
	92	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	0		0	
Y	87	2	-	-	-	-	-	-	1	133	1	2	
	92	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	0		0	
M	87	-	-	-	-	-	-	-	-	0	-	-	0
	92	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	1	20	7	7	1
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>% Change</u>					
'87		00%		00%		50%		Died out					
'92		00%		00%		00%		Appeared					
'97		00%		00%		00%							
Total Plants/Acre (excluding Dead & Seedlings)										'87	133	Dec:	-
										'92	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			
Gutierrezia sarothrae																	
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	92	10	-	-	-	-	-	-	-	-	9	-	-	1	200		10
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6
	97	8	-	-	1	-	-	-	-	-	9	-	-	-	180		9
M	87	58	-	-	-	-	-	-	-	-	58	-	-	-	3866	9 12	58
	92	48	-	-	3	-	-	1	-	-	52	-	-	-	1040	- -	52
	97	49	-	-	4	-	-	-	-	-	53	-	-	-	1060	10 13	53
D	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	1	-	-	-	-	-	-	-	-	-	-	-	60		3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>						
'87		00%			00%			00%			-70%						
'92		00%			00%			00%			+ 8%						
'97		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	3932	Dec:	2%			
											'92	1180		2%			
											'97	1280		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				
Leptodactylon pungens																		
S	87	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	92	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	87	6	-	-	-	-	-	-	-	-	6	-	-	-	400	5	6	
	92	16	-	-	-	-	-	-	-	-	16	-	-	-	320	-	-	
	97	9	-	-	5	-	-	-	-	-	13	-	1	-	280	18	20	
D	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			-43%							
'92		00%			00%			00%			-18%							
'97		00%			00%			07%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	599	Dec:	11%			
												'92	340		0%			
												'97	280		0%			
Opuntia spp.																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	-	-	-	-	-	-	-	-	1	-	20		1	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			Appeared							
'92		00%			00%			50%			Died out							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%			
												'92	40		50%			
												'97	0		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				
Purshia tridentata																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	1	-	1	-	-	-	2	-	-	-	40		2	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	87	-	-	6	-	-	-	-	-	-	6	-	-	-	400		6	
	92	2	5	6	1	3	3	1	-	-	21	-	-	-	420		21	
	97	-	3	1	-	-	-	-	-	-	4	-	-	-	80		4	
M	87	-	-	15	-	-	-	-	-	-	15	-	-	-	1000	12 41	15	
	92	-	3	19	2	-	7	-	-	11	39	-	-	3	840	- -	42	
	97	3	17	20	1	1	9	2	-	-	51	-	2	-	1060	20 41	53	
D	87	-	-	1	-	-	-	-	-	-	1	-	-	-	66		1	
	92	-	-	6	-	-	-	-	-	16	11	-	-	11	440		22	
	97	-	1	1	-	-	3	-	-	-	2	-	-	3	100		5	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			100%			00%			+14%							
'92		13%			80%			16%			-27%							
'97		35%			55%			08%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	1466	Dec:	5%			
												'92	1700		26%			
												'97	1240		8%			

Trend Study 27-8-97

Study site name: Fivemile Mountain .

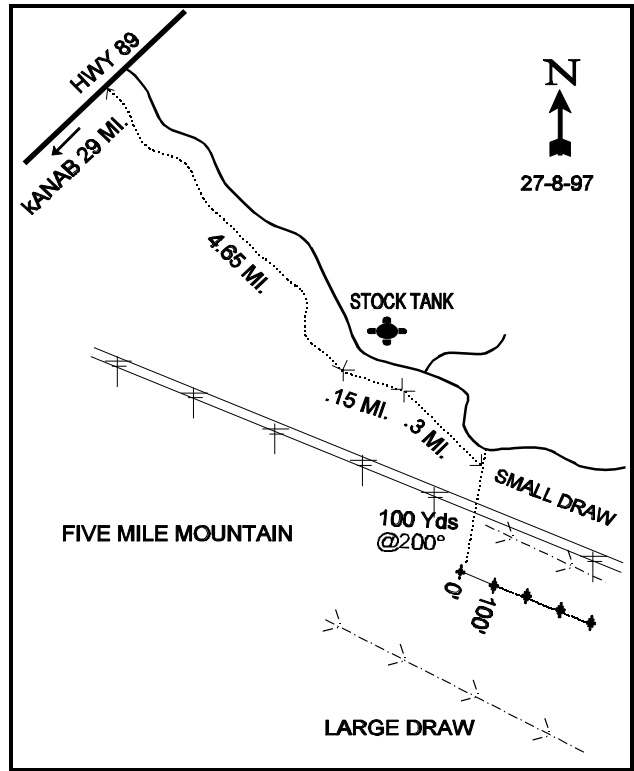
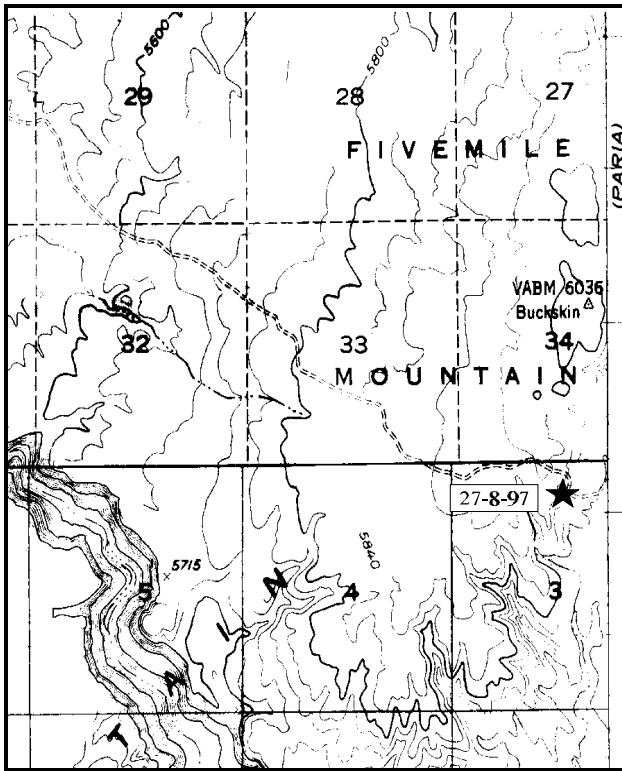
Range type: Black Sagebrush .

Compass bearing: frequency baseline 125 degrees.

Footmark (first frame at) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

From the 90° turn in US 89 in the center of Kanab, go 29 miles on south 89 to the turnoff to Five Mile Mountain. Turn right (southwest) and travel 4.6 miles on the graded road to a stock tank. Continue on a dirt road 0.15 miles to a fork, bear right. Continue up and over the mountain for 0.3 miles to a bend in the road. Stop here, then walk about 100 yards south to the crest of a small ridge and the 1st baseline stake, a 2' tall fencepost. The study runs E-SE down the ridge.



Map Name: Buckskin Mountain

Diagrammatic Sketch

Township 43S, Range 2W, Section 3

UTM 4106820.687 N, 410840.185 E

DISCUSSION

Trend Study No. 27-8 (52-8)

The Five Mile Mountain study is located on the south slope of Five Mile Mountain, a low plateau which gets the most big game use in severe winters, when deer drop down off the Vermillion Cliffs. Moderate numbers of deer pellet groups are usually encountered. Pellet group frequency was 16% in 1992 and 28% in 1997. There are no other studies or pellet group transects in this area east of Kaibab Gulch and south of US 89. The range type is black sagebrush, interspersed with juniper.

The transect runs down an east-southeast facing ridge with a slope of approximately 7% and an elevation of 5,850 feet. Besides low precipitation, the limiting factor for vegetation on this site is the shallow rocky soils. Effective rooting depth (see methods) is estimated at almost 11 inches with a high percentage of rock fragments in all horizons. Soil texture is a sandy clay loam with a neutral pH (7.2). Due to the rocky nature of the soil, average soil temperature is high at 75°F at an average depth of about 8 inches. Soil loss has left a layer of erosion pavement over most of the exposed surface, but current erosion is minimal.

The dominant browse species is black sagebrush which currently accounts for 88% of the browse cover and 65% of the total vegetative cover. Density estimates increased between 1987 and 1992, primarily due to the much larger sample used in 1992 and 1997. Density is currently estimated at 4,420 plants/acre. Utilization was moderate to heavy on 48% of the sagebrush sampled in 1987, but more moderate in 1992 and 1997. Vigor has been generally good since 1987 and percent decadence stable at around 30%. A high number of dead plants (1,040 plants/acre) were estimated in 1997, suggesting a rather rapid turnover of black sagebrush. An indication of further concerns is that 43% of the decadent plants were classified as dying. With these plants put in with the dead plants, the live to dead ratio goes up to 1:2.7, or 27% of the population would be dead. Currently, this percentage is at 19%. Biotic potential (percentage of seedlings to the population) has remained marginally adequate, ranging from 5% in 1987 to 2% in 1997. Young plants were abundant in 1992, but limited in 1987 and 1997. There is not currently enough seedlings or young plants to replace the decadent/dying plants.

If it was more common, Stansbury cliffrose could be a key browse species. Scattered large plants are found west of the study site. These shrubs average 10 feet in height and have been hedged, but not severely. There are occasional seedling and young plants along the ridge. Junipers on the site exhibit the harshness of the growing conditions by their stunted, twisted forms. Some individuals are highlined. There are few young pinyon. The other most common shrubs are increasers (broom snakeweed and low rabbitbrush). Broom snakeweed is vigorous, but found mainly in small patches and at fairly low densities. Rabbitbrush was more common in 1987, but the plants were in poor condition and appeared to be declining. Density has declined from 933 plants/acre in 1987 to 660 in 1997.

The herbaceous understory is poor and dominated by cheatgrass which has significantly increased in nested frequency since 1992. It currently accounts for 49% of the grass cover. There are several other perennial, native species present, however none occur more than occasionally. Eight perennial and two annual grasses provided just under 3% cover in 1992, increasing to 5% by 1997. Forbs are very limited on this harsh site. Seven perennial and seven annual forbs encountered in 1997 provided less than one half of one percent total cover. Most species occur only rarely.

1992 TREND ASSESSMENT

The soils on this site are shallow and very rocky. Surface rock-pavement is very common with a high cover value of 45%. Percent bare soil is now estimated at 8%. Trend for soil appears stable but in very poor condition. The trend for browse is stable. Black sagebrush has a moderately large population with a fairly good biotic potential and young age class of plants. Percent decadency has also decreased somewhat for this population. The trend for the herbaceous understory is slightly up. There was a slight increase in nested frequency values for the perennial grasses and forbs, but it is still in very poor condition.

TREND ASSESSMENT

soil - stable, but in poor condition

browse - stable

herbaceous understory - slightly up, but in poor condition

1997 TREND ASSESSMENT

Trend for soil is slightly down due to an increase in percent bare soil and a decline in vegetative cover. Percent pavement and rock cover declined from 45% to 37% which would suggest some overland soil movement. On the positive side from a watershed standpoint, sum of nested frequency of grasses increased. However, this improvement comes primarily from a significant increase in the nested frequency value for cheatgrass. Trend for black sagebrush is down. Population density has declined 26% since 1992, along with an slight increase in moderate to heavy use, an increase in plants showing poor vigor, and an increase in percent decadence from 24% to 31%. The percentage of decadent plants classified as dying has steadily increased since 1987 when it was 25%. It is currently up to 43%, meaning that an additional 584 plants/acre will soon be classified with the dead plants, raising the percentage of dead plants from 19% to 27%. Recruitment is currently not adequate to replace decadent/dying plants indicating a continued decline in density unless more favorable conditions for seedling establishment return to the area. Trend for the herbaceous understory is mixed. Sum of nested frequency of perennial grasses has remained similar to 1992 levels, while sum of nested frequency of forbs has declined. Since forbs are rare, trend is considered stable for the herbaceous understory. However, composition and abundance is poor.

TREND ASSESSMENT

soil - down slightly and in poor condition

browse - down

herbaceous understory - stable, but in poor condition

HERBACEOUS TRENDS --

Herd unit 27, Study no: 8

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'87	'92	'97	'87	'92	'97	'92	'97
G	<i>Bouteloua gracilis</i>	a15	b42	b42	8	18	17	1.25	.91
G	<i>Bromus tectorum</i> (a)	a-	b18	c180	-	10	61	.07	2.44
G	<i>Hilaria jamesii</i>	-	3	-	-	1	-	.03	-
G	<i>Oryzopsis hymenoides</i>	a12	b38	ab31	9	19	17	.51	.21
G	<i>Poa fendleriana</i>	-	3	3	-	1	1	.03	.00
G	<i>Poa secunda</i>	a-	b14	c35	-	6	13	.08	.40
G	<i>Sitanion hystrix</i>	b51	a22	a15	26	10	7	.15	.41
G	<i>Stipa comata</i>	48	25	40	22	13	20	.39	.28
G	<i>Stipa speciosa</i>	-	1	4	-	1	1	.00	.15
G	<i>Vulpia octoflora</i> (a)	a-	c107	b58	-	52	24	.34	.12
Total for Grasses		126	273	408	65	131	161	2.87	4.95
F	<i>Astragalus</i> spp.	a13	b40	a20	8	20	10	.12	.07
F	<i>Calochortus nuttallii</i>	a-	b9	ab3	-	4	3	.02	.01
F	<i>Collinsia parviflora</i> (a)	-	-	2	-	-	1	-	.00
F	Cruciferae	-	6	-	-	3	-	.04	-
F	<i>Descurainia pinnata</i> (a)	-	8	4	-	4	2	.02	.01
F	<i>Draba cuneifolia</i> (a)	-	19	-	-	9	-	.09	-
F	<i>Eriogonum cernuum</i> (a)	-	2	1	-	1	1	.03	.00
F	<i>Erodium cicutarium</i> (a)	-	-	12	-	-	4	-	.19
F	<i>Erigeron pumilus</i>	b23	a2	ab13	11	1	5	.03	.02
F	<i>Gilia inconspicua</i> (a)	a-	c139	b16	-	61	7	.48	.03
F	<i>Lappula occidentalis</i> (a)	a-	b146	a6	-	61	3	.48	.01
F	<i>Lomatium</i> spp.	-	5	1	-	2	1	.03	.03
F	<i>Penstemon thompsoniae</i>	-	1	1	-	1	1	.03	.00
F	<i>Phlox longifolia</i>	a3	b25	ab15	3	12	7	.25	.06
F	<i>Sphaeralcea grossulariaefolia</i>	-	3	-	-	1	-	.00	-
F	Unknown forb-annual	-	5	-	-	2	-	.01	-
F	<i>Zigadenus paniculatus</i>	-	1	-	-	1	-	.00	-
Total for Forbs		39	411	94	22	183	45	1.65	0.46

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --

Herd unit 27, Study no: 8

Type	Species	Strip Frequency		Average Cover %	
		'92	'97	'92	'97
B	Artemisia nova	86	79	22.60	13.00
B	Ceratoides lanata	1	2	-	-
B	Chrysothamnus viscidiflorus stenophyllus	25	20	2.09	1.18
B	Gutierrezia sarothrae	4	8	.19	.01
B	Juniperus osteosperma	2	2	2.49	-
B	Opuntia spp.	1	2	-	.38
B	Sclerocactus	5	3	.18	.15
Total for Browse		124	116	27.55	14.72

CANOPY COVER --

Herd unit 27, Study no: 8

Species	Percent Cover '97
Juniperus osteosperma	3

BASIC COVER --

Herd unit 27, Study no: 8

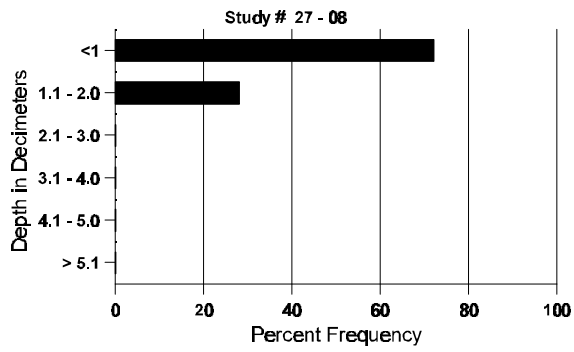
Cover Type	Nested Frequency		Average Cover %		
	'92	'97	'87	'92	'97
Vegetation	280	290	2.75	30.85	23.60
Rock	188	301	19.50	44.86	18.30
Pavement	222	317	28.00	0	18.18
Litter	255	377	36.00	29.56	28.00
Cryptogams	50	169	5.25	1.31	2.51
Bare Ground	109	297	8.50	8.08	12.39

SOIL ANALYSIS DATA --

Herd Unit 27, Study no: 8

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.7	75.0 (7.6)	7.2	58.4	19.1	22.6	2.1	16.0	115.2	.7

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 27, Study no: 8

Type	Quadrat Frequency	
	'92	'97
Rabbit	8	9
Deer	16	28
Cattle	-	2

BROWSE CHARACTERISTICS --

Herd unit 27, 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		1	2				
<i>Artemisia nova</i>												
S	87	2	-	-	-	-	-	-	2	133		2
	92	8	-	-	-	-	-	-	8	160		8
	97	4	-	-	-	-	-	-	4	100		5
Y	87	1	-	-	-	-	-	-	1	66		1
	92	27	9	-	1	-	-	-	37	740		37
	97	2	2	-	-	-	-	-	4	80		4
M	87	11	11	3	-	-	-	-	24	1666	12 20	25
	92	143	47	-	-	-	-	-	186	3800	- -	190
	97	107	35	5	-	2	-	-	149	2980	16 28	149
D	87	8	3	1	-	-	-	-	7	800		12
	92	61	10	-	-	1	-	-	49	1440		72
	97	37	24	-	-	7	-	-	39	1360		68
X	87	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	0		0
	97	-	-	-	-	-	-	-	-	1040		52
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'87		37%		11%		16%		+58%				
'92		22%		00%		09%		-26%				
'97		32%		02%		13%						
Total Plants/Acre (excluding Dead & Seedlings)						'87	2532	Dec:	32%			
						'92	5980		24%			
						'97	4420		31%			
<i>Ceratoides lanata</i>												
S	87	-	-	-	-	-	-	-	-	0		0
	92	1	-	-	-	-	-	-	1	20		1
	97	-	-	-	-	-	-	-	-	0		0
M	87	-	-	-	-	-	-	-	-	0	- -	0
	92	1	-	-	-	-	-	-	1	20	- -	1
	97	2	-	-	-	-	-	-	2	40	9 7	2
% Plants Showing		<u>Moderate Use</u>		<u>Heavy Use</u>		<u>Poor Vigor</u>		<u>%Change</u>				
'87		00%		00%		00%		Appeared				
'92		00%		00%		00%		+50%				
'97		00%		00%		00%						
Total Plants/Acre (excluding Dead & Seedlings)						'87	0	Dec:	-			
						'92	20		-			
						'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				
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	1	-	-	1	-	-	-	-	-	1	-	1	-	40		2	
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	87	8	-	-	-	-	-	-	-	-	6	-	1	1	533	10	9	8
	92	26	-	-	6	-	-	-	-	-	32	-	-	-	640	-	-	32
	97	19	-	-	-	-	-	-	-	-	19	-	-	-	420	11	21	21
D	87	6	-	-	-	-	-	-	-	-	2	-	2	2	400		6	
	92	5	-	-	-	-	-	-	-	-	2	-	2	1	100		5	
	97	10	-	-	1	-	-	-	-	-	8	-	-	3	220		11	
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			43%			-16%							
'92		00%			00%			10%			-15%							
'97		00%			00%			09%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	933	Dec:	43%				
											'92	780		13%				
											'97	660		33%				
<i>Cowania mexicana stansburiana</i>																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'87		00%			00%			00%			None							
'92		00%			00%			00%			None							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)											'87	0	Dec:	-				
											'92	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			
<i>Gutierrezia sarothrae</i>																	
S	87	6	-	-	-	-	-	-	-	-	6	-	-	-	400		6
	92	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	87	16	-	-	-	-	-	-	-	-	15	-	1	-	1066	7 7	16
	92	5	-	-	-	-	-	-	-	-	5	-	-	-	100	- -	5
	97	9	-	-	-	-	-	-	-	-	9	-	-	-	180	7 7	9
D	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>						
'87		00%			00%			06%			-92%						
'92		00%			00%			00%			+55%						
'97		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	1198	Dec:	6%			
											'92	100		0%			
											'97	220		18%			
<i>Juniperus osteosperma</i>																	
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0
	92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	- -	1
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	- -	1
D	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>						
'87		00%			00%			00%			-39%						
'92		00%			00%			00%			+ 0%						
'97		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)											'87	66	Dec:	100%			
											'92	40		0%			
											'97	40		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				
Opuntia spp.																		
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	'97	3	-	-	-	-	-	-	-	-	3	-	-	-	60	9	27	3
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			Appeared							
'92		00%			00%			00%			+67%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	-			
												'92	20		-			
												'97	60		-			
Sclerocactus																		
S	'87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	'92	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'92	1	-	-	1	-	-	-	-	-	2	-	-	-	40			2
	'97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'92	-	-	-	2	-	-	-	-	-	2	-	-	-	40	-	-	2
	'97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	5	8	2
D	'87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	'92	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	'97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>% Change</u>							
'87		00%			00%			00%			Appeared							
'92		00%			00%			20%			-40%							
'97		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'87	0	Dec:	0%			
												'92	100		20%			
												'97	60		0%			

Trend Study 27-9-97

Study site name: Buckskin Mountain .

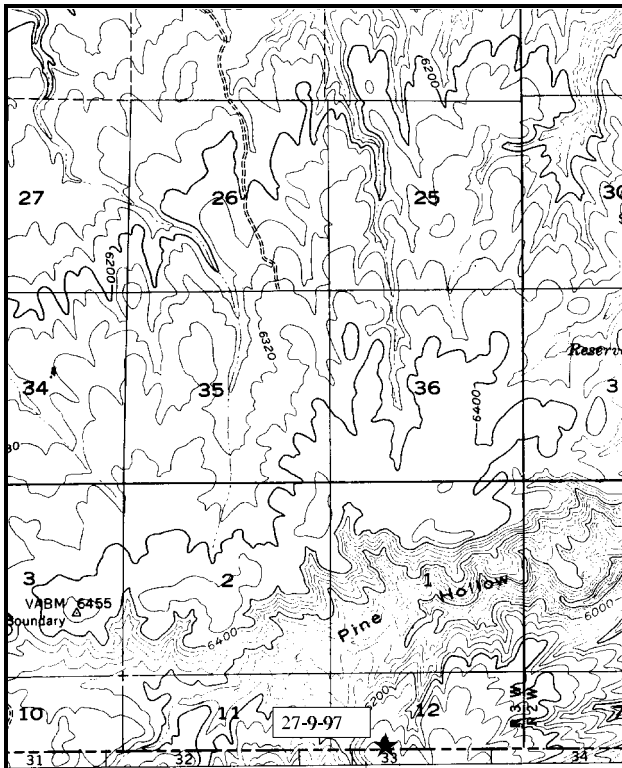
Range Type: Big Sagebrush

Compass bearing: frequency baseline 21 M degrees. (Line 5 357°M)

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

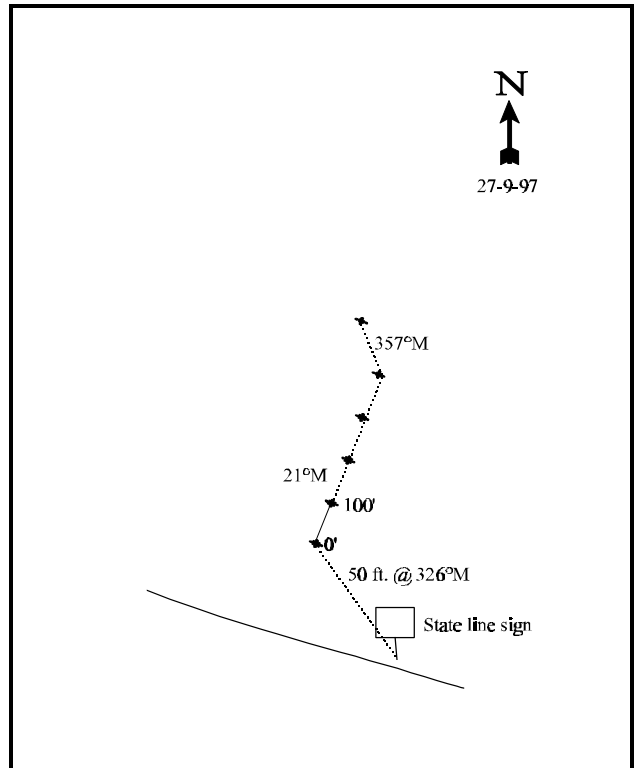
LOCATION DESCRIPTION

From Kanab head east on U.S. 89 to mile marker 44. Go 0.6 miles south of the mile marker to a road on the right. Drive 1.2 miles to a fork on the right. Take the right for (main road) for 1.4 miles to a left turn. Go 1.7 miles to another fork and go straight (left). Drive 2.9 miles to another fork. Stay on the main road (right) for 0.3 miles to a fork. Take the left fork for 1.55 miles to another left fork. Go 0.1 miles to a right fork. Continue 0.75 miles to another right fork. Take the right fork and drive 0.75 miles to the Arizona\Utah border sign. From this sign walk 50 feet at an azimuth of 326°M to the 0-foot stake. The study is marked by steel, green fenceposts approximately 12-18 inches in height.



Map name: Telegraph Flat .

Township 44 S, Range 3 W, Section 12



Diagrammatic Sketch

UTM 4095233.855 N, 403909.307 E

DISCUSSION

Trend Study No. 27-9

This is a new study established in 1997 at Buckskin Mountain. It is located south of U.S. 89, west of Kaibab Gulch, and just south of Pine Hollow Canyon on the Utah-Arizona border. This site was established to better sample critical winter range south of the Vermilion Cliffs. It samples a low flat ridge which supports a cliffrose/juniper overstory with a basin big sagebrush/grass understory. The site has a north by northwest aspect with a gentle slope of 3% to 5%. Elevation is approximately 6,300 feet. Deer frequent the site as evidenced by the high quadrat frequency of deer pellet groups at 49%. Cattle sign was also noted.

Soil at this site is very similar to the soil at Five Mile Mountain. Average effective rooting depth is estimated at almost 10 inches with abundant pavement and rock on the surface in the non-vegetated areas and throughout the profile. There is obviously no subsurface rooting barrier as evidenced by the dense stand of basin big sagebrush. The rocky nature of the soil obviously prevented an accurate measure of effective rooting depth. Soil texture is a loam with a moderately alkaline pH (7.4). Soil temperature is relatively high at 60°F at a depth of 11 inches, but not close to the 75°F on the Five Mile Mountain site. Some erosion is noted in the isolated open areas, but vegetation and litter cover appear adequate to prevent serious erosion.

Key browse species on the site include basin big sagebrush and Stansbury cliffrose. Sagebrush accounts for 52% of the shrub cover with an estimated density of 2,920 plants/acre. Mature plants average about 2 1/2 feet in height. Currently, mature plants make up 41% of the population. Percent decadence is moderately high at 34% and dead plants outnumber mature plants by a ratio of 2.4 to one. Utilization is light to moderate with a few individuals receiving heavy use. Vigor is good on most plants. The large number of dead and decadent sagebrush would be a cause for concern if not for the excellent recruitment found on the site. The reproductive potential (# of seedlings) is quite high at 22% with young plants accounting for 25% of the population. All this considered, it appears that the population may increase in the future.

Cliffrose is the other key species found on the site. It occurs in much smaller numbers (240 plants/acre) with many plants being at least partly unavailable to browsing. The average mature cliffrose is nearly seven feet in height with overhead canopy cover averaging 11% over the whole site. These tall plants receive mostly light to moderate use. Vigor is good and percent decadence is low at 17%. Some signs of reproduction were noted. The only other common shrub consists of broom snakeweed which appears to have a stable population of about 1,000 plants/acre.

The herbaceous understory is poor on this site. Several species of grasses were found but cheatgrass totally dominates the composition by providing 99% of the grass cover. Five perennial, native grasses were found on the site, but these combine to produce less than one percent cover. Forbs are rare. Seven species were encountered on the site but these produce less than one-tenth of one percent cover.

1997 APPARENT TREND ASSESSMENT

The soil trend appears stable with percent bare soil at only 6%. Vegetation and litter cover combined with the gentle terrain limit erosion. The browse trend appears down, primarily for sagebrush, however it provides the majority of the key browse forage (67%). It does look like that the population of big sagebrush will continue to decline with the percentage of decadent plants classified as dying up to 47%. Another way to look at it is that another 460 plants/acre will be dead in the future. This will raise the percentage of dead plants in the population from 32% to 38%. However, seedlings and young could help to maintain the current population, but nothing is certain with these harsh conditions. The herbaceous understory is in extremely poor condition due to the lack of perennial grasses and the dominance of cheatgrass. In addition, forbs are rare in their occurrence on this site.

HERBACEOUS TRENDS --

Herd unit 27, Study no: 9

Type	Species	Nested Frequency '97	Quadrat Frequency '97	Average Cover % '97
G	<i>Bouteloua gracilis</i>	1	1	.00
G	<i>Bromus tectorum</i> (a)	453	98	25.61
G	<i>Festuca ovina</i>	7	2	.03
G	<i>Poa fendleriana</i>	6	3	.21
G	<i>Poa secunda</i>	10	2	.01
G	<i>Sitanion hystrix</i>	26	10	.10
Total for Grasses		503	116	25.96
F	<i>Calochortus nuttallii</i>	6	3	.01
F	<i>Erigeron</i> spp.	6	2	.01
F	<i>Gilia</i> spp. (a)	11	3	.01
F	<i>Microsteris gracilis</i> (a)	2	1	.00
F	<i>Phlox longifolia</i>	5	2	.01
F	<i>Ranunculus testiculatus</i> (a)	1	1	.00
F	<i>Sphaeralcea coccinea</i>	1	1	.00
Total for Forbs		32	13	0.06

BROWSE TRENDS --

Herd unit 27, Study no: 9

Type	Species	Strip Frequency '97	Average Cover % '97
B	<i>Artemisia tridentata tridentata</i>	76	12.19
B	<i>Cercocarpus montanus</i>	-	.38
B	<i>Cowania mexicana stansburiana</i>	9	6.17
B	<i>Ephedra viridis</i>	3	.06
B	<i>Gutierrezia sarothrae</i>	27	1.08
B	<i>Juniperus osteosperma</i>	7	3.57
B	<i>Opuntia</i> spp.	3	.00
Total for Browse		125	23.48

CANOPY COVER --
Herd unit 27, Study no: 9

Species	Percent Cover '97
Cowania mexicana stansburiana	11
Juniperus osteosperma	5

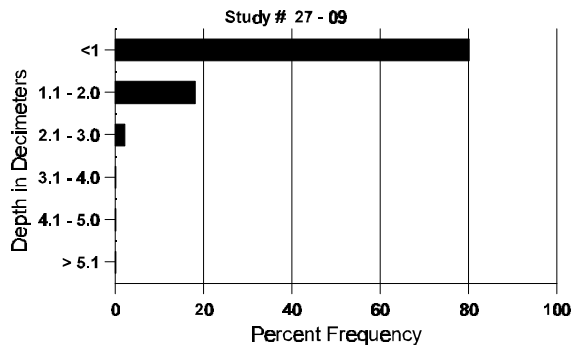
BASIC COVER --
Herd unit 27, Study no: 9

Cover Type	Nested Frequency '97	Average Cover % '97
Vegetation	456	38.47
Rock	196	4.40
Pavement	339	19.59
Litter	483	48.10
Cryptogams	67	.61
Bare Ground	224	5.84

SOIL ANALYSIS DATA --
Herd Unit 27, Study no: 09

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.8	60.0 (11.4)	7.4	41.7	32.7	25.6	2.6	25.7	121.6	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 27, Study no: 9

Type	Quadrat Frequency '97
Rabbit	24
Elk	5
Deer	49
Cattle	1

BROWSE CHARACTERISTICS --

Herd unit 27, Study no: 9

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 tridentata tridentata</i>																		
S	97	26	1	-	3	-	-	-	-	-	28	-	-	2	640		32	
Y	97	35	1	-	1	-	-	-	-	-	36	-	-	-	740		37	
M	97	34	21	5	-	-	-	-	-	-	60	-	-	-	1200	29	37	
D	97	19	22	8	-	-	-	-	-	-	26	-	-	23	980		49	
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	1360		68	
% Plants Showing '97		<u>Moderate Use</u> 30%			<u>Heavy Use</u> 09%			<u>Poor Vigor</u> 16%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'97	2920	Dec:	34%	
<i>Cowania mexicana stansburiana</i>																		
S	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	97	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	97	2	-	-	2	-	-	4	1	-	9	-	-	-	180	94	94	
D	97	1	1	-	-	-	-	-	-	-	1	-	-	1	40		2	
% Plants Showing '97		<u>Moderate Use</u> 17%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 08%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'97	240	Dec:	17%	
<i>Ephedra viridis</i>																		
M	97	2	-	-	1	-	-	-	-	-	3	-	-	-	60	28	30	
% 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	60	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			
<i>Gutierrezia sarothrae</i>								
Y	97	3	-	-	-	3		3
M	97	48	-	-	-	48	8 10	48
D	97	5	-	-	-	-		5
X	97	-	-	-	-	-		26
% Plants Showing '97		<u>Moderate Use</u> 00%	<u>Heavy Use</u> 00%	<u>Poor Vigor</u> 09%	<u>%Change</u>			
Total Plants/Acre (excluding Dead & Seedlings)					'97	1120	Dec:	9%
<i>Juniperus osteosperma</i>								
Y	97	-	-	1	-	1		1
M	97	2	-	-	4	6	-	6
% 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	140	Dec:	-
<i>Opuntia spp.</i>								
Y	97	2	-	-	-	2		2
M	97	2	-	-	-	2	6 15	2
X	97	-	-	-	-	-		1
% 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	80	Dec:	-
<i>Yucca spp.</i>								
M	97	-	-	-	-	0	24 31	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:	-

Trend Study 27-10-97

Study site name: Telegraph Flat .

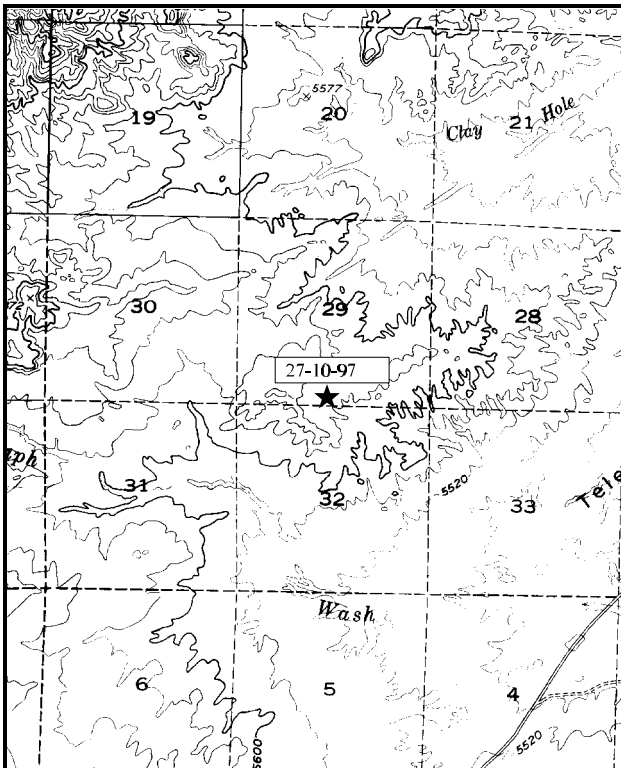
Range type: Cliffrose, Pinyon-Juniper

Compass bearing: frequency baseline 358 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

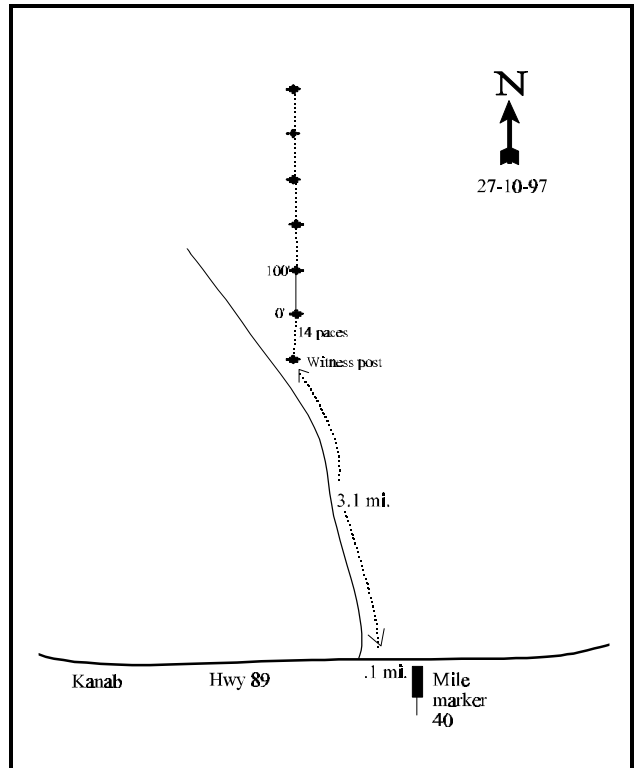
LOCATION DESCRIPTION

From mile marker 40 on highway 89 (east of Kanab) go 0.1 mile west to a road on the north. Go north 3.1 miles to a witness post on the right side of the road. From the witness post walk 14 paces at an azimuth of 0° M to the 0- foot stake. The study runs north and is marked by green, steel fenceposts approximately 12-18 inches in height.



Map name: Telegraph Flat .

Township 42 S, Range 3 W, Section 29



Diagrammatic Sketch

UTM 4109066.118 N, 397552.813 N

DISCUSSION

Trend Study No. 27-10

This is a new study established in 1997 on Telegraph Flat. It is located east of Telegraph Wash and west of Clay Hole Wash. The site samples a Wyoming big sagebrush community with a cliffrose and pinyon/juniper overstory on a nearly level bench. This area was chained and seeded in 1963. Elevation is approximately 5,650 feet. Pellet group data indicate use by mostly deer, some elk, and sheep.

Soil on the site has a sandy loam texture with a neutral pH (7.2). It is deep with an effective rooting depth estimated at over 14 inches. There is no rock and little pavement on the surface or in the profile. Soil temperature is moderately high, averaging 60°F at an average depth of 16 inches. There is a considerable amount of bare ground exposed (50%) but erosion is minimal on the site due to the lack of significant slope. In the area however, there are numerous gullies which have been caused by high intensity summer storms.

The key browse species is Wyoming big sagebrush which accounts for 69% of the browse cover. Population density is estimated at 12,760 plants/acre in which 40% are mature and half are young plants. Utilization is moderate to heavy with good vigor and low percent decadence (10%). However, this equates to 1,300 plants and 35% of these were classified as dying. This would mean an additional 460 plants/acre becoming classified as dead. This would move up the percent dead in the population to 5%, not critical for this large of a population, yet should be a concern in the future. Dead plants are rare at this time (1%), but this could change in a short time for there have been too many examples of this downward condition on the unit for the sagebrush populations. However, the site does not appear that it will support a much higher density of sagebrush.

Cliffrose density is estimated at 400 plants/acre. Mature plants average nearly 5 feet in height making some plants partly unavailable to browsing. Forty percent of the population consists of mature plants with a high proportion of young at 55%. Utilization is mostly moderate, vigor good, and percent decadence low at only 5%. A few rubber rabbitbrush and broom snakeweed are also found on the site.

The herbaceous understory is poor. Five perennial and two annual grass species occur on the site but only crested wheatgrass is common as it provides 90% of the herbaceous cover. All grasses combined provide only 6.2% cover. Forbs are nearly absent and produce just over one-quarter of one percent cover.

1997 APPARENT TREND ASSESSMENT

A considerable amount of bare soil is exposed on the site (50%) with some soil pedestaling evident. Herbaceous cover is lacking and nearly 3/4 of the vegetative cover consists of shrub crowns. However, due to the gentle terrain, erosion is not currently a serious problem on the site. The key browse, Wyoming big sagebrush, displays a dynamic population with half of the plants consisting of young plants. Mature plants are quite dense at an estimated 5,060 plants/acre. Utilization is moderate to heavy but vigor is good and decadence relatively low at 10%. There are some indications that the population may start to decline in numbers in the future. Cliffrose are moderately hedged with good recruitment, normal vigor, and low percent decadence. This population appears stable. The herbaceous understory is lacking. The only fairly common species is crested wheatgrass which makes up 90% of the herbaceous cover.

HERBACEOUS TRENDS --
Herd unit 27, Study no: 10

Type	Species	Nested Frequency '97	Quadrat Frequency '97	Average Cover % '97
G	Agropyron cristatum	252	83	5.83
G	Aristida longiseta	8	6	.20
G	Bromus tectorum (a)	2	1	.00
G	Festuca ovina	8	3	.01
G	Oryzopsis hymenoides	8	2	.06
G	Sitanion hystrix	3	2	.03
G	Vulpia octoflora (a)	10	4	.04
Total for Grasses		291	101	6.20
F	Agoseris glauca	1	1	.00
F	Astragalus spp.	5	2	.03
F	Calochortus nuttallii	-	-	.00
F	Castilleja spp.	1	1	.00
F	Gilia spp. (a)	2	1	.00
F	Holosteum umbellatum (a)	3	1	.00
F	Microsteris gracilis (a)	3	1	.00
F	Phlox austromontana	3	1	.15
F	Phlox hoodii	5	2	.03
F	Unknown forb-annual	3	1	.03
Total for Forbs		26	11	0.28

BROWSE TRENDS --

Herd unit 27, Study no: 10

Type	Species	Strip Frequency '97	Average Cover % '97
B	Amelanchier utahensis	-	.03
B	Artemisia tridentata wyomingensis	85	11.60
B	Chrysothamnus nauseosus	1	-
B	Cowania mexicana stansburiana	15	1.90
B	Gutierrezia sarothrae	3	-
B	Juniperus osteosperma	4	1.26
B	Pinus edulis	2	1.66
B	Yucca spp.	-	.38
Total for Browse		110	16.84

CANOPY COVER --

Herd unit 27, Study no: 10

Species	Percent Cover '97
Cowania mexicana stansburiana	2
Juniperus osteosperma	4
Pinus edulis	2

BASIC COVER --

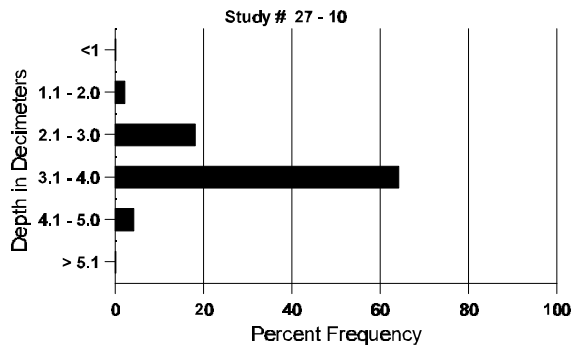
Herd unit 27, Study no: 10

Cover Type	Nested Frequency '97	Average Cover % '97
Vegetation	307	22.68
Pavement	30	0.06
Litter	451	28.17
Cryptogams	162	4.69
Bare Ground	413	49.65

SOIL ANALYSIS DATA --
Herd Unit 27, Study no: 10

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.4	60.0 (16.1)	7.2	62.4	19.1	18.6	1.3	20.2	124.8	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 27, Study no: 10

Type	Quadrat Frequency '97
Sheep	1
Rabbit	18
Elk	3
Deer	19

BROWSE CHARACTERISTICS --

Herd unit 27, Study no: 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>Artemisia tridentata wyomingensis</i>																		
S	97	4	-	-	-	-	-	3	-	-	7	-	-	-	140		7	
Y	97	128	157	30	-	-	-	5	-	-	320	-	-	-	6400		320	
M	97	52	159	36	2	-	3	1	-	-	253	-	-	-	5060	20	31	253
D	97	20	37	6	1	-	-	-	-	-	41	-	-	23	1300		65	
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	180		9	
% Plants Showing '97		<u>Moderate Use</u> 55%			<u>Heavy Use</u> 12%			<u>Poor Vigor</u> 04%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)											'97	12760	Dec:	10%				
<i>Chrysothamnus nauseosus</i>																		
Y	97	-	4	-	-	-	-	-	-	-	4	-	-	-	80		4	
% Plants Showing '97		<u>Moderate Use</u> 100%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)											'97	80	Dec:	-				
<i>Cowania mexicana stansburiana</i>																		
Y	97	5	5	-	1	-	-	-	-	-	11	-	-	-	220		11	
M	97	1	7	-	-	-	-	-	-	-	8	-	-	-	160	59	68	8
D	97	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1	
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing '97		<u>Moderate Use</u> 60%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)											'97	400	Dec:	5%				
<i>Gutierrezia sarothrae</i>																		
M	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80	9	10	4
D	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
% 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	100	Dec:	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			
Juniperus osteosperma																	
Y	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	97	2	-	-	-	-	-	1	-	-	3	-	-	-	60	-	3
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'97		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'97	80	Dec:	-		
Pinus edulis																	
M	97	-	-	-	1	-	-	1	-	-	2	-	-	-	40	-	2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>						
'97		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'97	40	Dec:	-		

Trend Study 27-11-97

Study site name: Crocodile .

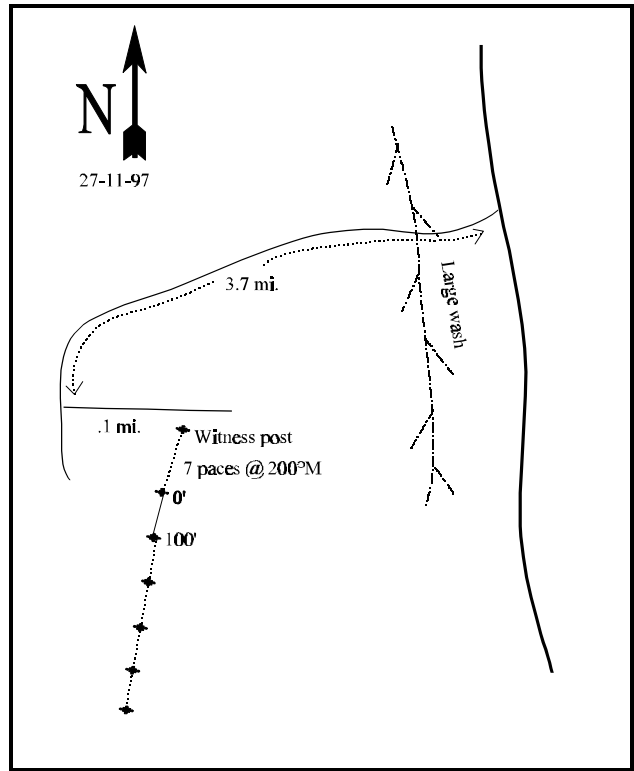
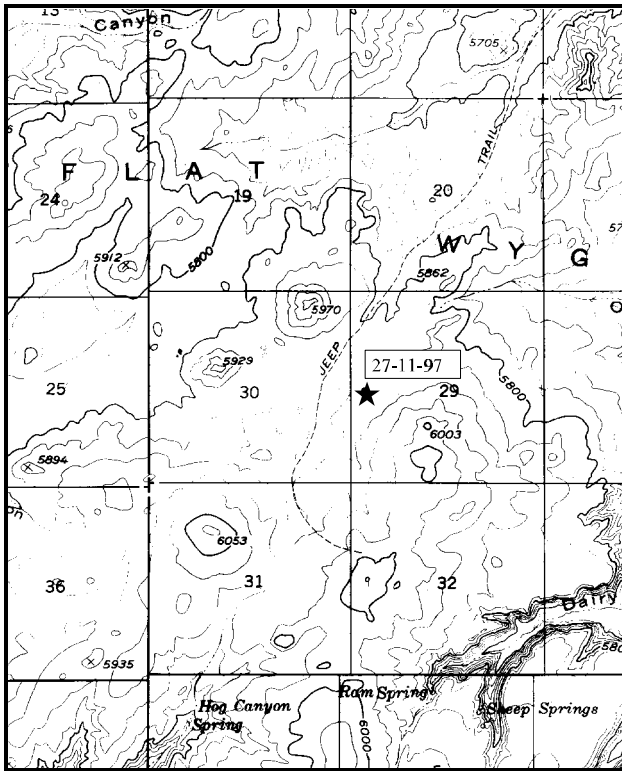
Range type: Basin Big Sagebrush

Compass bearing: frequency baseline 192 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

Start at the Church in Alton and head south 10.8 miles. At this intersection, turn left and head toward Kanab. Continue 6.8 miles to another intersection. Turn south on the pavement and go 9.8 miles to another intersection. Turn right (west) and go 0.1 miles to a left fork. Take this fork and go 3.7 miles across a large wash to a twin track on the left. Go 0.1 miles to a witness post on the right (south) side of the road.



Map name: Johnson (15 minute) .

Diagrammatic Sketch

Township 42 S, Range 5 W, Section 29

UTM 4110491 N, 371568 E

DISCUSSION

Trend Study No. 27-11

This is another new site, located on Crocodile, sampling critical winter range on the Paunsaugunt unit. It is located west of the Johnson Valley Road along the Wygaret Terrace about 1½ miles north of the head of Dairy Canyon. It samples a big sagebrush type with a scattered juniper overstory that was seeded with crested wheatgrass in the mid 1960's. Slope on the site varies from 3% to 10% with a slight north aspect. Elevation is approximately 5,650 feet. This area is a concentration area for wintering deer. A pellet transect read along the baseline indicated a very high level of deer use at 128 deer days use/acre. A few elk also utilize the area. Twenty-eight cow use days/acre were also counted with most of the herbaceous vegetation heavily utilized by the time the study was established on August 19. A watering trough was found about 1/4 of a mile to the west of the study area.

Soils at the study site are very deep with an effective rooting depth (see methods) estimated at nearly 35 inches. Soil texture is a fine sand. Phosphorus may be limiting to plant growth at 9.6 ppm and percent organic matter is very limited at only 0.3%. Rock and pavement are rare on the surface or in the profile. Erosion is not a serious problem on the site due to the high infiltration capacity of the sandy soil combined with the gentle terrain.

Basin big sagebrush and antelope bitterbrush are the key shrub species on the site. Big sagebrush accounts for 51% of the shrub cover with a population density of 2,860 plants/acre. Over half (60%) are large mature plants averaging four feet in height. Utilization is moderate to heavy with poor vigor found on 8% of the shrubs. Percent decadence is relatively low at 12%. However, 59% of the decadent plants were classified as dying. This would mean an additional 200 plants/acre could be added to those already categorized as dead (420 plants/acre). Percent dead within the population would go from 13% to 18%. This could be an indication of a slightly downward trend for sagebrush in the future. Bitterbrush provides 38% of the shrub cover with a moderate density of 900 plants/acre. Eighty-eight percent are large mature plants averaging nearly six feet in height and a crown diameter of nearly seven feet. Use is extremely heavy on these shrubs, yet vigor is still normal and percent decadence low at only 2%. The only other common shrub is broom snakeweed with a density of 1,620 plants/acre. It appears to have a stable population with its current age class distribution.

The herbaceous understory is lacking, similar to other winter range sites on the unit. Perennial warm and cool season grasses are diverse but not abundant. The only common grass includes needle-and-thread and sandhill muhly. The area appears to have been seeded in the past with crested wheatgrass. Currently, it is not particularly abundant with a quadrat frequency of only 20% and an average cover value less than one half of one percent. Most of the cool season grasses have been heavily utilized earlier this season by livestock. Forbs are nearly non-existent with three annual and four perennial species combining to produce less than 1/4 of one percent cover.

1997 APPARENT TREND ASSESSMENT

The soil on the site is extremely sandy and well drained. Over half (55%) of the ground surface is bare soil with less than 20% of the ground surface is covered by vegetation and 34% by litter. Seventy-four percent of the vegetation cover comes from shrub crowns. However, due to the lack of significant slope and the high infiltration capacity of the sandy soil, erosion is not currently a problem on this site. Trends for the key browse species, basin big sagebrush is slightly down and bitterbrush appears stable but current use is extremely heavy. The herbaceous understory is very poor.

HERBACEOUS TRENDS --

Herd unit 27, Study no: 11

Type	Species	Nested Frequency '97	Quadrat Frequency '97	Average Cover % '97
G	<i>Agropyron cristatum</i>	43	20	.30
G	<i>Bouteloua gracilis</i>	19	8	.11
G	<i>Muhlenbergia pungens</i>	49	15	1.64
G	<i>Oryzopsis hymenoides</i>	-	-	.00
G	<i>Sitanion hystrix</i>	10	4	.12
G	<i>Sporobolus cryptandrus</i>	60	21	.43
G	<i>Stipa comata</i>	108	42	2.67
G	<i>Vulpia octoflora</i> (a)	54	20	.15
Total for Grasses		343	130	5.45
F	<i>Astragalus</i> spp.	14	5	.02
F	<i>Comandra pallida</i>	6	2	.06
F	<i>Eriogonum cernuum</i> (a)	3	1	.00
F	<i>Lappula occidentalis</i> (a)	3	2	.01
F	<i>Lotus</i> spp.	4	2	.01
F	<i>Plantago patagonica</i> (a)	5	2	.01
F	<i>Sphaeralcea</i> spp.	3	1	.03
Total for Forbs		38	15	0.15

BROWSE TRENDS --

Herd unit 27, Study no: 11

Type	Species	Strip Frequency '97	Average Cover % '97
B	<i>Artemisia filifolia</i>	2	.15
B	<i>Artemisia tridentata tridentata</i>	65	7.94
B	<i>Chrysothamnus nauseosus albicaulis</i>	6	.18
B	<i>Chrysothamnus</i> spp.	9	.09
B	<i>Gutierrezia sarothrae</i>	33	1.04
B	<i>Leptodactylon pungens</i>	3	.04
B	<i>Opuntia</i> spp.	3	.03
B	<i>Purshia tridentata</i>	28	6.02
B	<i>Yucca</i> spp.	1	.15
Total for Browse		150	15.67

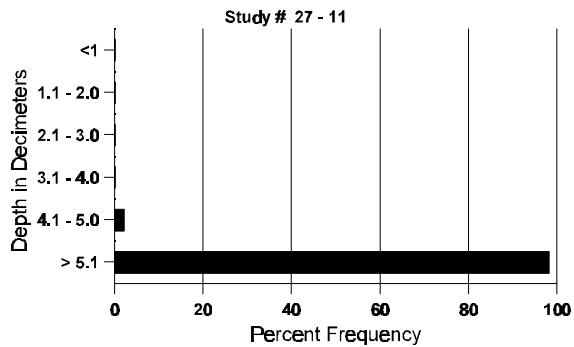
BASIC COVER --
Herd unit 27, Study no: 11

Cover Type	Nested Frequency '97	Average Cover % '97
Vegetation	283	18.82
Rock	11	.02
Pavement	33	.08
Litter	485	34.13
Cryptogams	42	.28
Bare Ground	412	54.99

SOIL ANALYSIS DATA --
Herd Unit 27, Study no: 11

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
34.8	64.8 (17.7)	5.8	91.6	2.4	5.9	.3	9.6	19.2	.2

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 27, Study no: 11

Type	Quadrat Frequency '97
Rabbit	29
Elk	8
Deer	44
Cattle	6

BROWSE CHARACTERISTICS --

Herd unit 27, Study no: 11

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 filifolia</i>																		
M	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60	20	19	3
% 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	60	Dec:	-	
<i>Artemisia tridentata tridentata</i>																		
S	97	8	-	-	6	-	-	-	-	-	14	-	-	-	280			14
Y	97	40	-	-	-	-	-	-	-	-	40	-	-	-	800			40
M	97	31	44	6	5	-	-	-	-	-	84	-	2	-	1720	46	49	86
D	97	10	2	4	1	-	-	-	-	-	7	-	-	10	340			17
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	420			21
% Plants Showing '97		<u>Moderate Use</u> 32%			<u>Heavy Use</u> 07%			<u>Poor Vigor</u> 08%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'97	2860	Dec:	12%	
<i>Chrysothamnus nauseosus</i>																		
M	97	7	-	-	-	-	-	-	-	-	7	-	-	-	140	25	38	7
D	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% 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	180	Dec:	22%	
<i>Chrysothamnus spp.</i>																		
Y	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	97	5	-	-	2	-	-	-	-	-	7	-	-	-	140	22	23	7
D	97	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
% Plants Showing '97		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 09%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'97	220	Dec:	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				
<i>Gutierrezia sarothrae</i>																		
Y	97	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	97	68	-	-	1	-	-	-	-	-	69	-	-	-	1380	8	11	69
D	97	5	-	-	-	-	-	-	-	-	-	-	-	5	100		5	
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	260		13	
% Plants Showing '97		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 06%			<u>% Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'97	1620	Dec:	6%			
<i>Leptodactylon pungens</i>																		
M	97	6	-	-	-	-	-	-	-	-	6	-	-	-	120	6	3	6
% 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	120	Dec:	-			
<i>Opuntia spp.</i>																		
M	97	2	-	-	1	-	-	-	-	-	3	-	-	-	60	3	6	3
% 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	60	Dec:	-			
<i>Purshia tridentata</i>																		
Y	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	97	-	16	24	-	-	-	-	-	-	40	-	-	-	800	71	81	40
D	97	-	-	1	-	-	-	-	-	-	-	-	-	1	20		1	
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
% Plants Showing '97		<u>Moderate Use</u> 36%			<u>Heavy Use</u> 56%			<u>Poor Vigor</u> 02%			<u>% Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'97	900	Dec:	2%			
<i>Yucca spp.</i>																		
M	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	20	37	1
% 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:	-			

Trend Study 27-12-97

Study site name: Moon's Landing .

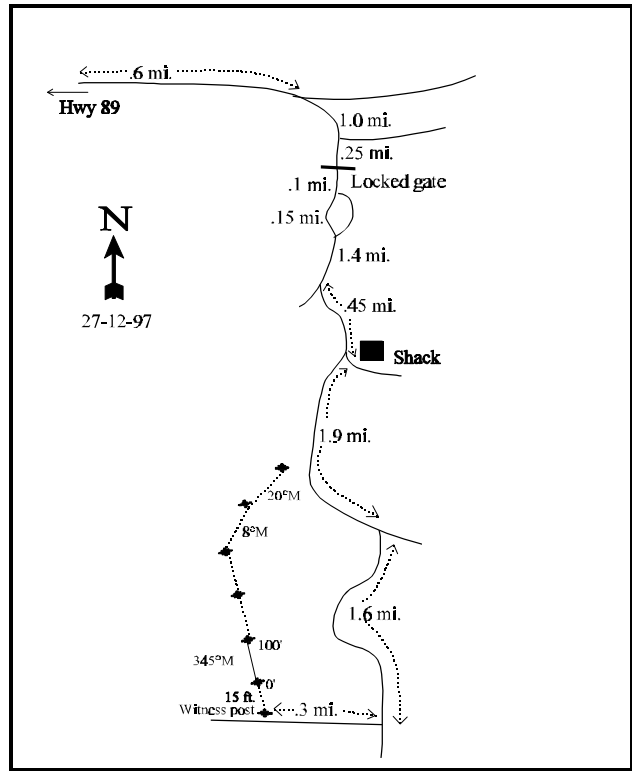
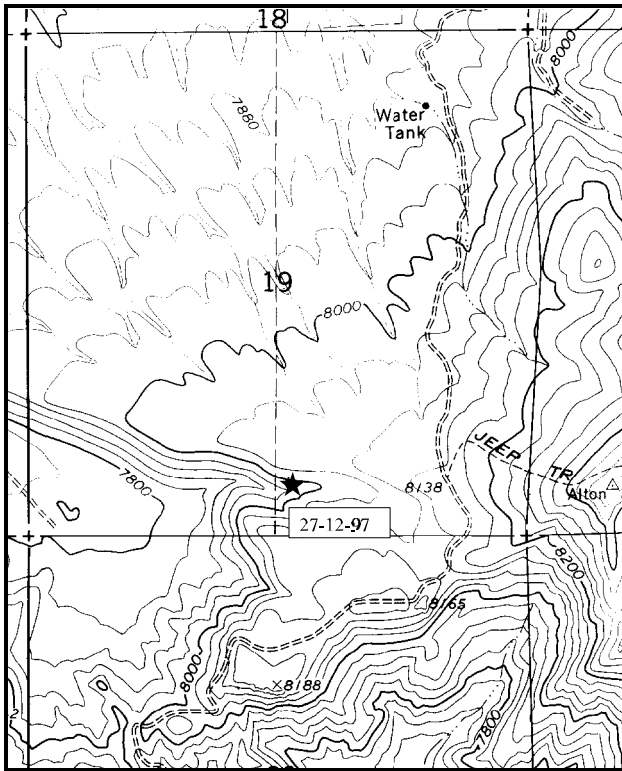
Range Type: Mountain brush

Compass bearing: frequency baseline 345 M degrees. (Line 4 8°M, line 5 20°M)

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From U. S. 89 go approximately 0.4 miles south of mile marker 111 to a road on the left. Go 0.6 miles to a fork. Stay on Bryce Road (right) and go 1 mile to a fork. Stay left and go 0.25 to a locked gate (get combination). Go through the gate and go 1.65 miles, staying on the main road, to a fork. Go right 0.45 miles to another fork with a shack on the left. Go right for 1.9 miles to a fork. Turn right and go 1.6 miles to a twin track road on the right. Go 0.3 miles on the twin track to a witness post on the right (north). The 0-foot stake is 15 feet north of the witness post. The study is marked by green, steel fenceposts approximately 12-18 inches in height.



Map name: Alton

Diagrammatic Sketch

Township 38 S, Range 5 W, Section 19

UTM 4149685.977 N, 371112.563 E

DISCUSSIONS

Trend Study No. 27-12

This site at Moon's Landing was established in 1997 to monitor winter/transitional range on the west side of the Paunsaugunt wildlife management area. It samples a mountain brush type two miles east of U.S. 89 and about four miles north of Alton. The land is privately owned and part of the Heaton private hunting unit. The transect is set up on a gently sloping ridge with a slight north aspect and an elevation of about 8,000 feet. Pellet group data shows heavy deer use on the area with an estimated 192 deer days use/acre and a quadrat frequency of deer pellet groups at 51%. Several deer were seen in the area during study establishment. Elk also use the area but to a much lesser extent at about 14 elk days use/acre. Cattle have been on the site this year in moderately high numbers. A total of 43 cow days use/acre were estimated by the pellet group transect.

The soil is moderately deep with an average effective rooting depth (see methods) of about 15 inches. Texture is a sandy clay loam with a moderately acid pH of 5.9. Rocks and pavement are not abundant on the surface or in the profile. The presence of both black sagebrush and mountain big sagebrush suggest some sort of rooting barrier, either physical or physiological, not discovered by the soil penetrometer. Erosion on the ridge is minimal due to the abundant vegetation and litter cover combined with the gentle terrain.

The site supports a variety of useful browse species including: serviceberry, black sagebrush, mountain big sagebrush, and bitterbrush. There are also some oak clones nearby which provide cover and additional forage. The most important shrub on the site is bitterbrush which provides 42% of the browse cover with a density of 1,860 plants/acre. Eighty percent of these plants are mature but young plants appear in adequate numbers to maintain the population. These shrubs have been severely hedged to the point where many are partly or totally unavailable due to hedging. Vigor is normal however, and only 6% of the population is decadent. Black sagebrush and mountain big sagebrush are both found on the site in moderate numbers. These populations appear to be stable with light to moderate use, good vigor and low decadence. Snowberry provides 24% of the browse cover with a density of 880 plants/acre. Mature plants are fairly large averaging about two feet in height with a crown diameter of nearly 5 feet. Snowberry usually receives little use on other sites in the unit, but here, utilization is moderate to heavy. Serviceberry are rare, but heavily hedged.

Stickyleaf low rabbitbrush, an increaser, is wide spread on the site with an estimated density of 2,080 plants/acre. The population appears stable with a majority of the plants being mature (88%). A small number of dwarf rabbitbrush and white rubber rabbitbrush were also found on the site.

The herbaceous understory is diverse with a fairly abundant perennial grass component. The most common grass is Letterman needlegrass which accounts for 64% of the grass cover. Other fairly common species include mutton bluegrass, Sandberg bluegrass and needle-and-thread. Cattle had utilized most of the grasses in the open areas earlier this year. These were almost exclusively Letterman needlegrass, needle-and-thread, and blue grama. The other grass species were found in association with shrubs which protected them from grazing. Forbs are also diverse with 17 annual and perennial species encountered in 1997. However, almost all of these species occur rarely. Forbs currently produce less than 3% total cover. The only common species are redroot eriogonum and longleaf phlox.

1997 APPARENT TREND ASSESSMENT

The soil is well protected by vegetation and litter cover. This, combined with the gentle terrain, limit erosion to localized areas. The key browse on the site, bitterbrush, appears to have a stable population but current use is extremely heavy. If this degree of use continues over several years, it could cause a downward trend, especially if coupled with extended drought. The other important browse species, black sagebrush, mountain big

sagebrush and snowberry, appear to have healthy, stable populations with good vigor and low decadence. The herbaceous understory is diverse but not particularly abundant especially for forbs which make up less than 3% total cover. The dense shrub cover, combined with livestock use, will prohibit any major improvements for grasses and forbs.

HERBACEOUS TRENDS --

Herd unit 27, Study no: 12

Type	Species	Nested Frequency '97	Quadrat Frequency '97	Average Cover % '97
G	<i>Agropyron smithii</i>	50	22	.77
G	<i>Agropyron trachycaulum</i>	7	2	.18
G	<i>Bouteloua gracilis</i>	31	8	.91
G	<i>Bromus carinatus</i>	2	1	.00
G	<i>Carex</i> spp.	19	7	.06
G	<i>Koeleria cristata</i>	24	10	.24
G	<i>Poa fendleriana</i>	47	14	1.34
G	<i>Poa secunda</i>	133	40	1.30
G	<i>Sitanion hystrix</i>	32	11	.30
G	<i>Stipa comata</i>	95	36	1.57
G	<i>Stipa lettermani</i>	305	82	11.75
Total for Grasses		745	233	18.45
F	<i>Agoseris glauca</i>	3	1	.00
F	<i>Allium</i> spp.	4	2	.01
F	<i>Antennaria rosea</i>	1	1	.00
F	<i>Artemisia dracunculus</i>	3	1	.03
F	<i>Artemisia ludoviciana</i>	88	32	1.41
F	<i>Balsamorhiza sagittata</i>	1	1	.15
F	<i>Cirsium</i> spp.	4	2	.03
F	<i>Epilobium paniculatum</i> (a)	1	1	.00
F	<i>Erigeron flagellaris</i>	15	4	.36
F	<i>Eriogonum racemosum</i>	118	45	1.52
F	<i>Eriogonum umbellatum</i>	6	2	.18
F	<i>Lomatium</i> spp.	5	2	.01
F	<i>Lychnis drummondii</i>	4	2	.03
F	<i>Phlox longifolia</i>	33	15	.10
F	<i>Polygonum douglasii</i> (a)	62	22	.18
F	<i>Potentilla gracilis</i>	1	1	.03
F	<i>Taraxacum officinale</i>	5	3	.06
F	<i>Tragopogon dubius</i>	6	4	.02

Type	Species	Nested Frequency '97	Quadrat Frequency '97	Average Cover % '97
	Total for Forbs	360	141	4.12

BROWSE TRENDS --

Herd unit 27, Study no: 12

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia nova	14	2.55
B	Artemisia tridentata vaseyana	15	2.17
B	Chrysothamnus depressus	12	.73
B	Chrysothamnus nauseosus albicaulis	10	.51
B	Chrysothamnus viscidiflorus viscidiflorus	53	5.56
B	Mahonia repens	4	.00
B	Purshia tridentata	58	17.35
B	Quercus gambelii	4	1.16
B	Ribes spp.	2	.15
B	Rosa woodsii	-	.15
B	Symphoricarpos oreophilus	30	10.24
B	Tetradymia canescens	2	-
	Total for Browse	204	42.00

CANOPY COVER --

Herd unit 27, Study no: 12

Species	Percent Cover '97
Quercus gambelii	2

BASIC COVER --

Herd unit 27, Study no: 12

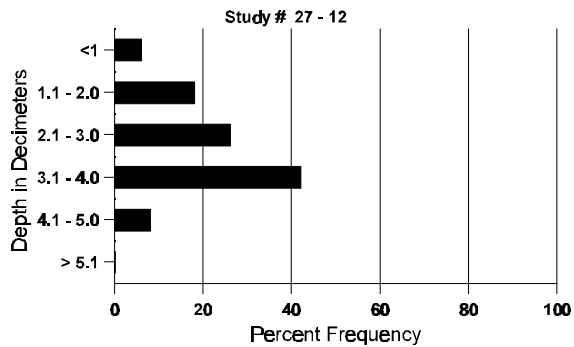
Cover Type	Nested Frequency '97	Average Cover % '97
Vegetation	444	62.22
Rock	72	1.33
Pavement	147	1.18
Litter	487	55.81
Cryptogams	33	.49
Bare Ground	205	7.05

SOIL ANALYSIS DATA --

Herd Unit 27, Study no: 12

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.4	50.6 (15.3)	5.9	64.0	16.1	19.9	2.7	19.1	134.4	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 27, Study no: 12

Type	Quadrat Frequency '97
Rabbit	3
Elk	8
Deer	45
Cattle	14

BROWSE CHARACTERISTICS --

Herd unit 27, 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			
<i>Amelanchier utahensis</i>								
M 97	- - - - -	-	-	-	-	0	93 78	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: -
<i>Artemisia nova</i>								
S 97	21 - - - - -	21	-	-	-	420		21
Y 97	20 - - - - 3 - -	22	-	1	-	460		23
M 97	10 7 2 3 - - - - -	22	-	-	-	440	18 36	22
D 97	2 - - 2 - - - - -	2	-	-	2	80		4
X 97	- - - - -	-	-	-	-	80		4
% Plants Showing '97		<u>Moderate Use</u> 14%	<u>Heavy Use</u> 04%	<u>Poor Vigor</u> 06%	<u>%Change</u>			
Total Plants/Acre (excluding Dead & Seedlings)						'97	980	Dec: 8%
<i>Artemisia tripartita tripartita</i>								
S 97	3 - - - - -	3	-	-	-	60		3
Y 97	85 - - - - -	85	-	-	-	1700		85
M 97	416 - - 2 - - - - -	418	-	-	-	8360	10 10	418
% 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	10060	Dec: -
<i>Artemisia tridentata vaseyana</i>								
S 97	5 - - - - -	5	-	-	-	100		5
Y 97	14 - - - - -	14	-	-	-	280		14
M 97	9 3 - - - - -	12	-	-	-	240	26 38	12
D 97	1 1 - - - - -	1	-	-	1	40		2
X 97	- - - - -	-	-	-	-	60		3
% Plants Showing '97		<u>Moderate Use</u> 14%	<u>Heavy Use</u> 00%	<u>Poor Vigor</u> 04%	<u>%Change</u>			
Total Plants/Acre (excluding Dead & Seedlings)						'97	560	Dec: 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>Chrysothamnus depressus</i>																		
Y	97	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	97	29	-	-	-	-	-	-	-	-	29	-	-	-	580	4	8	29
		% 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	760	Dec:		-		
<i>Chrysothamnus nauseosus albicaulis</i>																		
Y	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	97	17	-	-	-	-	-	-	-	-	17	-	-	-	340	12	16	17
		% 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	360	Dec:		-		
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	97	13	-	-	-	-	-	-	-	-	13	-	-	-	260		13	
M	97	84	-	-	7	-	-	-	-	-	91	-	-	-	1820	19	27	91
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
		% 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	2080	Dec:		-		
<i>Mahonia repens</i>																		
M	97	8	-	-	2	-	-	-	-	-	10	-	-	-	200	3	6	10
		% 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	200	Dec:		-		
<i>Purshia tridentata</i>																		
S	97	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1	
Y	97	2	5	1	1	2	1	1	-	-	13	-	-	-	260		13	
M	97	-	-	-	-	15	49	1	-	9	74	-	-	-	1480	23	70	74
D	97	-	-	-	-	1	5	-	-	-	5	-	-	1	120		6	
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
		% Plants Showing '97	<u>Moderate Use</u> 25%			<u>Heavy Use</u> 70%			<u>Poor Vigor</u> 01%			<u>%Change</u>						
Total Plants/Acre (excluding Dead & Seedlings)												'97	1860	Dec:		6%		

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>Quercus gambelii</i>																		
S	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	97	10	-	-	5	3	-	-	-	-	18	-	-	-	360		18	
M	97	2	-	-	-	4	-	-	-	-	2	4	-	-	120	98	32	6
D	97	-	-	-	-	1	-	-	-	-	-	-	-	1	20		1	
% Plants Showing '97		<u>Moderate Use</u> 32%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 04%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'97	500	Dec:	4%			
<i>Ribes spp.</i>																		
M	97	1	1	-	-	-	-	-	-	-	2	-	-	-	40	46	61	2
% Plants Showing '97		<u>Moderate Use</u> 50%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'97	40	Dec:	-			
<i>Symphoricarpos oreophilus</i>																		
Y	97	2	-	-	1	-	-	-	-	-	3	-	-	-	60		3	
M	97	2	6	2	9	20	2	-	-	-	37	4	-	-	820	25	57	41
% Plants Showing '97		<u>Moderate Use</u> 59%			<u>Heavy Use</u> 09%			<u>Poor Vigor</u> 00%			<u>%Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'97	880	Dec:	-			
<i>Tetradymia canescens</i>																		
S	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	97	-	-	-	-	-	-	1	-	-	1	-	-	-	20	10	13	1
% 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	80	Dec:	-			

Trend Study 27-13-97

Study site name: Heaton

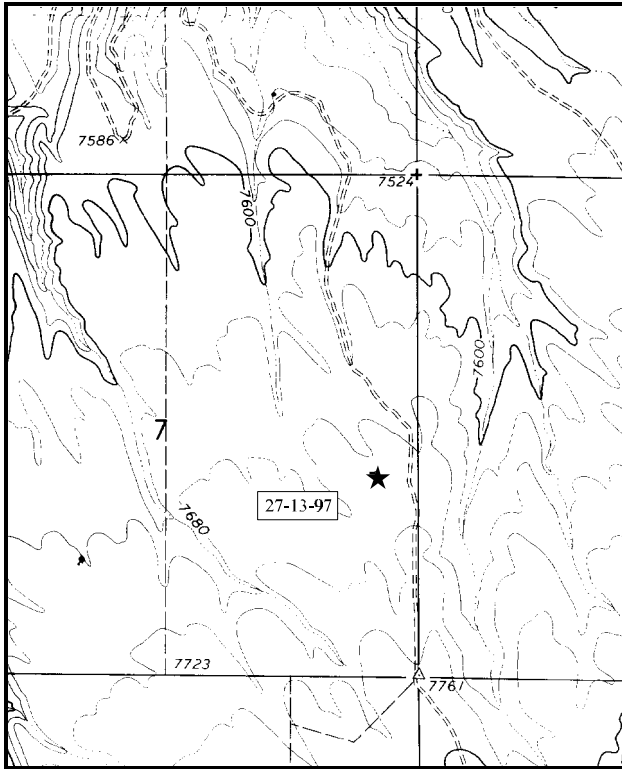
Range Type: Sagebrush

Compass bearing: frequency baseline 195 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

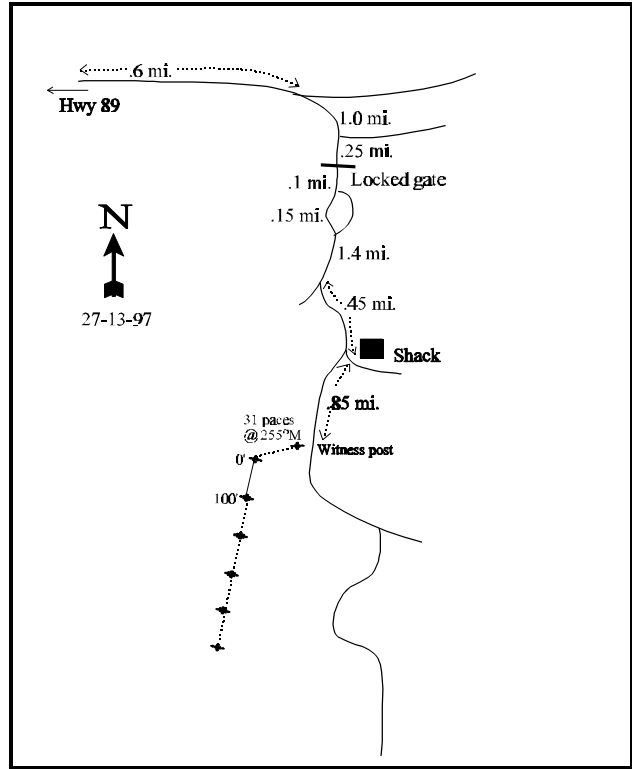
LOCATION DESCRIPTION

From U. S. 89 go approximately 0.4 miles south of mile marker 111 to a road on the left. Go 0.6 miles to a fork. Stay on Bryce Road (right) and go 1 mile to a fork. Stay left and go 0.25 to a locked gate (get combination). Go through the gate and go 1.65 miles, staying on the main road, to a fork. Go right 0.45 miles to another fork with a shack on the left. Go right for 0.85 miles to a witness post on the right (west). From the witness post walk 31 paces and 255°M to the 0-foot stake. The study is marked by green, steel fenceposts approximately 12-18 inches in height.



Map name: George Mountain

Township 38 S, Range 5 W, Section 7



Diagrammatic Sketch

UTM 4153324.024 N, 371812.001 E

DISCUSSIONS

Trend Study No. 27-13

The Heaton study site is another new transect established in 1997 to monitor winter/transitional range off the west side of the Paunsaugunt Plateau. It is found on the east side of U.S. 89 about 2 miles north of the Moons Landing study site. The study area is on private land owned by the Heaton family and is part of the Heaton private hunting unit. It samples a sagebrush/bitterbrush flat with a northwest aspect and a gentle slope of 3%. Elevation is approximately 7,680 feet. Deer use is also heavy here with a total of 113 deer days use/acre. Elk use is much lower at only 5 elk days use/acre. Cattle grazing is also heavy with 79 cow days use/acre estimated.

Soil at the site is moderately deep with an effective rooting depth (see methods) of almost 17 inches with little rock on the surface or in the profile. Texture is a sandy loam with a slightly acid pH of 6.1. This site also supports a combination of black sagebrush and mountain big sagebrush which suggests some sort of physical and/or physiological rooting barrier not discovered by the soil penetrometer. Erosion is not a problem locally due to the gentle terrain and adequate vegetation and litter cover.

Shrubs, particularly sagebrush, dominate the vegetational aspect of the site by providing 72% of the vegetation cover. Key species include: black sagebrush, bitterbrush, and mountain big sagebrush. Black sagebrush accounts for 65% of the browse cover with a moderately high density of 7,420 plants/acre. Two-thirds of the plants are mature with young plants adding an additional 26%. Utilization is light to moderate, vigor normal on most plants, and percent decadence low at 13%. However, there is a reoccurring, but disturbing pattern here for sagebrush noted again. Basically it is slowly dying off. On this site 55% of the decadent plants were classified as dying. This adds 540 plants to the dead population, making the percentage of dead plants in the population from what it is currently 7%, up to 13%. Mountain big sagebrush is much less abundant with an estimated density of 1,380 plants/acre. The population is mostly young (62%) with light to moderate use, good vigor and low decadence.

The other key browse species is bitterbrush which provides 29% of the browse cover. Age class analysis indicates a stable, mostly mature (82%) population of 1,220 plants/acre. Use is heavy on 21% of the shrubs sampled and moderate on 61%. The high level of hedging made 66% of the bitterbrush partly (1/3 to 2/3) unavailable to browsing. However, vigor is normal and percent decadence relatively low at 7%.

The herbaceous understory accounts for only 14% of the total vegetation cover on the site. Eight species of perennial grasses were found on the site, these combine to produce 12% cover. Mutton bluegrass, prairie Junegrass and needle-and-thread are the only common species. Forbs are diverse on the site but not abundant. Eighteen species of annual and perennial forbs found on the site account for less than 2% cover.

1997 APPARENT TREND ASSESSMENT

The soil is relatively well protected on the site by the abundant vegetation and litter cover combined with the gentle terrain. Unfortunately, 72% of the vegetation cover comes from shrubs which are not as effective at protecting the soil from high intensity summer storm events as herbaceous cover is. The herbaceous cover is lacking, especially forbs. Browse are abundant. The age class distribution of black sagebrush appears to be capable of maintaining itself on this site, however the proportion of dead plants in the population should be monitored closely. The population is already moderately dense and an increase will only further suppress the herbaceous understory. The more preferred bitterbrush is receiving some very heavy use but the population is healthy with good recruitment, normal vigor, and low percent decadence. The few serviceberry plants on the site are very severely hedged. The herbaceous understory is lacking on this site perhaps due to a long history of

livestock grazing. The herbaceous understory will likely further decline if the already dense population of black sage continues to increase.

HERBACEOUS TRENDS --

Herd unit 27, Study no: 13

Type	Species	Nested Frequency '97	Quadrat Frequency '97	Average Cover % '97
G	Agropyron cristatum	4	2	.53
G	Agropyron smithii	23	10	.07
G	Bouteloua gracilis	35	12	.28
G	Koeleria cristata	155	53	2.65
G	Poa fendleriana	273	72	6.67
G	Poa secunda	6	2	.15
G	Stipa comata	90	27	1.12
G	Stipa lettermani	29	10	.59
Total for Grasses		615	188	12.09
F	Allium spp.	1	1	.00
F	Antennaria rosea	13	3	.21
F	Arabis spp.	2	1	.00
F	Astragalus spp.	41	16	.37
F	Calochortus nuttallii	1	1	.00
F	Castilleja spp.	2	1	.00
F	Cirsium spp.	5	1	.00
F	Collinsia parviflora (a)	12	6	.05
F	Eriogonum racemosum	31	17	.37
F	Eriogonum umbellatum	7	2	.03
F	Gilia spp. (a)	8	4	.04
F	Lomatium spp.	3	1	.03
F	Lotus utahensis	45	20	.22
F	Oenothera spp.	1	1	.00
F	Orthocarpus spp. (a)	3	2	.01
F	Penstemon spp.	22	9	.09
F	Phlox longifolia	43	19	.14
F	Polygonum douglasii (a)	44	16	.08
Total for Forbs		284	121	1.70

BROWSE TRENDS --
Herd unit 27, Study no: 13

Type	Species	Strip Frequency '97	Average Cover % '97
B	Amelanchier utahensis	1	.03
B	Artemisia nova	83	23.14
B	Artemisia tridentata vaseyana	15	1.45
B	Chrysothamnus depressus	8	.24
B	Chrysothamnus nauseosus albicaulis	1	-
B	Chrysothamnus viscidiflorus viscidiflorus	22	.55
B	Gutierrezia sarothrae	1	-
B	Opuntia spp.	6	.18
B	Purshia tridentata	43	10.25
B	Rosa woodsii	1	-
B	Tetradymia canescens	1	-
Total for Browse		182	35.86

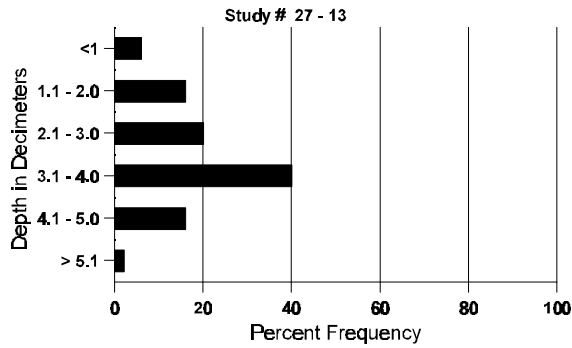
BASIC COVER --
Herd unit 27, Study no: 13

Cover Type	Nested Frequency '97	Average Cover % '97
Vegetation	424	49.70
Rock	25	.14
Pavement	157	3.04
Litter	488	53.33
Cryptogams	5	.06
Bare Ground	318	20.90

SOIL ANALYSIS DATA --
Herd Unit 27, Study no: 13

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
16.5	53.2 (16.9)	6.1	65.0	19.2	15.8	2.1	13.4	131.2	.4

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 27, Study no: 13

Type	Quadrat Frequency '97
Rabbit	3
Elk	8
Deer	51
Cattle	13

BROWSE CHARACTERISTICS --
Herd unit 27, 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										
Amelanchier utahensis															
S	97	-	-	-	1	-	-	-	-	-	-	1	20		1
M	97	-	-	-	-	-	-	-	1	1	-	-	20	-	1
% Plants Showing '97		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 100%			<u>Poor Vigor</u> 00%		<u>%Change</u>					
Total Plants/Acre (excluding Dead & Seedlings)											'97	20	Dec:	-	
Artemisia nova															
S	97	99	-	-	2	-	-	-	-	101	-	-	2020		101
Y	97	92	3	-	3	-	-	-	-	98	-	-	1960		98
M	97	179	26	5	11	3	-	-	-	224	-	-	4480	14	27
D	97	40	7	-	1	-	-	-	-	15	4	2	980		49
X	97	-	-	-	-	-	-	-	-	-	-	-	600		30
% Plants Showing '97		<u>Moderate Use</u> 11%			<u>Heavy Use</u> 01%			<u>Poor Vigor</u> 08%		<u>%Change</u>					
Total Plants/Acre (excluding Dead & Seedlings)											'97	7420	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>Artemisia tridentata vaseyana</i>																		
S	97	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
Y	97	41	2	-	-	-	-	-	-	-	43	-	-	-	860		43	
M	97	17	5	1	-	-	-	-	-	-	23	-	-	-	460	17 31	23	
D	97	1	-	1	-	-	1	-	-	-	2	-	-	1	60		3	
X	97	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
% Plants Showing '97		<u>Moderate Use</u> 10%			<u>Heavy Use</u> 04%			<u>Poor Vigor</u> 01%			<u>% Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)														'97	1380	Dec:	4%	
<i>Chrysothamnus depressus</i>																		
Y	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	97	11	-	-	-	-	-	-	-	-	11	-	-	-	220	6 10	11	
% 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	240	Dec:	-	
<i>Chrysothamnus nauseosus albicaulis</i>																		
M	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	24 30	1	
% 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>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	97	5	-	-	-	-	-	1	-	-	6	-	-	-	120		6	
M	97	42	-	-	5	-	-	-	-	-	47	-	-	-	940	6 11	47	
% 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	1060	Dec:	-	
<i>Gutierrezia sarothrae</i>																		
M	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	- -	1	
% 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:	-	

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	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	97	2	-	-	-	-	-	3	-	-	4	-	-	-	100	4	13	5
D	97	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
% Plants Showing '97		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 13%			<u>% Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'97	160	Dec:	13%			
Purshia tridentata																		
S	97	7	-	-	2	-	-	-	-	-	9	-	-	-	180		9	
Y	97	4	-	-	2	-	1	-	-	-	7	-	-	-	140		7	
M	97	2	2	2	2	32	10	-	-	-	48	2	-	-	1000	22	51	50
D	97	-	-	-	-	3	-	1	-	-	2	-	-	2	80		4	
% Plants Showing '97		<u>Moderate Use</u> 61%			<u>Heavy Use</u> 21%			<u>Poor Vigor</u> 03%			<u>% Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'97	1220	Dec:	7%			
Rosa woodsii																		
D	97	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
% Plants Showing '97		<u>Moderate Use</u> 00%			<u>Heavy Use</u> 00%			<u>Poor Vigor</u> 100%			<u>% Change</u>							
Total Plants/Acre (excluding Dead & Seedlings)												'97	20	Dec:	100%			
Tetradymia canescens																		
M	97	-	-	-	1	-	-	-	-	-	1	-	-	-	20	-	-	1
% 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:	-			

SUMMARY

WILDLIFE MANAGEMENT UNIT - 27 - PAUNSAUGUNT

Eight study sites, five on deer summer range and three on winter range, were established in 1987. These eight sites were reread in 1992 and again in 1997. In addition, five new winter range sites were established during the 1997 season at Buckskin Mountain (#27-9), Telegraph Flat (#27-10), Crocodile (#27-11), Moon's Landing (#27-12) and Heaton (#27-13). Trends on summer range sites indicate slightly downward browse trends at Proctor Canyon (#27-1) and Whiteman Bench (#27-3). Browse trend is stable at Ahlstrom Hollow (#27-2) and Sand Pass (#27-4) and slightly up but unimportant at Podunk Creek (#27-5). Herbaceous trends, which are of particular importance on spring/summer ranges, are downward on all sites except Ahlstrom Hollow which displays a stable herbaceous trend. All of the summer range sites showed a substantial decline in herbaceous cover in 1997 compared to the 1992 reading. This is obviously due to the particularly dry season of 1996.

Browse trends on the winter range sites were all slightly downward compared to 1992. Herbaceous trends were all considered stable but in poor condition. The Five Mile Mountain site showed a significant increase in the nested frequency of cheatgrass. The new winter range sites at Buckskin Mountain, Telegraph Flat and Crocodile appear to have poor but stable soil trends. Browse trends appear stable. The herbaceous understories on these sites are all depleted and in poor condition. The two high elevation winter/transitional range sites at Moon's Landing and Heaton are heavily utilized by deer as well as domestic livestock. Trends for soil and browse appear stable at the present time. A trend summary table follows.

Site	1992			1997		
	Soil	Browse	Grasses & Forbs	Soil	Browse	Grasses & forbs
27-1 Proctor Canyon	-	+	0	-	-	-
27-2 Ahlstrom Hollow	-	+	-	+	0	0
27-3 Whiteman Bench	-	+	0	-	-	-
27-4 Sand Pass	-	-	-	-	0	-
27-5 Podunk Creek	0	0	0	0	+	-
27-6 Nephi Pasture	-	-	-	0	-	0
27-7 Nephi Pasture Exclosure	+	-	0	0	-	0
27-8 Five Mile Mountain	0	0	+	-	-	0
27-9 Buckskin Mountain	Established in 1997					
27-10 Telegraph Flat	Established in 1997					
27-11 Crocodile	Established in 1997					
27-12 Moon's Landing	Established in 1997					
27-13 Heaton	Established in 1997					

(+) = upward trend, (-) = downward trend, (0) = stable trend

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