

UTAH BIG GAME RANGE TREND STUDIES 1996 Volume 1



Photo courtesy of Lynn Chamberlain

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ANNUAL PERFORMANCE REPORT FOR FEDERAL AID PROJECT W-135-R-17

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE RESOURCES

UTAH BIG GAME
RANGE TREND STUDIES
1996 Volume 1

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Performance Report for Federal Aid Project W-135-R-17

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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 1996 field season and reported in this publication involves the reading of interagency range trend studies in the DWR Northern Region. Trend studies surveyed in these management units were established in 1983 and 1984 with rereads on most sites in 1990 and 1996.

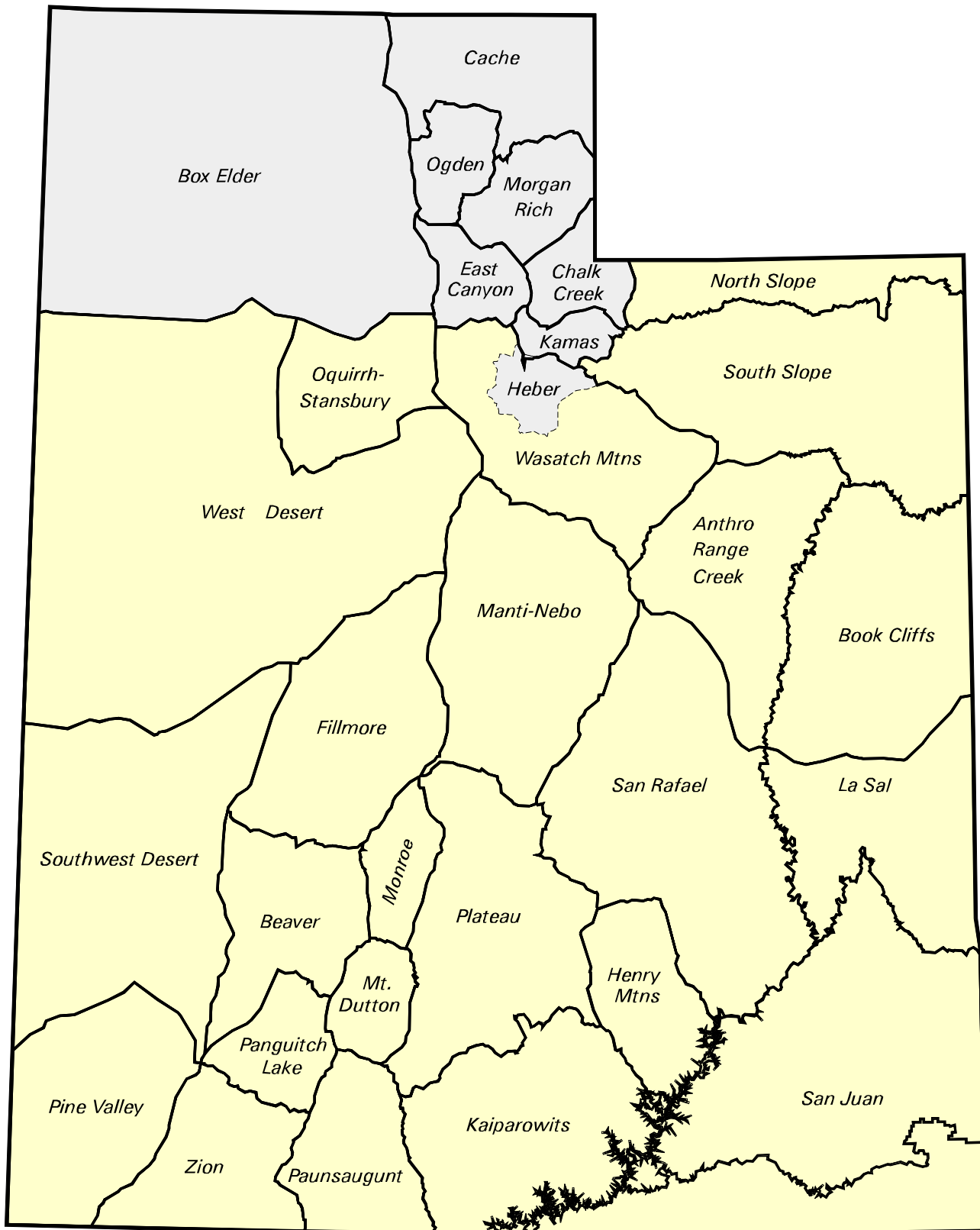
The following National Forest Service and Bureau of Land Management offices provided information and/or assistance in completion of the trend studies which greatly add to the value of this interagency report:

Sawtooth National Forest
 Burley Ranger District
Wasatch-Cache National Forest
 Logan Ranger District
 Ogden Ranger District

Bureau of Land Management
 Bear River Resource Area
 Pony Express Resources Area

Most private landowners were extremely cooperative in allowing access to study sites located on their land. However, several studies could not be accessed, especially due to lack of cooperation on the private landowners part.

Management Units Surveyed in 1996



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.

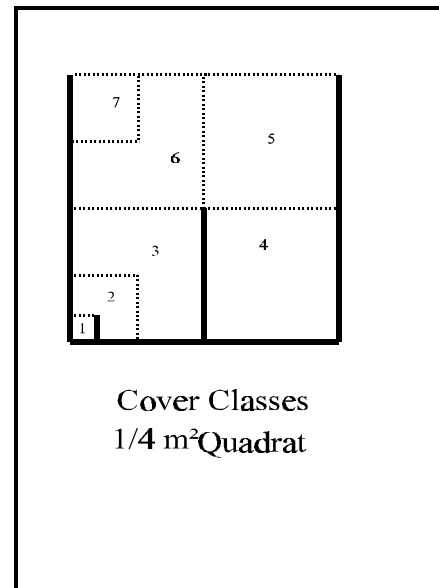
Vegetative composition

Determining vegetational characteristics for each "key" area is determined by setting up 5 consecutive 100 ft base line 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.

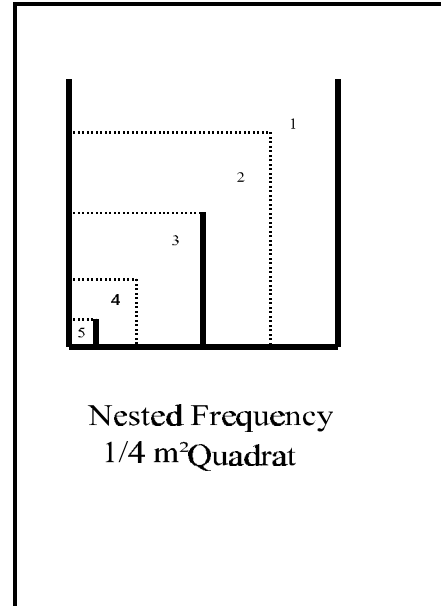
Currently, cover is determined using a slightly modified Daubenmire (1959) cover class method. The seven cover class are: 1) .01-1%, 2) 1.1-5%, 3) 5.1-25%, 4) 25.1-50%, 5) 50.1-75%, 6) 75.1-95%, 7) 95.1-100%.

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 (¹U.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. Each 100th acre shrub strip is divided into 20, 5 foot segments. Presence or absence is determined for these strip segments to give a measure of shrub frequency. This larger sample will better reflect 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 estimate 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

T y p e	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 strip frequency of 86 out of a possible 100. Cover is estimated at 16.28%.

BROWSE TRENDS --
Herd unit 30A, Study no: 1

T y p e	Species	Strip Frequency	Average Cover %
		'94	'94
B	Amelanchier utahensis	18	2.25
B	Artemisia tridentata wyomingensis	86	16.28
B	Chrysothamnus viscidiflorus	71	3.62
Total for Browse		175	22.15

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 penetrometer readings, 5 of the deepest probes possible near each of the 5 baseline starting stakes. The effective rooting depth is a relative index that can be used for site comparisons with regard to individual species differences, 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

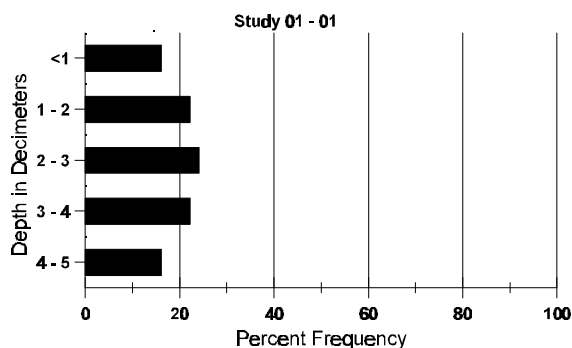
Percent organic matter (%OM) refers to the amount of organic matter in the top 12 inches of soil. Parts per million of phosphorus and potassium are also included. Values for phosphorus and potassium less than 10 ppm and 70 ppm respectively may be limiting to vegetation growth.

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 patterns use on the site.

PELLET GROUP FREQUENCY --
Herd unit 36, Study no: 1

Type	Quadrat Frequency '94
Rabbit	44
Elk	28
Deer	14

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 G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Artemisia tridentata wyomingensis																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	94	45	-	-	2	-	-	-	-	-	-	-	-	47	-	-	47	
Y	87	2	1	1	-	-	-	-	-	-	-	-	4	-	-	266	4	
	94	10	-	-	-	-	-	-	-	-	-	-	10	-	-	200	10	
M	87	20	15	3	-	-	-	-	-	-	-	-	37	-	1	2533	13 17	38
	94	96	26	3	4	-	-	-	-	-	-	-	121	-	8	2580	18 32	129
D	87	2	4	-	-	-	-	-	-	-	-	-	6	-	-	400		6
	94	94	4	2	1	-	-	-	-	-	-	-	85	-	3 13	2020		101
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6
Total Plants/Acre (excluding Dead & Seedlings)												'87	3199	Dec:	12%			
												'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.

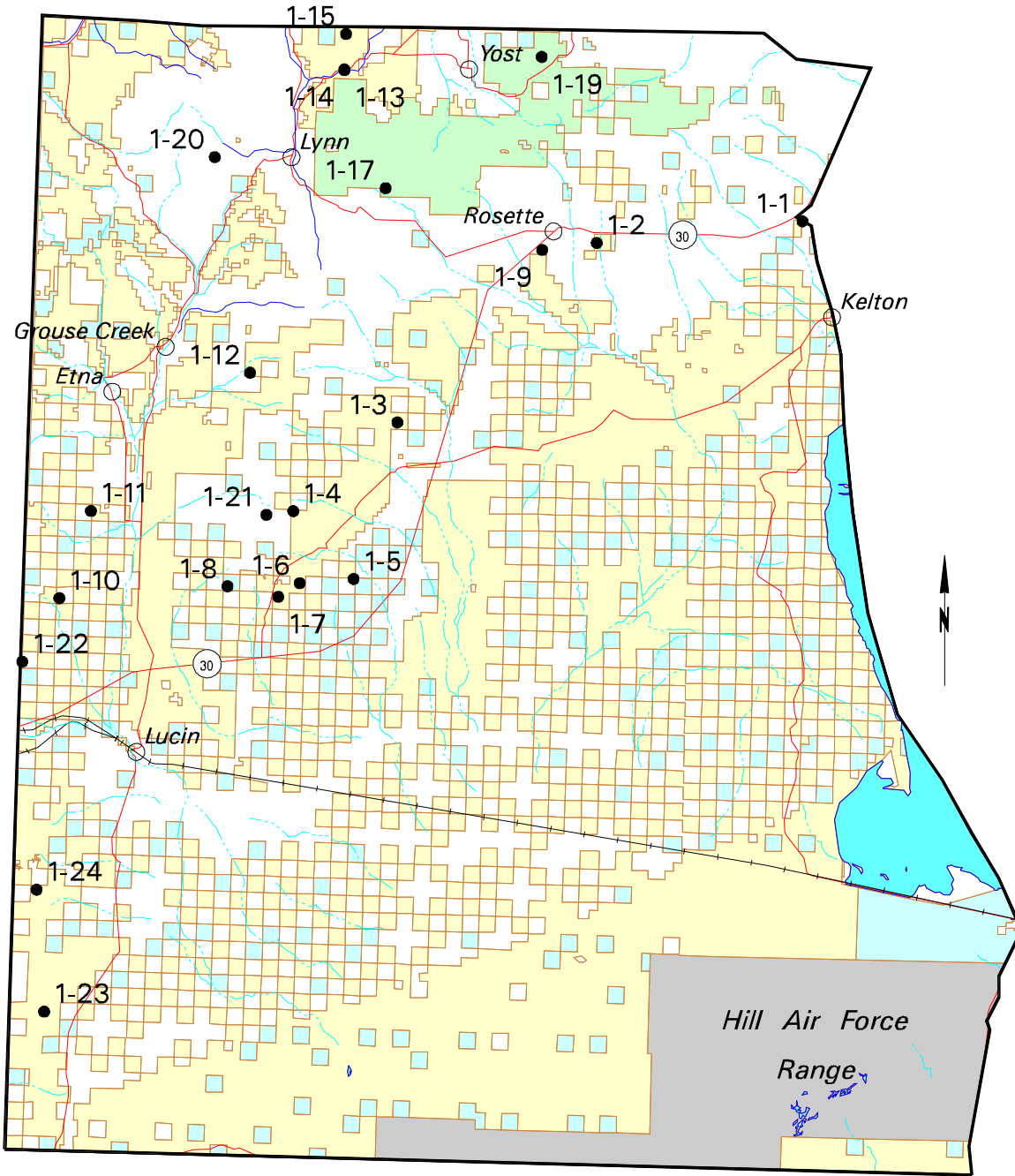
The name of the site and directions for locating the site are given on the location page. Due to many changes in management unit boundaries, trend studies have been renumbered. The previous trend study number is found in parenthesis following the trend study number currently being used. Also included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

Deer Management Unit 1A – 1996 Transect Locations













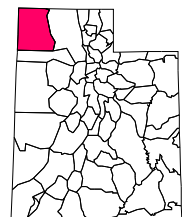
Map Scale 1:649,440

1 inch = 10.25 miles

MAP LOCATION

LEGEND

- | | | |
|--|--|---|
|  BLM |  State Wildlife Res./Mgmt. Area |  Perennial Stream |
|  State |  Water Body |  Intermittent Stream |
|  Native American |  Transect Location |  Road |
|  Private Land | | |



DEER HERD UNIT 1 - BOX ELDER

Boundary Description

Box Elder, Tooele, Salt Lake, Davis and Weber counties - Boundary begins at the Utah-Idaho state line and Interstate 15; then west along this state line to the Utah-Nevada state line, south along this state line to Interstate 80, east on I-80 to I-15, north on I-15 to the Utah-Idaho state line.

Herd Unit Description

Covering approximately 3,475,200 acres (King and Muir 1971), deer herd unit 1 is one of the largest in the state. However, big-game range accounts for less than one-third of the unit and consists of two separate and distinct areas. The Promontory region, subunit 1C, is located in the east side and consists primarily of private land and was considered unsuitable for permanent trend studies. The western portion, where studies were established, is dominated by the Raft River Mountains in subunit 1A, and the Grouse Creek and Goose Creek Mountains in subunit 1B. Here again, private land accounts for almost 70% of what is considered "normal" winter range (King and Muir 1971) and is arranged in a checkerboard pattern with public lands. Towns located within this area are Etna, Grouse Creek, Lynn, Yost, and Park Valley.

The Raft River Mountains run parallel to the Utah-Idaho border, are moderately steep on the south and east sides, and more gentle on the north and west sides. The highest point is 9,925 feet on an unnamed peak at the head of the Clear Creek drainage. The Grouse Creek Mountains are relatively narrow and steep and run north-south. At 9,000 feet, Red Butte is the highest point in the Grouse Creek Range. The topography of the Goose Creek Mountains is generally more nominal, the highest point being 8,584 feet on Twin Peaks. The Dove Creek Mountains are more rough, but the terrain becomes more gentle near the Three Corners area.

Normal winter range covers 588,898 acres in subunits 1A and 1B. The upper limits range between 6,000 and 8,000 feet depending on aspect. Winter concentration areas include: the Raft River Narrows, Devils Playground, Bovine, Kimber Ranch, Red Butte Basin, Black Hills, Hardister Creek, and Mud Springs Basin. During severe winters, the normally available winter range can be reduced as much as 74% (King and Muir 1971).

Seasonal migration consists mainly of elevational, and north to south migrations from summer range to winter range. A significant number of deer which spend their summers in Idaho, migrate south into unit 1 winter ranges.

King and Muir (1971) estimated that the summer range was restricted to 194,612 acres (only 17% of the range) located in the tops of the Raft River, Goose Creek and Grouse Creek Mountains. They considered this quality summer range to be critical to the unit's big-game herds, especially for deer. Areas specifically listed as summer concentration areas for deer are the uppermost elevations of the Raft River Mountains, Johnson Creek Drainage, the head of Lynn Valley, the crest of the Grouse Creek Mountains, and Hardister Creek Plateau. Fawn production estimates from 1975 through 1990 have averaged a little more than 74 fawns/100 does, which can be misleading (Jense et al. 1985, Jense et al. 1991). Between 1990 and 1995 the average was nearly 60. This would indicate that the summer range seems to be of sufficient quantity and quality to maintain a healthy herd, at least at present levels. But, if one examines a regression of trend on the fawn/doe ratios, it shows a declining trend through this same 15 year period (1975-90) with the ratios going from almost 86 down to 46. This is reflective of the long periods of drought that are so detrimental to summer ranges, especially if they are already a limiting factor.

King and Muir (1971) also describe seven general vegetation types which dominate this big-game range. Sagebrush makes up 55% of the winter range and 58% of the summer range. With an estimated production of 2,010 lbs/acre and 3,033 lbs/acre on the winter and summer ranges, respectively, the big sagebrush type produces the most forage of any type. Black sagebrush occupies ridge tops in the summer range and the upper reaches of the winter range. On the summer range, the black sagebrush type has the best source of grasses and forbs. Within the summer range, the browse type is dominated by curlleaf mountain mahogany on the drier sites and by maple on the more mesic sites. This type provides a good variety of spring-fall forage, yet makes up less than 1% of the winter range. The sagebrush-juniper and juniper types together account for 31% of the winter range and the juniper are important for the cover they provide. Although small amounts of the aspen-timber and forb-grass types are found along the upper edges of winter range, their primary value is as summer range. A more detailed description and vegetation maps of the different vegetative types for deer herd unit 1 can be found in the 1970 Range Inventory Report published in 1971 by King and Muir.

The Box Elder deer herd unit is divided into two areas, the western segment has 588,898 acres of useable big-game range with the eastern segment having 342,567 acres of useable big-game range. The average vegetative production for each vegetative type and their respective acreages for each range type were determined as follows:

Black sagebrush 1,940 lbs/acre on 26,188 acres; sagebrush 2,010 lbs/acre on 511,744 acres; mixed browse 1,842 lbs/acre on 5,767 acres; sagebrush-juniper 1,863 lbs/acre on 134,167 acres; juniper 1,556 lbs/acre on 154,912 acres; aspen-timber 384 lbs/acre on 5,056 acres; forb-grass 1,164 lbs/acre on 7,564 acres; and maple-sagebrush 1,086 lbs/acre on 21,203 acres (this last type is located only on the eastern segment of the unit). The remainder of the acreage is made up of non-range and agricultural land types.

These average production figures were determined by sampling a total of 404 one-hundred-foot transect lines during the range inventory in 1970.

Big Game Trends

Pratt (1983) gave a brief history of recent management of this unit's deer populations. In 1950, the season was primarily buck only with a few special permits. Between 1951 and 1970, regulations allowed either sex hunting with some special permits and season extensions. During 1971 and 1972, the first three days were either sex, followed by eight days of buck only hunting. From 1973 to the present, hunts have been buck only with a few special antlerless permits to help lower the population because of depredation to agricultural lands.

The 1990 management objectives was to maintain the population necessary to sustain a yearly harvest of 2,250 bucks from subunits A and B and 1,100 for subunit C. Current objectives are to manage for a modeled target winter population of 24,000 deer with an annual buck harvest of about 2,800 animals, achieve post season ratio of 15 bucks/100 does, and to maintain and protect 588,000 acres of winter range and 194,000 acres of summer range.

Between 1950 and 1981, the buck harvest for the western portion of the unit ranged between 508 and 3,022, with an average of 1,302 bucks per year (Pratt 1983). However, the harvest has been increasing in recent years. In 1982, there were 2,891 bucks taken and 3,364 and 2,233 were taken respectively in 1983 and 1984 (Jense et al. 1985). Harvests peaked in 1988 and 1991 when 4,454 and 4,323 bucks were harvested respectively. Harvests dropped significantly after the severe winter of 1992-93. Only 503 bucks were taken in 1993 increasing to 1,081

by 1994. Antlerless permits have been issued each year averaging 1,418 does per year between 1986 and 1992. Numbers dropped to only 583 in 1993, 39 in 1994 and 117 in 1995.

A regression trend line of buck harvest for the last 40 years (1950-1990) shows an increasing trend from 838 in 1950 to 3,014 by 1990. While the regression of fawn-doe ratios have decreased from 86 to 64 through the last 15 years (1975-1990). This would suggest that the harsh winters of 1982-84 and drought since then have had a detrimental effect on the fawn population. Between 1991-92 and 1994-95 the fawn/doe ratio has averaged 64 fawns/100 does. Since the severe winter of 1992-93, numbers have increased from 54 fawns/100 does in 1992-93 to 70 in 1994-95.

Elk herd unit 1 coincides with Deer herd unit 1. The Pilot Mountain elk unit population has been relatively stable for the last 6 years, with the last two aerial counts (1989 and 1990) showing totals of 302 and 327 animals. The calve-cow ratios have bounced around a lot since 1984 and have gone from a low of 24 to a high of 51 in 1990. Between 1991-92 and 1995-96 the calves/100 cow ratio has averaged only 39. The regressed trend for calve-cow ratios has shown a slightly downward trend since 1984, following the downward trend of the fawn-doe ratios and the continuing summer drought.

Pratt (1983) listed several concerns about the increasing pressure on the unit's range and deer herd. A livestock owners group called the "Park Valley Improvement Association" is attempting to rehabilitate the range (for livestock use) by burning or chaining sagebrush and juniper on private lands. Much of this range is then seeded to monotypic stands of crested wheatgrass. This results in reductions in important wintering areas, and thermal and hiding cover. It has changed migration routes and concentration areas and has resulted in increased agricultural depredation problems. Other problems mentioned were: access problems resulting in uneven harvests and increasing hunter pressure in more open vegetation types, which could result in over-harvests. More importantly, these monotypic grass stands are more susceptible to catastrophic events, for example drought, insect outbreaks, disease, and limits their season of use. The more diverse a plant community is, the more resilient it is, especially in it's recovery from extended periods of drought. Community diversity also extends season of use for both wildlife and livestock.

When interpreting the data, it should be recalled that the 1984 studies were read in a period of above average precipitation while the 1990 and 1996 studies were conducted after several successive years of drought. These conditions must be considered when evaluating long-term trend data, especially pertaining to herbaceous vegetation. Since the studies sample mostly winter range where browse, most often sagebrush, is the key forage, the following study site discussions focus more on trends related to browse condition, composition and availability.

Trend Study Summary

Twenty four studies were read in 1996 on unit 1. Fifteen of the study sites were rereads from sites established in 1984 and read in '84 and '90. Twelve of these sample winter ranges on sagebrush-grass range types with two sites placed in the pinyon-juniper type and one in mixed mountain brush. The new studies established in 1996 were added to provide data in other areas of concern. These include mixed mountain brush sites at Nut Pine Hills (#1-16), Clark's Basin (#1-17), and Keg Spring (#1-21). A high elevation black sagebrush site was added on Bally Mountain (#1-19) and an aspen site was established at Cotton Thomas (#1-20). Due to the increasing elk herd on the Pilot Range, two studies, Patterson Pass (#1-23) and Sheep Range Spring (#1-24) were also established. An additional site was established at Dake Pass (#1-22) to monitor a black sagebrush wintering area for elk north of the Pilot mountains.

TREND STUDY 1-1-96

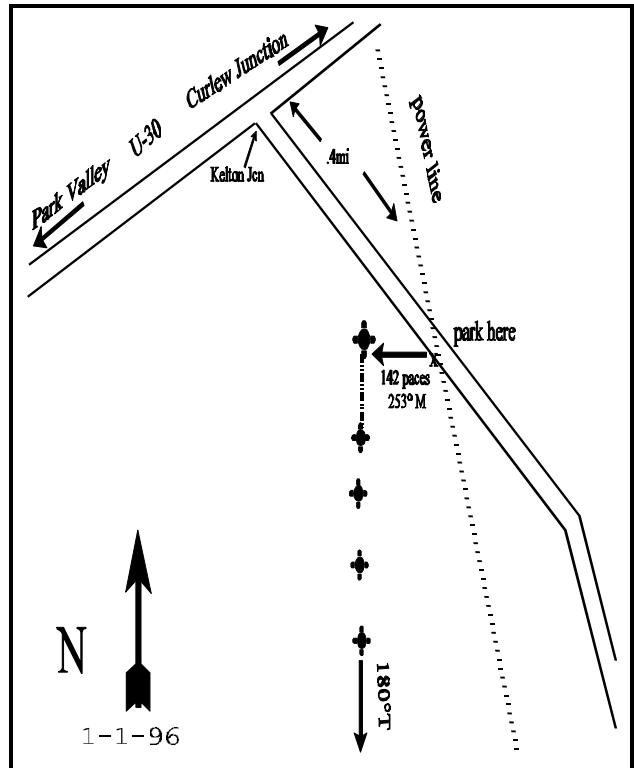
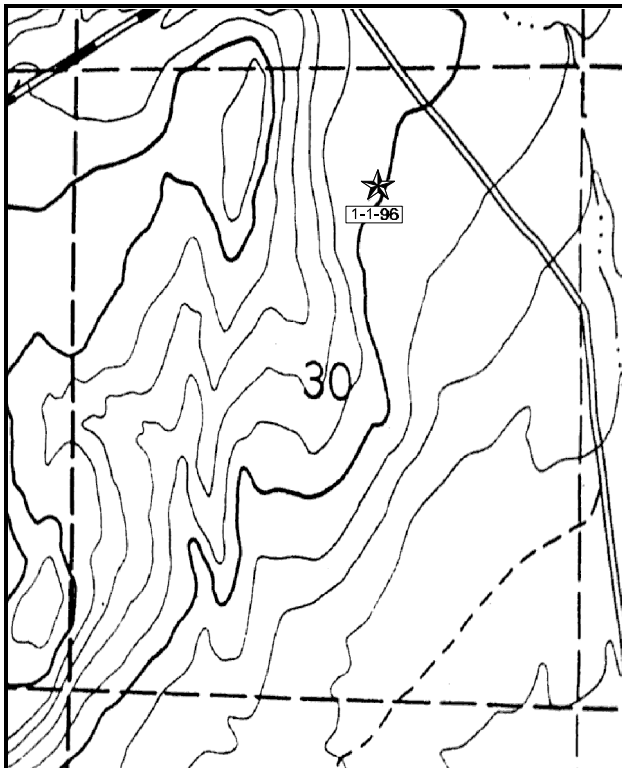
Study site name: Kelton. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 197 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Proceed on U-30 to the Kelton Junction and turn southeast off U-30. Note mileage at the junction and proceed 0.40 miles to a point where the telephone pole line crosses the road. Stop here. From the power pole on the west side of the road, take a compass bearing of 253 degrees magnetic (directly west) and walk 142 paces to the 0-foot stake of the frequency baseline. This is a green steel fence post wired with browse tag #7905. The baseline runs true south (i.e., 180 degrees true or 197 degrees magnetic).



Map Name: Kelton Pass, Utah

Diagrammatic Sketch

Township 13N Range 11W, Section 30 UTM COOR: 3-21-921E 46-33-402N

DISCUSSION

Trend Study No. 1-1

This study is located approximately one-half mile south of the Kelton Junction on Highway U-30. Identified as an important deer and antelope winter range, the study area often has concentrations of both animals. Antelope and deer pellet groups were abundant in the past. Elevation is approximately 4,640 feet on nearly level to gently sloping terrain with a slight east or east-southeast aspect. The range type is basin big sagebrush with an extensive understory of cheatgrass.

Soil is alluvial in origin and basalt derived. Soil is a loam in texture and is relatively deep. Apart from a few basalt outcrops and boulders, surface rockiness is minimal. Organic matter content is lacking (1.6%) and is primarily derived from a nearly uniform understory cover of dead cheatgrass. Shrubs in the past comprised the primary vegetative cover and in combination with cheatgrass, litter and rock provide a nearly complete ground cover. Fire before 1990 has reduced it to less than 3%. Soil erosion is minimal.

Browse composition is dominated by basin big sagebrush but there are also small numbers of white rubber rabbitbrush. During the 1984 reading, total browse density was estimated at 3,000 plants/acre, 91% of which was basin big sagebrush. This species showed evidence of heavy use, but exhibited good vigor and a stable age structure. Between 1984 and 1990, a fire burned the area reducing the sagebrush to only 132 plants/acre. By 1996, density of basin big sagebrush increased to 560 plants/acre, 61% of which are young plants.

Currently, understory vegetation is depleted and consists almost entirely of annuals, primarily cheatgrass which accounts for 90% of the vegetation cover. Cheatgrass forms a dense uniform cover of "fine fuel" that is a severe fire hazard when it is dry. Perennial grasses are limited to isolated individuals of bottlebrush squirrel-tail and Sandberg bluegrass. Forbs are infrequent. Annuals and biennials such as prickly lettuce, annual stickseed, tansy-mustard, and tumble mustard are prevalent. Perennial forbs are limited to a few individuals of gooseberry leaf globemallow and longleaf phlox.

1984 APPARENT TREND ASSESSMENT

This site is essentially stable, although subjected to very heavy deer and antelope use. As a result, overall vegetative condition is below optimum, but not apparently deteriorating further. The browse component is dominant and will remain so. Understory condition is poor but stable. Soil trend is stable. Litter and vegetative cover are high and the site is nearly level, resulting in almost negligible soil erosion. The greatest threat to the site is the high fire hazard because of the dense annual grass cover. With the right conditions, one fire could eliminate most of the basin big sagebrush that is so important to deer and antelope.

1990 TREND ASSESSMENT

A fire on the study site since 1984 has dramatically changed the species composition and eliminated over 95% of the sagebrush. Quadrat frequency has gone from 21% to 2%. The area is currently dominated by cheatgrass and Russian thistle, both with 100% quadrat frequency values. Annuals were not inventoried in 1982, so no comparison can be made. Photo point comparisons with 1984 show that much of the understory consisted of cheatgrass before the burn.

TREND ASSESSMENT

soil - stable, increased bare ground but increased frequency of grasses and

forbs

browse - down after fire, poor composition and density

herbaceous understory - down after fire, dominated by annuals

1996 TREND ASSESSMENT

The soil trend has improved slightly since 1990. Percent bare ground has declined while litter cover has increased. Erosion is not a problem on this site due to the lack of slope and abundant herbaceous vegetation cover, but more than 90% is provided by annual species. The browse trend has continued to improve since the fire. Estimated density of basin big sagebrush has increased from 132 plants/acre to 560. The number of seedling and young plants have also increased. On the negative side, broom snakeweed was picked up in the 1996 reading. It currently numbers only 320 plants/acre but has an age class distribution of an expanding population. The herbaceous trend is in stable yet poor condition. Cheatgrass brome still dominates the site, providing 96% of the herbaceous vegetation cover. Perennial grasses are nearly absent. The forb composition is also dominated by annuals. Sum of nested frequency of forbs declined considerably since 1990 due to a major reduction in Russian thistle. Currently the dominant forbs consist of tumble mustard, prickly lettuce, and scarlet globemallow.

TREND ASSESSMENT

soil - improved slightly

browse - slightly up, but density are still poor and only provides about 2% total cover

herbaceous understory - stable but dominated by annuals

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 1

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Bromus tectorum (a)	a-	b360	c380	-	100	98	33.03
G	Poa secunda	a5	a-	b17	2	-	7	.10
G	Sitanion hystrix	a14	a16	b3	8	7	1	.03
G	Unknown grass - perennial	3	-	-	1	-	-	-
Total for Grasses		22	376	400	11	107	106	33.17
F	Chaenactis douglasii	-	-	3	-	-	1	.00
F	Descurainia spp. (a)	-	13	-	-	7	-	-
F	Erigeron spp	-	-	3	-	-	1	.00
F	Euphorbia spp.	-	-	5	-	-	2	.01
F	Euclidium syriacum	-	2	-	-	1	-	-
F	Gilia spp. (a)	-	-	1	-	-	1	.00
F	Halogeton glomeratus (a)	-	24	-	-	9	-	-
F	Holosteum umbellatum (a)	-	-	3	-	-	1	.00
F	Lactuca serriola	a-	a5	b22	-	2	9	.21
F	Phlox longifolia	a5	a-	b17	3	-	9	.07
F	Salsola iberica (a)	a-	b369	c15	-	100	7	.06
F	Sisymbrium altissimum (a)	-	-	103	-	-	49	.81

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	Sphaeralcea grossulariaefolia	2	9	4	1	5	2	.15
F	Tragopogon dubius	3	-	1	1	-	1	.00
F	Unknown forb-perennial	3	-	-	1	-	-	-
Total for Forbs		13	422	177	6	124	83	1.34

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

BROWSE TRENDS --

Herd unit 01 , Study no: 1

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata tridentata	13	1.60
B	Chrysothamnus nauseosus albicaulis	4	.30
B	Chrysothamnus nauseosus consimilis	2	.38
B	Gutierrezia sarothrae	10	.06
Total for Browse		29	2.34

BASIC COVER --

Herd unit 01 , Study no: 1

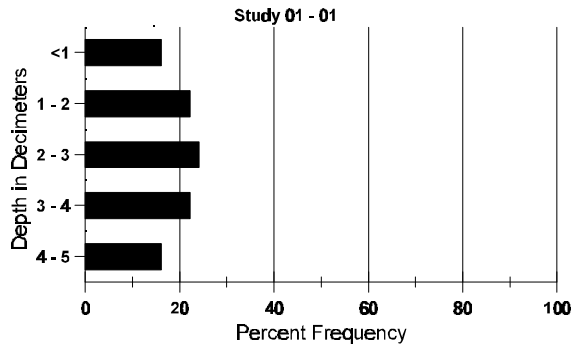
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	388	2.00	23.00	39.01
Rock	111	1.25	.75	2.93
Pavement	182	.25	1.25	2.15
Litter	400	80.75	54.25	69.33
Cryptogams	78	8.25	0	1.11
Bare Ground	155	7.50	20.75	4.40

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 1

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

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 01 , Study no: 1

Type	Quadrat Frequency '96
Cattle	4

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 1

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata tridentata</i>																		
S	84	3	2	-	-	-	-	-	-	-	4	1	-	-	166		5	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	2	-	-	-	-	-	2	-	-	-	40		2	
Y	84	2	6	2	-	-	-	-	-	-	10	-	-	-	333		10	
	90	2	-	-	-	-	-	-	-	-	1	1	-	-	66		2	
	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340		17	
M	84	1	15	31	-	-	-	-	-	-	46	-	1	-	1566	27 34	47	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	10 8	1	
	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220	21 25	11	
D	84	-	7	12	-	-	-	1	-	-	6	-	12	2	666		20	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
Total Plants/Acre (excluding Dead & Seedlings)												'84	2565	Dec :	26%			
												'90	132		25%			
												'96	560		0%			
<i>Chrysothamnus nauseosus albicaulis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	33	22 26	1	
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120	20 30	6	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec :	-			
												'90	33		-			
												'96	120		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Chrysothamnus nauseosus consimilis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220	16	16	11
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	220		-			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	84	3	-	-	-	-	-	-	-	-	2	1	-	-	100			3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33	12	20	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21	38	0
D	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
Total Plants/Acre (excluding Dead & Seedlings)												'84	199	Dec:	33%			
												'90	0		0%			
												'96	0		0%			
<i>Grayia spinosa</i>																		
M	84	-	-	2	-	-	-	-	-	-	2	-	-	-	66	33	48	2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	25	50	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Gutierrezia sarothrae</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	14	-	-	1	-	-	-	-	-	15	-	-	-	300			15
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180	11	16	9
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	320		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Leptodactylon pungens</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	7	16	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Opuntia fragilis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	6	6	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			

TREND STUDY 1-2-96

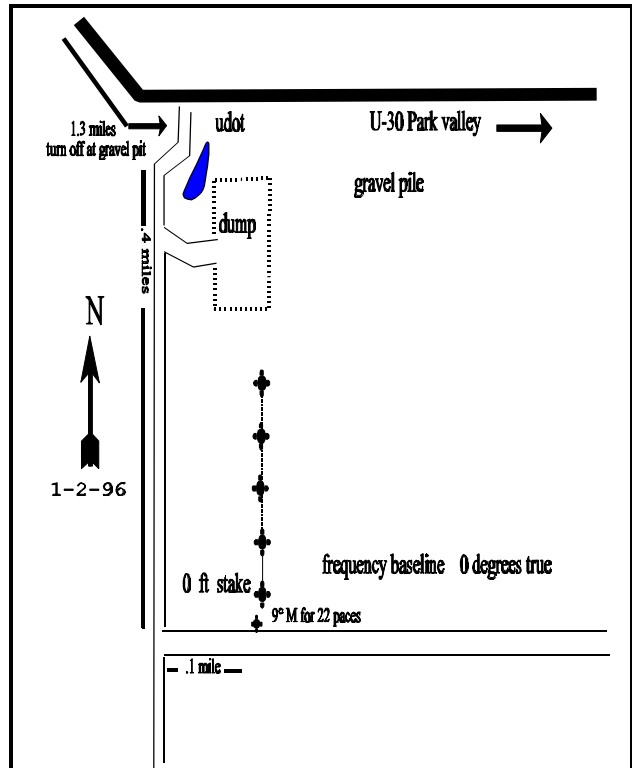
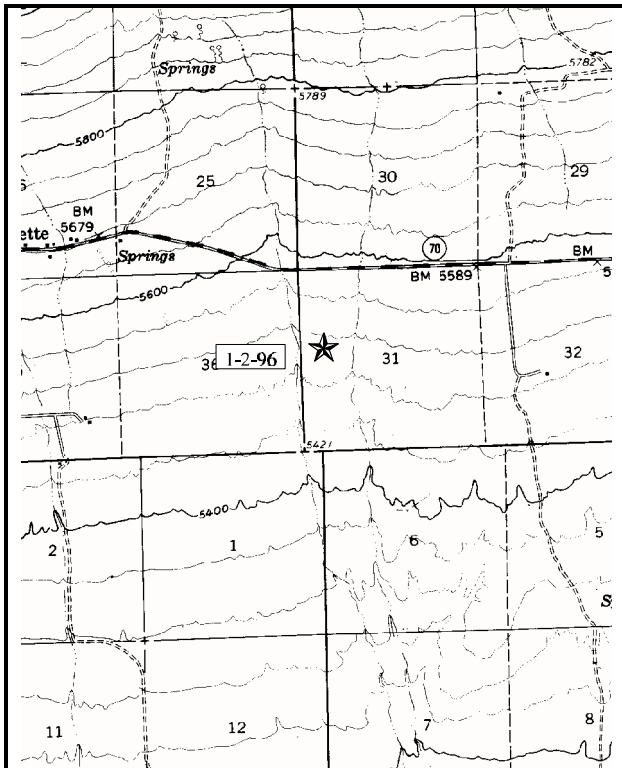
Study site name: Rosette. Range type: Big sagebrush.

Compass bearing: frequency baseline 0 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Rosette, Utah and mile marker 51, proceed northeast on U-30 approximately 1.3 miles and turn right. Proceed through the Utah Department of Transportation gravel dump picking up a dirt road on the west side of gravel pile area. Proceed south on this road for 0.4 miles (passing a left fork) to a left fork. Turn left (i.e., east), proceed 0.1 miles to a witness post on the left side of the road and stop. From the witness post take a bearing of 9 degrees magnetic and walk 22 paces to the 0-foot stake of the frequency baseline. The 0-foot stake is wired with a red browse tag, number 7906.



Map Name: Park Valley, Utah

Diagrammatic Sketch

Township 13N, Range 13W, Section 31 UTM COOR: 3-01-841E 12-46-31-508N

DISCUSSION

Trend Study No. 1-2

The Rosette trend study is located approximately two miles east-southeast of Rosette on critical deer winter range. This area is a Wyoming big sagebrush type which also contains some scattered Utah juniper and a few pockets of black sagebrush on the more shallow soils. Judging from browse utilization and pellet group frequency, deer use is moderate to heavy but less in the immediate vicinity. Cattle also graze the area and were present at the time the study was established. This area is within the Hirschi allotment which is assigned for 25 cattle with a season of use from October 16 through December 31. Elevation is 5,480 feet on gently sloping to almost level terrain with a southerly exposure.

Soil is a sandy clay loam which has been alluvially deposited. There is minimal rockiness and the soil is moderately deep. Average effective rooting depth was estimated to be 15.5 inches but is likely deeper. The ratio of protective ground cover from vegetation and litter compared to percent bare ground is relatively poor, yet erosion is not a concern because of nearly level terrain.

The key browse species is Wyoming big sagebrush. Density was estimated at 6,400 plants/acre in 1984 and 6,160 in 1996, accounting for 64% and 41% of the browse composition respectively. In terms of forage production, Wyoming sagebrush accounts for a considerably larger portion of the total. The sagebrush type in the 1970 Range Inventory had an air dry estimated production of 2,010 pounds to the acre. Utilization was estimated as heavy in 1984 when 52% of the population displayed heavy use. By 1990, only 11% of the sagebrush were classified as heavily hedged. The bulk of plants exhibiting poor vigor were classified as decadent. Percent decadency rose in 1990 to 77% with poor vigor expressed on 48% of those shrubs. By 1996, decadency declined to 29%. Utilization was light to moderate and vigor was good on all but 31% of the decadent plants. Dead plants were counted for the first time during the 1996 reading. There was an estimated 1,780 dead sagebrush plants/acre, or one dead plant to every 4 live plants. Poor vigor and the high number of dead plants is likely the result of intraspecific competition combined with prolonged drought, not a result of heavy use. Age class analysis from 1996 suggest an expanding population due to a large number of seedlings and young.

Other shrubs found on the site which produce additional forage consist of small numbers of black sagebrush and rubber rabbitbrush. Narrowleaf low rabbitbrush, a low growing increaser, has a density of 5,900 plants/acre and has an age class structure of an expanding population. Monitoring of this species' abundance will be an important trend parameter in the future.

Herbaceous plants are considerably more diverse and important as forage than at the Kelton site(#1-1). Although percent cover and total herbaceous density are much lower here, cheatgrass is not nearly as abundant. Currently it only accounts for 33% of the grass cover. Perennial grasses are much more abundant on this site than at Kelton. Common species include thickspike wheatgrass, Sandberg bluegrass, and bottlebrush squirreltail. Forbs are diverse yet produce only 2% total cover. Common forb species includes hooker balsamroot, hoods phlox, and cryptantha.

1984 APPARENT TREND ASSESSMENT

Vegetative trend is stable, however, the heavy forage utilization could produce changes in shrub composition and density. Herbaceous conditions are only fair, but are not noticeably declining. Soil trend is stable to slightly down. Signs of soil movement are apparent, but the nearly level terrain prevents rapid soil loss.

1990 TREND ASSESSMENT

Trend for soil is stable. Bare ground cover values increased slightly from 42% to 50%, but basal vegetation cover nearly doubled. Trend for browse is down. Wyoming big sagebrush on this site had an estimated 25% canopy cover in 1990. However, it has declined since the last reading in nested frequency (69 down to 54), Quadrat frequency (35% down to 29%) and density (6,332 down to 3,799 plants per acre). Percent decadency has increased from 23% to 77% in 1990. Very few seedlings and no young sagebrush were found on site. Recent utilization of the sagebrush has been light to moderate. In contrast, the narrowleaf low rabbitbrush has increased it's density, nested frequency (41 up to 69), and Quadrat frequency (22% up to 32%). Trend for the herbaceous understory is slightly up. Sandberg bluegrass and squirreltail have increased in sum of nested frequency and quadrat frequency values since 1984. Eight of the thirteen perennial forbs have also increased values for both quadrat and nested frequencies.

TREND ASSESSMENT

soil - stable

browse - down

herbaceous understory - up slightly

1996 TREND ASSESSMENT

The soil trend is still improving due to an increase in litter cover and a significant decline in bare ground (50% to 22%). This combined with the level terrain limit erosion. Trend for the key browse species, Wyoming big sagebrush, has also improved since 1990. Density has increased from 3,799 to 6,160 plants/acre, percent decadence has declined from 77% to 29% and vigor is good on all but 31% of the decadent shrubs. Age class analysis indicates an expanding population with 2,620 seedlings/acre and 3,040 young plants/acre estimated. Cover was estimated at 14% and a further increase in sagebrush cover and density will negatively effect understory plants. Trend for the herbaceous understory is stable. Sum of nested frequency for grasses declined slightly while sum of nested frequency of forbs increased slightly. Sum of nested frequency of thickspike and bluebunch wheatgrass increased significantly while that of Sandberg bluegrass declined significantly.

TREND ASSESSMENT

soil - up

browse - up

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 2

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron dasystachyum	73	51	67	31	23	24	.57
G	Agropyron spicatum	a-	a1	b14	-	1	6	.05
G	Bromus tectorum (a)	-	-	259	-	-	84	3.20
G	Oryzopsis hymenoides	1	2	-	1	2	-	-
G	Poa secunda	180	231	189	70	83	71	5.15
G	Sitanion hystrix	a21	b74	b70	10	35	30	.61
G	Vulpia octoflora (a)	-	-	3	-	-	1	.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
	Total for Grasses	275	359	602	112	144	216	9.59
F	Agoseris glauca	-	-	3	-	-	2	.01
F	Allium acuminatum	a23	b-	b-	9	-	-	-
F	Antennaria spp.	-	-	3	-	-	1	.03
F	Arabis spp.	-	-	6	-	-	3	.01
F	Astragalus beckwithii	-	-	2	-	-	1	.00
F	Astragalus spp.	-	-	3	-	-	1	.00
F	Astragalus utahensis	a-	ab2	b6	-	1	4	.07
F	Balsamorhiza hookeri	-	-	2	-	-	2	.18
F	Calochortus nuttallii	-	3	-	-	1	-	-
F	Chaenactis douglasii	a10	a4	b32	4	2	11	.08
F	Cryptantha spp.	a-	a5	b44	-	4	18	.19
F	Cymopterus longipes	a53	a55	b23	24	25	13	.06
F	Delphinium nelsonii	a17	b-	b-	9	-	-	-
F	Descurainia spp. (a)	-	-	3	-	-	1	.00
F	Eriogonum caespitosum	a2	b16	a3	1	9	1	.00
F	Eriogonum cernuum (a)	-	-	21	-	-	8	.06
F	Gilia spp. (a)	-	-	13	-	-	6	.05
F	Lappula occidentalis (a)	-	-	17	-	-	8	.09
F	Lepidium perfoliatum	-	-	4	-	-	2	.03
F	Machaeranthera spp	-	-	4	-	-	3	.07
F	Navarretia intertexta (a)	-	-	4	-	-	2	.01
F	Penstemon spp.	-	1	-	-	1	-	-
F	Phlox hoodii	a27	b51	ab36	12	24	17	.77
F	Phlox longifolia	48	66	57	22	32	26	.18
F	Polygonum douglasii (a)	-	-	4	-	-	2	.01
F	Ranunculus testiculatus (a)	-	-	9	-	-	3	.01
F	Sisymbrium altissimum (a)	-	-	3	-	-	1	.03
F	Streptanthus cordatus	8	4	-	3	1	-	-
	Total for Forbs	188	207	302	84	100	136	2.00

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

BROWSE TRENDS --

Herd unit 01 , Study no: 2

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata wyomingensis	90	14.07
B	Chrysothamnus nauseosus	1	-
B	Chrysothamnus nauseosus consimilis	1	-
B	Chrysothamnus viscidiflorus stenophyllus	81	5.62
B	Juniperus osteosperma	8	2.50
B	Leptodactylon pungens	31	2.04
B	Opuntia fragilis	8	.21
Total for Browse		220	24.47

BASIC COVER --

Herd unit 01 , Study no: 2

Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	349	4.25	8.25	35.01
Rock	161	0	.50	1.20
Pavement	277	9.25	4.00	4.63
Litter	391	37.25	26.25	39.15
Cryptogams	155	7.25	11.50	4.57
Bare Ground	269	42.00	49.50	22.06

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 2

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.3	63.8 (13.6)	7.3	46.6	25.4	28.0	1.5	7.2	236.8	.72

PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 2

Type	Quadrat Frequency '96
Rabbit	19
Moose	1
Deer	21

BROWSE CHARACTERISTICS --
 Herd unit 01 , Study no: 2

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia nova</i>																		
M	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66	10	10	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Artemisia tridentata wyomingensis</i>																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	131	-	-	-	-	-	-	-	-	131	-	-	-	2620			131
Y	84	2	1	6	-	-	-	-	-	-	7	-	2	-	600			9
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	151	-	-	1	-	-	-	-	-	152	-	-	-	3040			152
M	84	5	26	33	-	-	-	-	-	-	60	-	4	-	4266	19	20	64
	90	11	1	1	-	-	-	-	-	-	13	-	-	-	866	27	28	13
	96	35	29	-	2	-	-	-	-	-	66	-	-	-	1320	25	37	66
D	84	-	12	10	-	-	-	-	-	-	8	-	10	4	1466			22
	90	32	7	5	-	-	-	-	-	-	23	5	12	4	2933			44
	96	52	38	-	-	-	-	-	-	-	62	-	-	28	1800			90
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1780			89
Total Plants/Acre (excluding Dead & Seedlings)												'84	6332	Dec:	23%			
												'90	3799		77%			
												'96	6160		29%			
<i>Chrysothamnus nauseosus</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	11	10	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
<i>Chrysothamnus nauseosus consimilis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	22	28	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	84	6	-	-	-	-	-	-	-	-	6	-	-	-	400		6	
	90	2	2	-	3	-	-	-	-	-	7	-	-	-	466		7	
	96	80	-	-	3	-	-	-	-	-	83	-	-	-	1660		83	
Y	84	5	3	-	-	-	-	-	-	-	7	-	1	-	533		8	
	90	18	1	-	-	-	-	-	-	-	17	1	1	-	1266		19	
	96	59	-	-	-	-	-	-	-	-	59	-	-	-	1180		59	
M	84	11	21	1	-	-	-	-	-	-	31	-	2	-	2200	7 13	33	
	90	15	2	4	1	-	-	-	-	-	20	2	-	-	1466	9 8	22	
	96	192	2	-	30	-	-	6	-	-	230	-	-	-	4600	11 18	230	
D	84	-	10	1	-	-	-	-	-	-	6	-	5	-	733		11	
	90	9	2	7	4	-	-	-	-	-	18	-	2	2	1466		22	
	96	1	5	-	-	-	-	-	-	-	5	-	-	1	120		6	
Total Plants/Acre (excluding Dead & Seedlings)												'84	3466	Dec:	21%			
												'90	4198		35%			
												'96	5900		2%			
<i>Juniperus osteosperma</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100	-	5	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	160		-			
<i>Leptodactylon pungens</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	-	-	2	-	-	-	-	-	5	-	-	-	333		5	
	96	13	-	-	-	-	-	-	-	-	13	-	-	-	260		13	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	66	5 5	1	
	96	96	-	-	16	-	-	-	-	-	112	-	-	-	2240	12 15	112	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	66		1	
	96	1	-	-	-	-	-	-	-	-	-	-	1	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	465		14%			
												'96	2520		1%			

AGE	YR	Form Class (No. of 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>Opuntia fragilis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66	6	4	1
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	6	10	1
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120	4	12	6
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	0%			
												'90	66		0%			
												'96	160		13%			
<i>Pinus edulis</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			

TREND STUDY 1-3-96

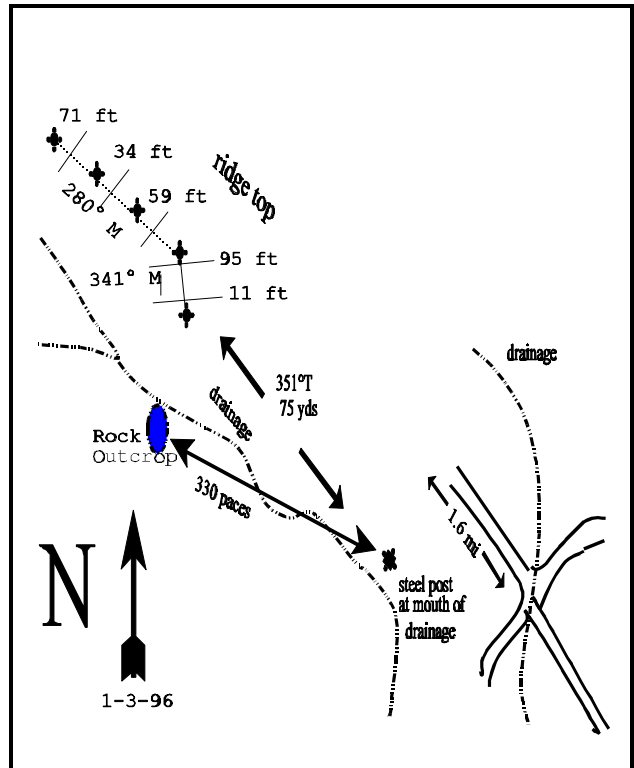
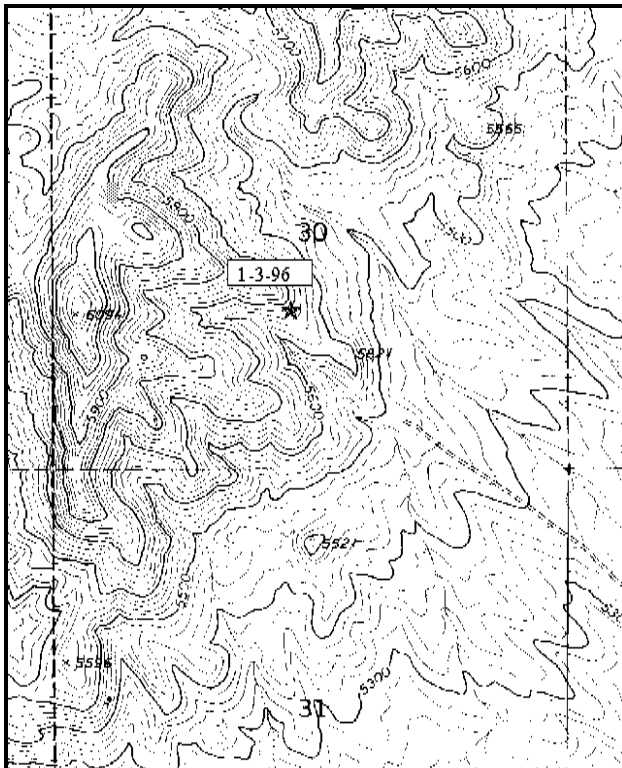
Study site name: Rosebud Hills. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 341 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (59ft), line 3 (34 & 71ft).

LOCATION DESCRIPTION

Traveling towards Rosette (north) on U-30, proceed 0.1 miles past mile marker 34 and turn left (west). Note mileage here. Proceed through gate, travel 1.1 miles to a fork, turn left and proceed 0.25 miles southwest to another fork. Turn right and proceed 1.6 miles to end of the road, crossing a wash and following the ridgetop. From here walk to the mouth of the drainage to the left, start up drainage and find a green steel stake near opening of drainage. Beginning at the stake, proceed approximately 330 paces up the drainage bottom and note a large rock outcrop on the left. If the drainage has divided, you have gone too far. From the rock, take a bearing of 351 degrees true and proceed 75 yards up slope to the 0-foot stake of the baseline. The 0-foot stake is marked with browse tag number 7907. The baseline runs south to north at 341 degrees magnetic. Lines two and three change directions and run 280° M.



Map Name: Warm Springs Hill, Utah

Diagrammatic Sketch

Township 11N, Range 15W, Section 30, UTM COOR: 2-82-502E 46-13-826N

DISCUSSION

Trend Study No. 1-3

This study, located on the east side of the Rosebud Hills, is a major concentration area for wintering deer. Evidence for this conclusion was furnished by the presence of 12 winter-killed carcasses located within a 200 yard radius of the study site during the 1984 readings. Pellet groups are abundant, but appear to be quickly dispersed by overland water flow. This area is typical foothill terrain, occupied primarily by black sagebrush, with scattered pockets of Utah juniper on the ridges and canyon bottoms. Vegetative production for this vegetative type (black sagebrush-grass) was inventoried in 1970 and found to have an air dry weight of 1,194 pounds per acre. The study site has a moderately steep (40%) south slope and an elevation of 5,720 feet.

Soils on the study site, and on most of the surrounding area, are extremely rocky. Average rooting depth was estimated at 16.7 inches during the 1996 reading. The underlying rock appeared to be fractured in some areas as some deeper measurements were encountered over 20 inches. Weathered-in-place, soil is derived from parent material composed primarily of metamorphic rock, probably quartzite, and lesser amounts of a sedimentary shale-like rock. Ground cover from vegetation or litter is poor and erosion is occurring. Signs of erosion include the amount of exposed rock, erosion pavement and pedestalling of perennial plants. The soil surface has an almost "armored" appearance with rock and pavement covering more than half of the ground surface (61%).

Browse composition is dominated by an evenly spaced, but low-growing stand of black sagebrush numbering approximately 7,320 plants/acre in 1996. Of these, 12% are young, 70% are mature, and 18% are decadent. Individual shrubs are regularly spaced and separated by interspaces largely devoid of vegetation. Use was very heavy in 1984, when 95% of the mature and decadent sagebrush were classified as heavily hedged (>60% of twigs browsed). Percent decadence was also high then at 47%. Conditions were similar in 1990, except use was mostly light. Seedlings and young were numerous at 1,000 and 1,700 plants/acre respectively. By 1996, estimated population density increased to 7,320 plants/acre. Percent decadency dropped to 18% and use was heavy on only 14% of the mature and decadent shrubs. The black sagebrush population appears self-sustaining in spite of heavy use.

Other shrubs occurring on the study area include shadscale, narrowleaf low rabbitbrush, Nevada ephedra, spiny horsebrush, grey horsebrush, spiny hopsage, Utah juniper, a few antelope bitterbrush and big sagebrush that are intermediate in appearance between basin and Wyoming big sagebrush. The latter two species, however, are very heavily utilized and could likely disappear through time. Shadscale increased significantly in density since 1990 when 1,066 plants/acre were estimated. Currently there are 5,560 plants/acre, 31% of which are young plants. Some of the increase in population density may be due to the larger, more representative sample used in 1996, which better estimates aggregated or discontinuous populations. Utilization is moderate with heavy use reported on 18% of the mature plants.

Herbaceous composition is depleted and is of little value either for forage or soil protection. Grasses combine to produce only 1.5% cover, while forbs combine for less than one percent cover. Perennial or biennial plants are scarce and are limited to a few low-growing milkvetches, cryptantha, longleaf phlox, and grasses such as bottlebrush squirreltail, Indian ricegrass, Sandberg bluegrass, and sparse clumps of bearded bluebunch wheatgrass in the canyon bottom.

1984 APPARENT TREND ASSESSMENT

Soil is very shallow and rocky. A long history of erosion has removed much of

the surface soil leaving an almost "armored" soil surface composed of small to medium sized rocks and erosion pavement. Trend continues to decline but most of the damage has already occurred. Vegetative condition is poor but essentially stable with respect to trend. The herbaceous component is depleted and unlikely to improve or deteriorate further. The black sagebrush population is maintaining itself through seedling reproduction. Seedlings become established in shelter provided either by larger rocks or directly underneath shrub crowns.

1990 TREND ASSESSMENT

The lightly utilized south-facing slope is dominated by black sagebrush and shadscale. Both browse have increasing nested frequency and quadrat frequency values but the populations show little change from 1984. There is almost a 20% canopy cover from the low-growing sagebrush. The site supports very low diversity and production for perennial herbaceous plants. Grass sum of nested frequency and quadrat frequency indicates a slight overall decline. Forbs are already at very low frequencies (almost non-existent) with not much change. The high percentage of erosion pavement and active sheet erosion is normal for the type.

TREND ASSESSMENT

soil - stable, but poor condition

browse - stable

herbaceous understory - declining and poor condition

1996 TREND ASSESSMENT

Ground cover characteristics are similar to those of 1990. Soil conditions are poor but little bare soil is exposed. Soil depth estimates made in 1996 report effective rooting depth to be approximately 16.7 inches with occasional measurements over 20 inches. Soil temperature at an average depth of 15 inches is moderately high at 64°F, making this slope a harsh site with more than 60% rock cover and moderately high soil surface temperatures during the summer months. This helps explain why this area is dominated by black sagebrush instead of mountain big sagebrush. The browse trend is up with increased densities of black sagebrush and shadscale. Current utilization is heavier on these shrubs than in 1990, but not close to that of 1984. Percent decadence is lower and vigor is good. The herbaceous understory is still deficient. Trend is slightly up, due to an increase in the sum of nested frequency of grasses and forbs.

TREND ASSESSMENT

soil - stable but in poor condition with more than 60% rock cover

browse - up

herbaceous understory - up slightly but in poor condition, contributes to less than 3% total cover

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 3

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Bromus tectorum (a)	-	-	119	-	-	48	.61
G	Oryzopsis hymenoides	23	31	30	14	16	17	.42
G	Sitanion hystrix	_a 68	_b 17	_c 40	33	7	22	.42
	Total for Grasses	91	48	189	47	23	87	1.47

T y p e	Species	Nestled Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	Astragalus beckwithii	2	-	-	1	-	-	-
F	Astragalus newberryi	1	1	5	1	1	2	.01
F	Castilleja linariaefolia	-	-	7	-	-	3	.18
F	Cryptantha spp.	a-	a ¹	b ²⁰	-	1	9	.10
F	Eriogonum cernuum (a)	-	-	50	-	-	22	.38
F	Gilia spp. (a)	-	-	8	-	-	3	.01
F	Lappula occidentalis (a)	-	-	4	-	-	2	.01
F	Oenothera spp.	a-	a-	b ¹²	-	-	6	.22
F	Phlox longifolia	-	-	6	-	-	2	.03
F	Sphaeralcea coccinea	-	-	1	-	-	1	.00
F	Unknown forb-perennial	-	-	4	-	-	2	.01
Total for Forbs		3	2	117	2	2	52	0.98

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

BROWSE TRENDS --

Herd unit 01 , Study no: 3

T y p e	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia nova	98	14.77
B	Artemisia spinescens	1	-
B	Atriplex confertifolia	64	2.24
B	Chrysothamnus viscidiflorus stenophyllus	33	.86
B	Ephedra nevadensis	6	.06
B	Juniperus osteosperma	3	.44
B	Kochia americana	3	
B	Tetradymia nuttallii	4	.03
Total for Browse		212	18.40

BASIC COVER --

Herd unit 01 , Study no: 3

Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	256	1.25	4.50	20.42
Rock	370	43.00	54.75	45.49
Pavement	349	14.00	19.25	15.93
Litter	361	19.25	13.75	15.79
Cryptogams	81	.50	0	.43
Bare Ground	205	22.00	7.75	3.59

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 3

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
16.7	64.0 (14.9)	7.8	50.6	26.1	23.4	.81	5.4	208.0	.64

PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 3

Type	Quadrat Frequency '96
Rabbit	13
Deer	30

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 3

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia nova</i>																		
S	84	47	2	-	-	-	-	-	-	-	49	-	-	-	1633		49	
	90	30	-	-	-	-	-	-	-	-	30	-	-	-	1000		30	
	96	24	-	-	2	-	-	-	-	-	26	-	-	-	520		26	
Y	84	5	2	-	-	-	-	-	-	-	7	-	-	-	233		7	
	90	49	2	-	-	-	-	-	-	-	49	1	1	-	1700		51	
	96	24	15	2	1	1	-	-	-	-	43	-	-	-	860		43	
M	84	-	3	85	-	-	-	-	-	-	69	-	19	-	2933	14 23	88	
	90	62	-	-	-	-	-	-	-	-	62	-	-	-	2066	9 18	62	
	96	8	99	40	-	107	3	-	-	-	252	-	5	-	5140	10 24	257	
D	84	-	6	79	-	-	-	-	-	-	58	-	27	-	2833		85	
	90	75	2	1	1	-	-	-	-	-	65	2	7	5	2633		79	
	96	2	42	6	-	14	2	-	-	-	55	-	-	11	1320		66	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	740		37	
Total Plants/Acre (excluding Dead & Seedlings)											'84	5999	Dec :	47%				
											'90	6399		41%				
											'96	7320		18%				
<i>Artemisia spinescens</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	3	-	-	-	-	-	-	-	3	-	-	-	60	3 4	3	
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec :	-				
											'90	0		-				
											'96	60		-				
<i>Atriplex confertifolia</i>																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	2	-	-	1	-	-	-	-	-	3	-	-	-	100		3	
	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340		17	
Y	84	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	96	35	26	4	4	17	1	-	-	-	87	-	-	-	1740		87	
M	84	21	2	1	-	-	-	-	-	-	24	-	-	-	800	8 13	24	
	90	13	-	-	-	-	-	-	-	-	13	-	-	-	433	8 9	13	
	96	14	21	9	26	76	28	-	-	6	180	-	-	-	3600	6 12	180	
D	84	10	2	1	-	-	-	-	-	-	12	-	1	-	433		13	
	90	16	-	-	-	-	-	-	-	-	10	-	1	5	533		16	
	96	1	-	-	1	8	1	-	-	-	8	-	-	3	220		11	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	160		8	
Total Plants/Acre (excluding Dead & Seedlings)											'84	1366	Dec :	32%				
											'90	1066		50%				
											'96	5560		4%				

A G E	YR	Form Class (No. of 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>																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
Y	84	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	90	7	-	-	1	-	-	-	-	-	8	-	-	-	266		8	
	96	4	-	-	1	-	-	-	-	-	5	-	-	-	100		5	
M	84	8	2	2	-	-	-	-	-	-	12	-	-	-	400	6	8	12
	90	10	-	-	-	-	-	-	-	-	10	-	-	-	333	8	11	10
	96	36	-	-	3	3	-	-	-	-	42	-	-	-	840	8	15	42
D	84	1	1	-	-	-	-	-	-	-	2	-	-	-	66		2	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Total Plants/Acre (excluding Dead & Seedlings)												'84	632	Dec:	10%			
												'90	599		0%			
												'96	940		0%			
<i>Ephedra nevadensis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	2	-	1	-	-	-	-	2	-	1	-	100	10	13	3
	90	-	-	1	1	-	-	-	-	-	2	-	-	-	66	11	14	2
	96	-	-	3	-	1	3	-	-	-	7	-	-	-	140	11	16	7
Total Plants/Acre (excluding Dead & Seedlings)												'84	100	Dec:	-			
												'90	99		-			
												'96	140		-			
<i>Juniperus osteosperma</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	1	-	-	-	-	1	-	-	2	-	-	-	66	60	66	2
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	67	87	1
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	66		-			
												'96	60		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Kochia americana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	4	-	-	1	-	-	-	-	-	5	-	-	-	100	6	5	5
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	120		-			
<i>Tetradymia nuttallii</i>																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	6	-	-	-	-	-	-	-	-	6	-	-	-	200		6	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	10	-	-	-	-	-	-	-	-	10	-	-	-	333		10	
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66	5	2	2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	2	1	-	-	-	-	3	-	-	-	60	20	29	3
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	399	Dec:	0%			
												'90	100		0%			
												'96	80		25%			
<i>Tetradymia spinosa</i>																		
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33	15	19	1
	90	1	-	-	-	-	-	-	-	-	-	-	1	-	33	14	24	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	33	Dec:	-			
												'90	33		-			
												'96	0		-			

TREND STUDY 1-4-96

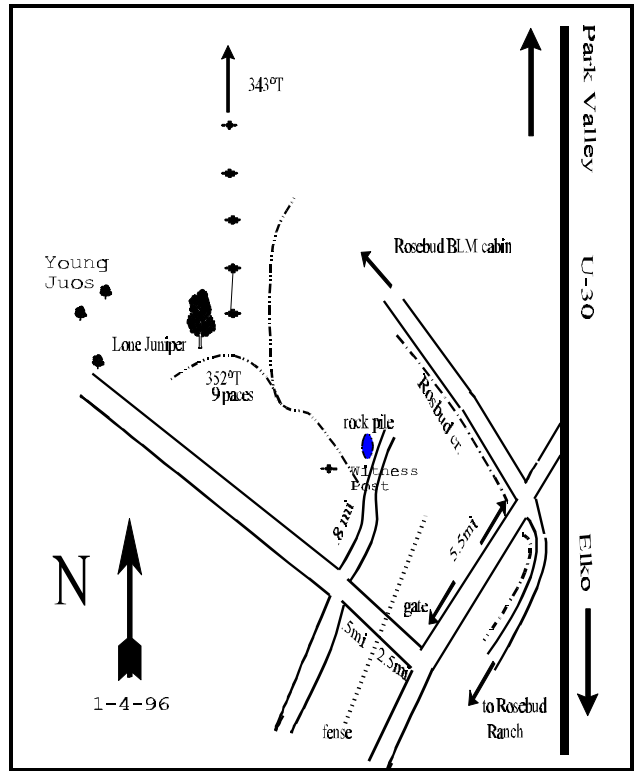
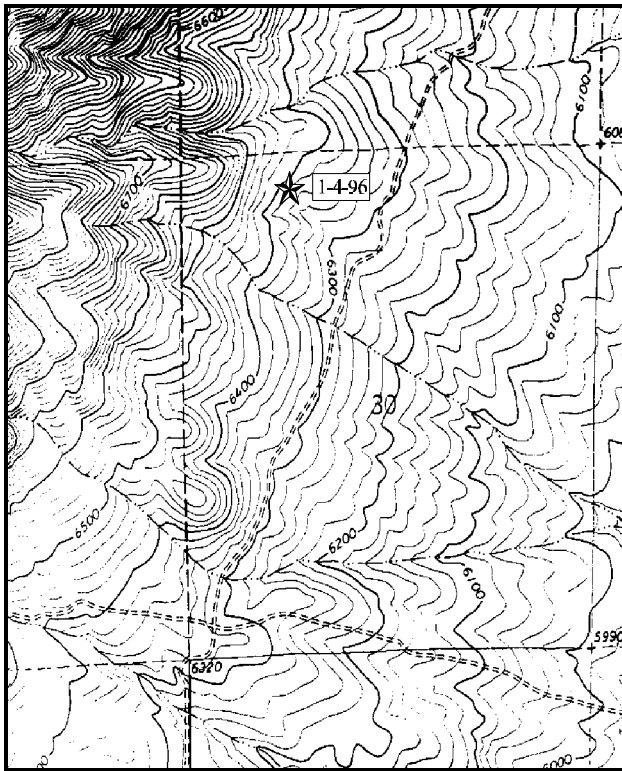
Study site name: Chokecherry Springs. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 343 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (71ft), line 4 (59ft).

LOCATION DESCRIPTION

Proceed from U-30 towards Rosebud BLM field station. Bear left at fork to BLM station. Travel 2.1 miles to canal and intersection with a sign designating Emigrant Pass Road. Proceed southwest on Emigrant Pass Road 5.5 miles to a fork. Turn right and travel 2.5 miles to a gate. Pass through gate, proceed 0.5 miles and turn right at four-way junction. Travel 0.8 miles to a witness post on left side of road and stop. From the witness post, take a bearing of 276 degrees magnetic to a large, lone juniper with several young around it on the slope above where drainage splits and curves to the southwest. From this tree, take a bearing of 352 degrees true (9 magnetic) and walk nine paces to the 0-foot stake of the frequency baseline. The baseline runs end-on at 343 degrees true. The 0-foot stake is marked with browse tag #7910.



Map Name: Emigrant Pass, Utah

Diagrammatic Sketch

Township 10N, Range 16W, Section 30, UTM COOR: 2-72-376E 46-05-196N

DISCUSSION

Trend Study No. 1-4

This study is located approximately one mile northeast of Chokecherry spring on a gently (15%) east-southeast facing slope. This area is a mountain big sagebrush-grass type which contains a scattered population of antelope bitterbrush. Elevation (6,400 feet) and exposure both suggest that the area is not "critical" deer winter range. John Pratt, the local conservation officer, considers the area "preferred winter range." Vegetationally and topographically, this site is intermediate between the mountain brush type on steeper, higher slopes and the more gentle alluvial slopes to the east. Immediately below and east of the study area, there are broad ridges occupied by black sagebrush with intervening swales containing mostly basin big sagebrush.

Soil is moderately deep, but quite rocky. Effective rooting depth (see methods) is not an apparent problem. Average effective rooting depth was estimated at 15.8 inches with several measurements over 20". Like the site at Rosebud Hills (#1-3), soil temperature is moderately high, with an average of nearly 60°F at a depth of 16.9 inches. Surface rock cover is much lower however than site #1-3, with rock and pavement combining to cover 12.5% of the ground surface. The area appears fertile and generally has a good litter cover and organic content. Vegetative cover from shrubs, to a lesser extent herbaceous plants, are adequate to prevent accelerated erosion. Low to moderate soil movement is occurring on trailing livestock and wildlife.

By virtue of its abundance and palatability, mountain big sagebrush is the key browse species, accounting for 46% of estimated browse cover. The population has remained fairly stable since 1984. Utilization is light to moderate. Dead plants are fairly numerous at 980 plants/acre. A serious threat to big sagebrush as well as most other browse species, is the winter feeding activities of Voles (Microtus spp.). A large number of shrubs in the immediate area showed evidence of complete or near complete girdling damage during the 1984 reading. This appears to have commonly occurred during the severe winters of 1982-84 in many areas. Such damage is especially evident in swales, however, it has also occurred on the study area. Some winter injury was noted on some of the sagebrush in 1996, perhaps caused by the deep snows during the 1992-93 winter. Currently there are an estimated 780 decadent plants/acre, 54% of which appeared to be dying.

Among other shrub species, the most important is a semi-erect layering ecotype of antelope bitterbrush. This species showed evidence of relatively intense deer use as well as rodent damage in 1984 and 1990. Current use is light to moderate. The site could support more bitterbrush than currently occurs. Narrowleaf low rabbitbrush, a known increaser, occurs in moderately high numbers and displays a stable trend.

Perennial grasses are rather scarce with 7 species combining to produce nearly 9% cover. Most important is bluebunch wheatgrass followed by subalpine needlegrass, bottlebrush squirreltail, and Sandberg bluegrass. Almost all of these showed evidence of current use by cattle in 1984. Annual cheatgrass is the most abundant grass accounting for 42% of the grass cover.

Forb composition is moderately diverse but not highly productive. A few annuals are present but are less important than perennials. The most productive forbs on the site include; arrowleaf balsamroot, stoneseed, silvery lupine, tapertip hawksbeard, and longleaf phlox.

1984 APPARENT TREND ASSESSMENT

Soil trend is stable even though limited erosion is occurring. Animal use is the chief disturbance and most erosion is associated with trampling and trailing effects. Soil trend could easily decline if intensity of use were to become greater. Vegetative trend is stable to slightly down. The principal factors are a large and vigorous population of narrowleaf low rabbitbrush, serious rodent damage on all species of shrubs and an apparent slow but steady decline in antelope bitterbrush. The latter species maintains itself primarily through vegetative means.

1990 TREND ASSESSMENT

This higher elevation winter range shows the potential for excellent mountain big sagebrush and bitterbrush production. The trend values for these key browse species have remained similar to 1984 data. The shrubs display generally light to moderate hedging and good vigor. herbaceous understory is diverse and productive. Five out of the six grasses and twelve out of twenty-one forbs have increased nested and quadrat frequency values.

TREND ASSESSMENT

soil - stable
browse - stable
herbaceous understory - slightly up

1996 TREND ASSESSMENT

Ground cover characteristics have improved since 1990. Percent bare ground has declined from 17% to 7% and litter cover has increased from 45% to 55%. Trend for the key browse species, mountain big sagebrush, appears to be stable to slightly down. Population density has declined slightly, percent decadence has increased from 21% to 26% and the proportion of shrubs displaying poor vigor increased slightly (14% to 16%). Trend for antelope bitterbrush is up. Bitterbrush accounts for 14% of the shrub cover with an estimated density of 740 plants/acre. The increase in density since 1990 (132 to 740 plants/acre) is likely due to the larger, more representative sample used in 1996. Percent decadency declined from 50% to 0%, with heavy use decreasing from 50% to 3%. Overall, trend for browse is stable. The herbaceous understory displays a slightly upward trend. Sum of nested frequency increased slightly for perennial grasses while frequency of forbs remained similar.

TREND ASSESSMENT

soil - up
browse - stable
herbaceous understory - up slightly

HERBACEOUS TRENDS --
Herd unit 01 , Study no: 4

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron dasystachyum	a-	a-	b12	-	-	4	.59
G	Agropyron spicatum	58	72	50	28	31	24	2.91
G	Bromus tectorum (a)	-	-	318	-	-	90	6.21
G	Festuca ovina	-	1	5	-	1	3	.19
G	Oryzopsis hymenoides	a4	b14	ab11	2	7	5	.37

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	<i>Poa secunda</i>	a22	ab35	b58	12	18	26	.99
G	<i>Sitanion hystrix</i>	ab17	a10	b30	8	6	14	1.18
G	<i>Stipa columbiana</i>	a-	a-	b26	-	-	13	2.45
G	<i>Stipa comata</i>	a-	b6	a-	-	4	-	-
Total for Grasses		101	138	510	50	67	179	14.90
F	<i>Agoseris glauca</i>	a28	a32	b5	13	12	3	.01
F	<i>Allium</i> spp.	a40	b4	b14	19	3	8	.04
F	<i>Astragalus beckwithii</i>	a4	a15	b37	3	8	19	.53
F	<i>Astragalus</i> spp.	a34	a24	b-	18	13	-	-
F	<i>Balsamorhiza sagittata</i>	4	6	11	3	4	6	1.29
F	<i>Camelina microcarpa</i> (a)	-	-	76	-	-	29	.19
F	<i>Calochortus nuttallii</i>	-	2	-	-	1	-	-
F	<i>Chaenactis douglasii</i>	4	2	7	2	1	3	.01
F	<i>Cirsium arvense</i>	5	4	4	3	2	2	.01
F	<i>Collomia</i> spp. (a)	-	-	46	-	-	25	.15
F	<i>Comandra pallida</i>	a7	a6	b29	2	2	11	.55
F	<i>Collinsia parviflora</i> (a)	-	-	179	-	-	67	.93
F	<i>Crepis acuminata</i>	a2	b33	b17	2	14	11	.35
F	<i>Cryptantha</i> spp.	a-	a-	b13	-	-	8	.04
F	<i>Galium aparine</i> (a)	-	-	8	-	-	4	.04
F	<i>Gayophytum ramosissimum</i>	-	-	1	-	-	1	.03
F	<i>Hackelia patens</i>	ab19	a27	b8	9	15	4	.04
F	<i>Lactuca serriola</i>	2	-	-	1	-	-	-
F	<i>Lithospermum ruderales</i>	a1	b15	b15	1	8	8	1.20
F	<i>Lomatium triternatum</i>	9	13	8	5	6	4	.04
F	<i>Lupinus argenteus</i>	ab13	a3	b17	6	2	8	1.03
F	<i>Lupinus</i> spp.	-	-	6	-	-	3	.30
F	<i>Lygodesmia spinosa</i>	a29	b47	ab37	17	26	18	.66
F	<i>Machaeranthera</i> spp	a-	a-	b13	-	-	5	.02
F	<i>Oenothera caespitosa</i>	2	2	2	1	2	1	.03
F	<i>Penstemon speciosus</i>	-	1	-	-	1	-	-
F	<i>Phlox longifolia</i>	a60	b89	b100	28	42	48	.51
F	<i>Ranunculus testiculatus</i> (a)	-	-	7	-	-	3	.01
F	<i>Tragopogon dubius</i>	1	5	5	1	3	3	.04
F	<i>Veronica biloba</i> (a)	-	-	21	-	-	8	.06
Total for Forbs		264	330	686	134	165	310	8.19

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

BROWSE TRENDS --

Herd unit 01 , Study no: 4

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	70	13.18
B	Chrysothamnus nauseosus consimilis	7	.79
B	Chrysothamnus viscidiflorus stenophyllus	77	10.39
B	Juniperus osteosperma	3	.01
B	Opuntia fragilis	12	.03
B	Purshia tridentata	28	3.91
B	Symphoricarpos oreophilus	5	.07
Total for Browse		202	28.41

BASIC COVER --

Herd unit 01 , Study no: 4

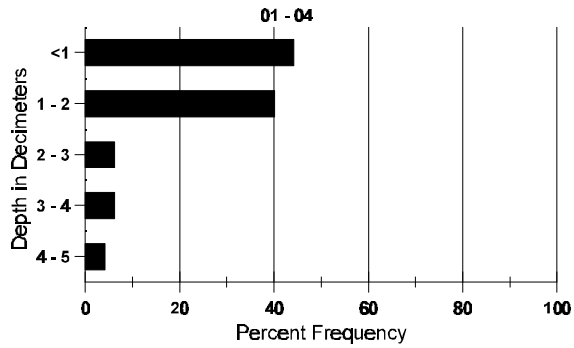
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	366	1.75	11.50	46.40
Rock	216	8.25	9.75	6.39
Pavement	242	14.75	16.50	6.14
Litter	397	58.50	45.25	55.46
Cryptogams	11	0	0	.05
Bare Ground	187	16.75	17.00	7.03

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 4

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.8	60.6 (16.9)	7.7	41.7	29.0	29.3	2.5	5.9	201.6	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 01 , Study no: 4

Type	Quadrat Frequency '96
Rabbit	5
Deer	11
Cattle	3

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 4

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
S	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
Y	84	24	3	-	-	-	-	-	-	-	27	-	-	-	1800		27	
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	96	16	1	-	-	-	-	-	-	-	17	-	-	-	340		17	
M	84	7	10	3	-	-	-	-	-	-	20	-	-	-	1333	34	36	20
	90	32	4	-	-	-	-	-	-	-	36	-	-	-	2400	19	25	36
	96	84	7	-	1	-	-	-	-	-	88	2	2	-	1840	20	32	92
D	84	-	5	8	-	-	-	-	-	-	10	-	3	-	866		13	
	90	10	-	1	-	-	-	-	-	-	4	-	2	5	733		11	
	96	28	6	2	3	-	-	-	-	-	18	-	-	21	780		39	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	980		49	
Total Plants/Acre (excluding Dead & Seedlings)											'84	3999	Dec:	22%				
											'90	3399		22%				
											'96	2960		26%				

A G E	YR	Form Class (No. of 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 consimilis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	26	36	3
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	200		20%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	84	9	1	-	-	-	-	-	-	-	10	-	-	-	666		10	
	90	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8	
	96	6	2	-	2	-	-	-	-	-	9	-	1	-	200		10	
M	84	26	11	-	-	-	-	-	-	-	37	-	-	-	2466	28	32	37
	90	21	2	-	1	-	-	-	-	-	22	1	-	1	1600	15	16	24
	96	145	10	-	12	-	-	-	-	-	167	-	-	-	3340	14	24	167
D	84	12	-	-	-	-	-	-	-	-	12	-	-	-	800		12	
	90	16	1	-	1	-	-	-	-	-	16	-	-	2	1200		18	
	96	3	1	1	1	-	-	-	-	-	4	-	-	2	120		6	
Total Plants/Acre (excluding Dead & Seedlings)												'84	3932	Dec:	20%			
												'90	3333		36%			
												'96	3660		3%			
<i>Juniperus osteosperma</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	2	-	-	-	-	-	2	-	-	-	40		2	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	66		-			
												'96	60		-			

A G E	YR	Form Class (No. of 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>Opuntia fragilis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200	6	5	3
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200	8	17	3
	96	13	-	-	-	-	-	-	-	-	13	-	-	-	260	5	15	13
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	200	Dec:	0%			
												'90	200		0%			
												'96	300		7%			
<i>Purshia tridentata</i>																		
Y	84	2	1	2	-	-	-	-	-	-	4	-	1	-	333		5	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	1	-	1	-	-	-	-	-	4	-	-	-	80		4	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	1	-	-	-	-	-	-	1	-	-	-	66	15	35	1
	96	18	11	1	2	1	-	-	-	-	33	-	-	-	660	27	54	33
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	333	Dec:	0%			
												'90	132		50%			
												'96	740		0%			
<i>Symphoricarpos oreophilus</i>																		
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	1	1	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	1	1	-	-	-	-	-	-	-	2	-	-	-	133	26	65	2
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200	17	52	3
	96	2	1	-	1	-	-	-	-	-	4	-	-	-	80	21	47	4
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	-	-	1	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	266	Dec:	0%			
												'90	332		20%			
												'96	120		0%			

TREND STUDY 1-5-96

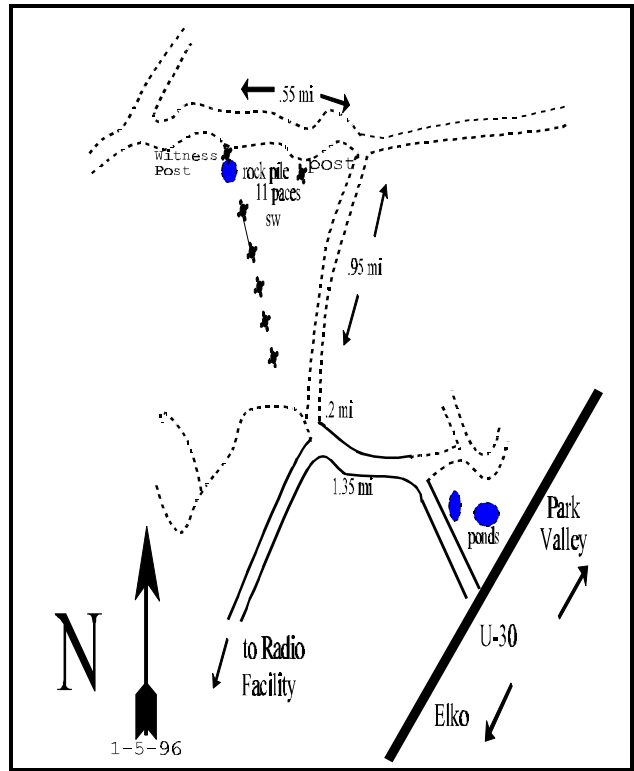
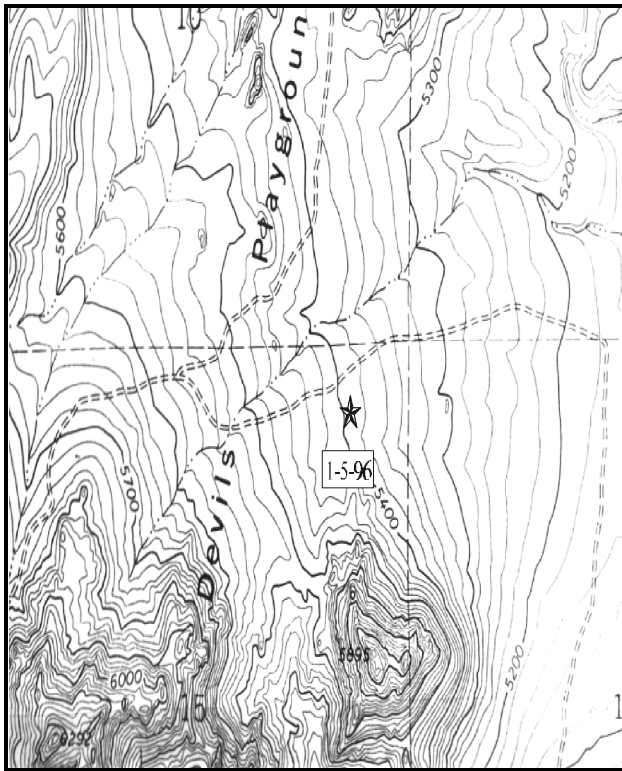
Study site name: Devil's Playground. Range type: Juniper.

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Proceed toward Elko, Nevada on U-30 to mile marker 24 and turn right (west). Begin to note mileage here. Travel 1.35 miles to a fork and bear right. Travel 0.2 miles to a large, flat rock and rockpile on the left side of the road. Walk 11 paces south by west from the rockpile to the 0-foot stake of the frequency baseline. The baseline is marked by a red browse tag #708. The azimuth of the baseline is 180 degrees due south.



Map Name: Emigrant Pass, Utah

Diagrammatic Sketch

Township 9N, Range 16W, Section 15, UTM COOR: 2-78-238E 45-98-600N

DISCUSSION

Trend Study No. 1-5

This study samples critical deer winter range in the "Devils Playground." This is an area of gentle (5%-10%) east facing slopes interrupted by large granite outcrops. The vegetation is dominated by juniper-pinyon woodland with numerous and various sized openings occupied by black sagebrush and big sagebrush. The study site is a mixed sagebrush/J-P woodland type at about 5,390 feet elevation. Further to the east, vegetation becomes increasingly dominated by black sagebrush in the more shallow soils. To the west and at a higher elevation, J-P woodland is associated with significant amounts of big sagebrush-bitterbrush. Deer and sheep are the primary forage users. This area is within the White Lakes allotment which allows 1,500 sheep to use the area from December 1st through March 31st. Winter deer pellet groups are also abundant with a quadrat frequency of 44% in 1996.

Soil on the site is derived from granite parent material. It is a coarse textured sandy loam which is light colored on the surface, but much darker below. Ground cover from vegetation or litter is moderately poor and there are extensive areas of erosion pavement and bare ground between shrubs and trees. The soil appears highly erodible and erosion would increase if the terrain was steeper. The soil is deep and well drained. Average effective rooting depth was estimated to be nearly 27 inches. Soil temperature is also fairly high, averaging 60°F at an average depth of 20 inches. Soil temperatures at other sites in the area are also relatively high. The sandy texture and the excessive drained nature of the soil are the main reasons this area is dominated by black sagebrush instead of basin big sagebrush.

Browse composition consists chiefly of black sagebrush, interspersed by smaller amounts of narrowleaf low rabbitbrush, prickly phlox, and basin big sagebrush. Also present are scattered individuals of Nevada ephedra and spiny hopsage. Black sagebrush numbered 4,266 plants/acre in 1984, increasing to 5,960 by 1996. The population has good vigor except for some of the decadent individuals. Utilization was heavy in 1984 when 86% of the mature and decadent plants displayed heavy use. This probably is the factor most responsible for partial crown death observed in many of the sagebrush. Use was mostly light in 1990, but percent decadence still increased from 56% in 1984 to 82% in 1990. Twenty-six percent of these decadent sagebrush were classified as dying (1,127 plants/acre). Drought combined with the excessively drained characteristics of the soil are likely responsible for this increased decadence. During the 1996 reading, utilization was moderate to heavy with 14% of the mature and decadent plants displaying heavy use. Percent decadency declined to 26%. It appears that many of the decadent shrubs sampled in 1990, recovered as evidenced by the decrease in the number of decadent plants. There are still approximately 340 decadent plants/acre classified as dying. Seedlings and young plants are fairly numerous and in sufficient numbers to maintain the population. Narrowleaf low rabbitbrush, showed similar heavy use with 38% in 1984. Currently these shrubs appear unutilized. A few spiny hopsage occur on the site, but none were sampled within the shrub density strips. These shrubs were heavily hedged and appeared to be dying.

The herbaceous understory is fairly diverse but not abundant. Five species of perennial grasses combine to produce about 5% cover. Dominant species include, bluebunch wheatgrass, Sandberg bluegrass, and bottlebrush squirreltail. Annual grasses and forbs are numerous, but not dense enough to constitute a fire hazard. Forbs are diverse but produce only about 2% total cover. Most are low growing and of little forage value.

1984 APPARENT TREND ASSESSMENT

Trend assessment on this site is influenced greatly by animal use, soil characteristics, and plant composition. The first factor, animal use, has no doubt had a substantial effect on almost all trend parameters. Use is very heavy and has possibly influenced an unsatisfactory age structure in the key browse species as well as a general depletion of the herbaceous understory. In turn, ground cover and soil organic content has been reduced, which has led to a significant but not extreme rate of soil erosion. One other factor should be considered. The study site is within an area where expansion and gradual thickening of the juniper-pinyon type is very likely to occur. Current conditions are such that this process is likely to be enhanced. Both soil and vegetative trends are declining.

1990 TREND ASSESSMENT

Black sagebrush, on this important wintering area, has declined significantly in nested frequency since 1984. Recent use was judged to be light, compared to heavy use by sheep and deer in previous years. Black sagebrush contains a very high number of decadent plants (82%). It provides most of the cover on the study site, where there is a relatively low density of pinyon and juniper. Surrounding areas support a much higher density of trees, but still it is not usually a closed canopy. There is a vigorous stand of native grasses for the range type. Four out of five perennial grasses increased in sum of nested frequency and quadrat frequency values. Percent bare ground has decreased slightly (36% to 32%) but litter cover decreased substantially (40% to 27%). Soil erosion is still active but is not serious.

TREND ASSESSMENT

soil - down

browse - down

herbaceous understory - improving but depleted

1996 TREND ASSESSMENT

Protective ground cover characteristics have changed somewhat since 1990. Percent bare ground has declined from 32% to 20%, but some of the increase is due to an increase in pavement cover. Pavement and rock cover have increased since 1984 and currently cover nearly 30% of the ground surface. Litter cover has also declined steadily since 1984 (40% to 27%). The soil is very porous due to the sandy texture, however there are some signs of soil pedestaling and there is an active gully between lines 2 and 3. Trend for soil is considered stable but in poor condition. The browse trend for the key species, black sagebrush is up. Percent decadence has declined from an extremely high 82% in 1990 to 26%. Utilization is moderate with heavy use reported on only 14% of the population. Vigor is good on all but 22% of the decadent sagebrush. The increaser, narrowleaf low rabbitbrush appears to have a stable trend. Spiny hopsage, likely the most preferred browse on the site, occurs in small numbers and appears to be dying out due to heavy use and lack of reproduction. Trend for the herbaceous understory is mixed. Trend for grasses is down with a decline in the nested frequencies in 4 out of the 5 perennial species sampled in 1990. Trend for forbs is up with an increase in diversity and sum of nested frequency of perennial species. Since forbs contribute little to the total herbaceous cover on the site, trend is still considered slightly down.

TREND ASSESSMENT

soil - stable but in poor condition

browse - up for black sagebrush which makes up 62% of the browse cover

herbaceous understory - slightly down

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 5

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	<i>Agropyron spicatum</i>	a28	b56	ab46	14	22	20	1.00
G	<i>Bromus tectorum</i> (a)	-	-	97	-	-	45	.37
G	<i>Oryzopsis hymenoides</i>	a4	b17	b18	2	10	9	.66
G	<i>Poa compressa</i>	a-	a-	b74	-	-	30	1.57
G	<i>Poa secunda</i>	a53	b162	a74	26	66	30	1.33
G	<i>Sitanion hystrix</i>	a114	a100	b56	50	49	30	.66
G	<i>Stipa thurberiana</i>	a11	a22	b-	5	11	-	-
G	<i>Vulpia octoflora</i> (a)	-	-	78	-	-	32	.16
Total for Grasses		210	357	443	97	158	196	5.76
F	<i>Agoseris glauca</i>	a-	a-	b17	-	-	7	.03
F	<i>Astragalus beckwithii</i>	2	7	3	1	2	3	.04
F	<i>Aster</i> spp.	-	-	76	-	-	33	.16
F	<i>Astragalus utahensis</i>	10	14	11	5	7	6	.08
F	<i>Castilleja chromosa</i>	11	1	7	6	1	3	.06
F	<i>Chaenactis douglasii</i>	a22	b4	a28	11	4	12	.08
F	<i>Crepis acuminata</i>	-	-	3	-	-	1	.03
F	Cruciferae (a)	-	-	31	-	-	14	.07
F	<i>Cryptantha</i> spp.	a-	a4	b93	-	2	37	.36
F	<i>Delphinium</i> spp.	-	-	3	-	-	1	.00
F	<i>Descurainia</i> spp. (a)	-	-	4	-	-	2	.01
F	<i>Eriogonum cernuum</i> (a)	1	6	10	1	3	5	.02
F	<i>Eriogonum ovalifolium</i>	a-	a-	b13	-	-	5	.05
F	<i>Gayophytum ramosissimum</i> (a)	-	-	35	-	-	14	.09
F	<i>Gilia</i> spp. (a)	-	-	21	-	-	8	.04
F	<i>Lomatium</i> spp.	-	-	4	-	-	1	.00
F	<i>Lygodesmia spinosa</i>	-	-	-	-	-	-	.00
F	<i>Navarretia intertexta</i> (a)	-	-	78	-	-	34	.17
F	<i>Phlox hoodii canescens</i>	-	8	4	-	4	2	.03
F	<i>Phlox longifolia</i>	35	23	35	17	12	16	.10
F	<i>Phlox</i> spp. (a)	-	-	102	-	-	37	.43
F	<i>Townsendia</i> spp.	-	2	-	-	1	-	-
F	<i>Tragopogon dubius</i>	a13	b-	b2	6	-	1	.03
Total for Forbs		94	69	580	47	36	242	1.94

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

BROWSE TRENDS --

Herd unit 01 , Study no: 5

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia nova	86	11.55
B	Artemisia tridentata tridentata	7	.60
B	Chrysothamnus viscidiflorus stenophyllus	50	1.50
B	Juniperus osteosperma	3	4.88
B	Leptodactylon pungens	10	.16
B	Opuntia fragilis	1	-
B	Pinus monophylla	2	.00
B	Symphoricarpos oreophilus	1	-
Total for Browse		160	18.70

BASIC COVER --

Herd unit 01 , Study no: 5

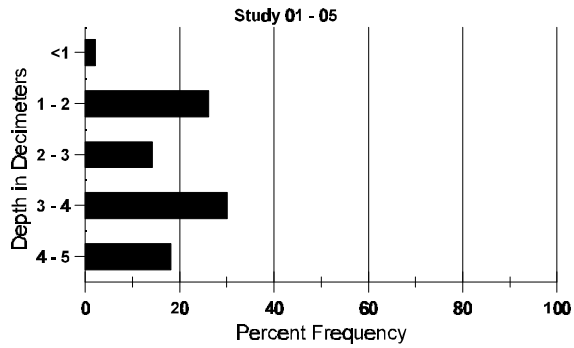
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	310	2.50	8.25	25.64
Rock	121	.25	.50	1.48
Pavement	341	20.75	25.00	27.95
Litter	371	39.75	33.00	27.04
Cryptogams	45	1.25	1.50	.72
Bare Ground	275	35.50	31.75	19.56

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 5

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
26.2	59.6 (19.7)	8.0	65.7	17.0	17.3	.98	3.5	92.8	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 01 , Study no: 5

Type	Quadrat Frequency '96
Rabbit	32
Elk	2
Deer	44

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 5

A G E	YR	Form Class (No. of 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5
Y	84	1	4	2	-	-	-	-	-	-	7	-	-	-	466		7
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	8	14	-	-	-	-	-	-	-	22	-	-	-	440		22
M	84	-	3	18	-	-	-	-	-	-	20	-	1	-	1400	9 16	21
	90	13	-	-	1	-	-	-	-	-	14	-	-	-	933	10 15	14
	96	19	122	33	1	20	3	-	-	-	198	-	-	-	3960	9 23	198
D	84	-	4	31	1	-	-	-	-	-	24	-	12	-	2400		36
	90	64	1	-	-	-	-	-	-	-	48	-	-	17	4333		65
	96	11	56	6	3	2	-	-	-	-	61	-	-	17	1560		78
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	740		37
Total Plants/Acre (excluding Dead & Seedlings)												'84	4266	Dec:	56%		
												'90	5266		82%		
												'96	5960		26%		

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata tridentata</i>																		
S	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	1	-	-	-	-	-	-	1	-	-	-	66		1	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66	20	25	1
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	21	29	1
	96	5	6	-	-	-	-	-	-	-	11	-	-	-	220	21	39	11
D	84	-	3	-	-	-	-	-	-	-	3	-	-	-	200		3	
	90	1	2	-	-	-	-	-	-	-	2	1	-	-	200		3	
	96	-	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	332	Dec:	60%			
												'90	332		60%			
												'96	260		15%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	6	1	1	-	-	-	-	-	-	8	-	-	-	533		8	
	90	17	-	-	1	-	-	-	-	-	18	-	-	-	1200		18	
	96	6	-	-	1	-	-	-	-	-	7	-	-	-	140		7	
M	84	3	5	8	-	-	-	-	-	-	16	-	-	-	1066	10	11	16
	90	10	1	-	5	-	-	-	-	-	16	-	-	-	1066	15	19	16
	96	61	5	-	10	-	-	-	1	-	77	-	-	-	1540	9	13	77
D	84	-	3	2	-	-	-	-	-	-	4	-	1	-	333		5	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	1932	Dec:	17%			
												'90	2332		3%			
												'96	1680		0%			
<i>Ephedra nevadensis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	16	17	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Grayia spinosa</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	31	35	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			

A G E	YR	Form Class (No. of 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>																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	3	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	60		-			
<i>Leptodactylon pungens</i>																		
Y	84	7	-	-	-	-	-	-	-	-	7	-	-	-	466		7	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	2	-	-	4	-	-	-	80		4	
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66	4	4	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	11	-	-	1	-	-	-	-	-	12	-	-	-	240	9	11	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	2	-	-	-	-	-	-	-	-	2	-	-	40		2		
Total Plants/Acre (excluding Dead & Seedlings)												'84	532	Dec:	0%			
												'90	0		0%			
												'96	360		11%			
<i>Opuntia fragilis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	20	5	7	1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	66		-			
												'96	20		-			
<i>Pinus monophylla</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	-	-	-	-	-	1	-	-	1	-	-	20		1		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	20	-	-	1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	40		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Symphoricarpos oreophilus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	-	1	-	-	-	-	-	-	-	-	1	-	-	20	16	23	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			

TREND STUDY 1-6-96

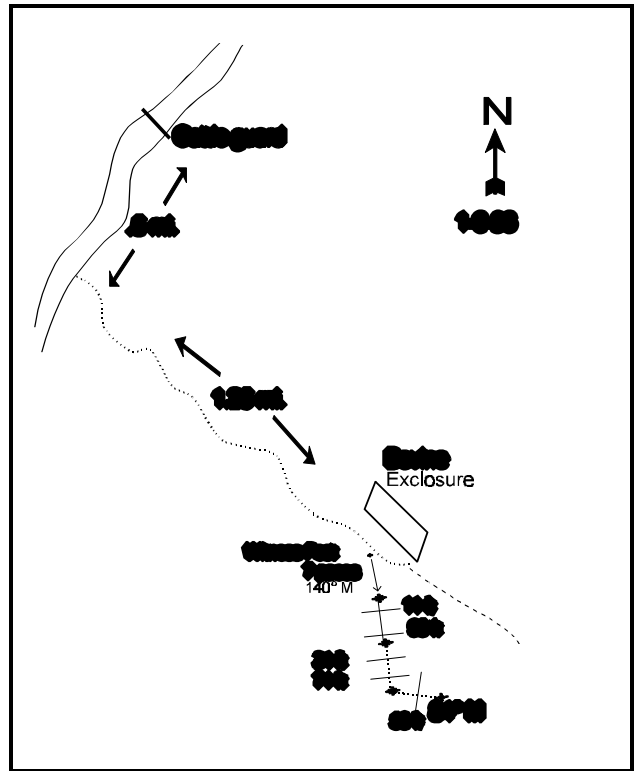
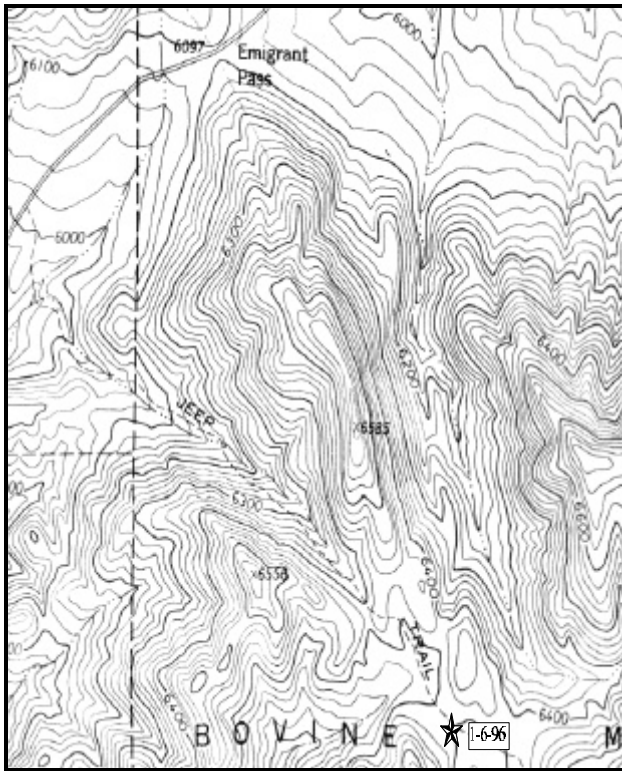
Study site name: Bovine Exclosure. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34 & 71ft), line 3 (59ft).

LOCATION DESCRIPTION

Proceed south by west to the summit of Emigrant Pass on Emigrant Pass Road. From the cattleguard at the summit, proceed south 0.5 miles to a fork and turn left. Travel 1.25 miles on this road to the Bovine Exclosure where there will be a witness post on the right side of the road. From the witness post, follow an azimuth of 140 degrees magnetic for 7 paces to the 0-foot stake of the frequency baseline. The 0-foot stake is a green, steel fence post with browse tag #7909. Bearing of the baseline is 180 degrees true. Line three will change direction to 59° M.



Map Name: Emigrant Pass, Utah

Diagrammatic Sketch

Township 9N Range 16W, Section 18, UTM: 2-72-995E 45-98-194N

DISCUSSION

Trend Study No. 1-6

This study is located immediately adjacent (south) to the Bovine enclosure. Although at a relatively high elevation (6,400 ft.), the study site receives substantial deer use during all but the most severe winters. During the winter of 1983-84, two and a half to three feet of snow covered the area and deer were unable to use the area in midwinter. However, during most years, the area is available and is considered critical deer winter range. Deer use is moderate to occasionally heavy. The site is located in a small "saddle" and thus has only a 5% to 10% percent east-southeast facing slope. Much of the surrounding area is steeper. The range type is sagebrush-grass with scattered or open juniper-pinyon woodland. Point quarter data from 1996 estimate Utah juniper density at 47 trees/acre and singleleaf pinyon at 8 trees/acre. This area is in the White Lakes sheep allotment which is grazed by 1,500 sheep from December 1 through March 31.

Soil is loose and coarse textured but apparently quite deep, especially on the more level areas. On steeper areas, erosion has resulted in shallower soils with a lot of exposed rock. Effective rooting depth averages 22 to 24 inches along the original baseline. Two additional 100 foot baselines were added in 1996 to increase the sample size. These two baselines are on shallower soils averaging only 12 to 13 inches in depth. Rock cover on the surface is also greater. The parent material appears to be granite, which must contain some subsurface fractures because there are some basin big sagebrush growing on these shallower soils. Ground cover is fair from perennial grasses and litter. Erosion is not currently a problem.

The key browse species, basin big sagebrush, numbered 1,532 plants/acre in 1984 increasing to 3,199 by 1990. Forage production for this sagebrush type was estimated at 2,010 pounds per acre (air dry) with the 1970 range inventory. Extremely heavy vole damage during the 1983-84 winter, killed approximately three-fourths of the big sagebrush and bitterbrush in the area. Other shrub species; black sagebrush, rabbitbrush, stickyleaf low rabbit brush, and Utah juniper experienced considerably less damage. Under more normal circumstances, shrub density, especially that of the more preferred species would be higher. The surviving basin big sagebrush sampled in 1984 were generally in poor vigor with 63% of the population decadent. Decadency was primarily from rodent damage. Browsing by deer was moderate with 20% of the plants heavily utilized. Utilization was light to moderate in 1990, and percent decadency declined to 22%. Conditions are similar as of 1996 with light to moderate use and a decadency rate of 27%. Vigor is good on all but a few decadent plants. During the 1996 reading, dead plants were included in the shrub density estimates. There were approximately 1,700 dead basin big sagebrush per acre. This data provides an idea as to the extent of the 1983-84 die-off. Some of the decadent and dying sagebrush encountered in 1996 appeared to be a result of the extended drought since the late 1980's.

With the extended base line used in 1996, more black sagebrush and bitterbrush were picked up in the sample. Currently there are an estimated 1,360 black sagebrush plants/acre which are lightly hedged and in good vigor. Bitterbrush number about 260 plants/acre with 31% displaying heavy use. Percent decadency of these shrubs is 15% and vigor is generally good.

It was feared that the widespread die off would provide an opportunity for less desirable shrubs such as broom snakeweed and narrowleaf low rabbitbrush to increase. Narrowleaf low rabbitbrush has remained stable since 1984 and broom snakeweed, first sampled in 1996, numbers only 900 plants/acre.

Observations from the nearby livestock enclosure also show a basin big sagebrush die-off. Both the total enclosure and the livestock enclosure show dead and dying plants. Use of the sagebrush in the livestock enclosure was light to moderate while the bitterbrush had a clubbed growth form indicating heavy use.

The herbaceous understory is dominated by native grasses, primarily bluebunch wheatgrass and Sandberg bluegrass. Annual cheatgrass is also abundant and provides 17% of the grass cover. Forb composition features several large showy species and a variety of lower growing forms. Overall forb composition and density are above the average for most juniper-pinyon sites in this area. Important forbs include arrowleaf balsamroot, tapertip hawksbeard, two large Lomatium species, and at least two kinds of milkvetch.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable even though there are numerous patches of bare ground and erosion pavement. The interspersed herbaceous cover and litter accumulations have acted to prevent serious erosion. The gentle slope is also a factor in this regard. Vegetative trend is down primarily because of widespread rodent damage to the most important browse species. Whether there will be any recovery will become apparent within the next few years. Herbaceous density, however, appears to be high enough to offer some competition to developing shrub seedlings.

1990 TREND ASSESSMENT

Trend for soil is stable. Percent bare ground increased slightly while litter cover declined. However, basal vegetative cover nearly doubled and erosion is not a problem on this site. Trend for browse is up. Density of big sagebrush increased since 1984 from 1,532 to 3,199. Percent decadency has declined from 63% in 1984, to 22% in 1990. Seedlings and young plants are abundant and the population appears to be increasing. Hedging is light on the available shrubs and sagebrush canopy cover averages 11%. The point-centered quarter method estimates 77 junipers per acre, 67% mature trees. The grass component, mainly bluebunch wheatgrass and Sandberg bluegrass, increased significantly in sum of nested frequency and quadrat frequency, while thickspike wheatgrass decreased significantly during this same period.

TREND ASSESSMENT

soil - stable

browse - up

herbaceous understory - up

1996 TREND ASSESSMENT

Trend for soil continues to be stable. Litter cover declined but percent bare ground also went down from 26% to 15%. Trend for browse is stable. Density estimates are similar for mature and decadent plants compared to 1990 data. The number of seedlings and young declined considerably but there are still enough to maintain the population. Use is currently light to moderate and percent decadency slightly higher at 27%. Trend for the herbaceous understory is slightly down. Sum of nested frequency of perennial grasses and forbs declined slightly since 1990. Sum of nested frequency for bluebunch wheatgrass declined significantly while frequency of Sandberg bluegrass remained the same. Five of the forb species encountered in 1990 declined significantly in nested frequency. Since 1984, forb sum of nested frequency has declined with every reading while grasses increased initially then declined slightly.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - slightly down

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 6

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	<i>Agropyron dasystachyum</i>	a35	b7	b10	15	2	3	.21
G	<i>Agropyron spicatum</i>	a138	b207	a157	57	85	66	7.69
G	<i>Bromus tectorum</i> (a)	-	-	223	-	-	70	2.32
G	<i>Elymus cinereus</i>	a12	b2	b4	6	1	2	.15
G	<i>Oryzopsis hymenoides</i>	a-	ab1	b8	-	1	4	.09
G	<i>Poa secunda</i>	a54	b145	b145	22	60	56	3.32
G	<i>Sitanion hystrix</i>	a-	a-	b16	-	-	5	.24
Total for Grasses		239	362	563	100	149	206	14.04
F	<i>Agoseris glauca</i>	a-	b17	a5	-	12	3	.01
F	<i>Allium textile</i>	3	-	-	1	-	-	-
F	<i>Arabis</i> spp.	a-	b10	b24	-	6	11	.08
F	<i>Astragalus beckwithii</i>	ab16	a32	b7	7	15	5	.05
F	<i>Astragalus cibarius</i>	a24	b-	b2	14	-	1	.00
F	<i>Balsamorhiza sagittata</i>	11	5	8	7	3	4	.87
F	<i>Caulanthus crassicaulis</i>	-	4	-	-	2	-	-
F	<i>Calochortus nuttallii</i>	-	3	-	-	2	-	-
F	<i>Collomia linearis</i> (a)	-	-	11	-	-	4	.02
F	<i>Comandra pallida</i>	-	4	5	-	2	3	.04
F	<i>Collinsia parviflora</i> (a)	-	-	26	-	-	12	.06
F	<i>Crepis acuminata</i>	a97	b45	c9	46	24	4	.02
F	<i>Cryptantha</i> spp.	a-	a-	b18	-	-	7	.06
F	<i>Delphinium nelsonii</i>	a52	b2	b3	26	1	2	.01
F	<i>Erigeron pumilus</i>	15	10	12	9	6	7	.09
F	<i>Galium aparine</i> (a)	-	-	10	-	-	5	.17
F	<i>Hackelia patens</i>	a-	b23	b17	-	12	8	.26
F	<i>Kelloggia galioides</i>	a47	b-	b-	22	-	-	-
F	<i>Lappula occidentalis</i> (a)	-	-	1	-	-	1	.00
F	<i>Lomatium</i> spp.	6	-	-	3	-	-	-
F	<i>Lomatium triternatum</i>	a15	b1	b-	6	1	-	-
F	<i>Microsteris gracilis</i> (a)	-	-	3	-	-	1	.00
F	<i>Navarretia intertexta</i> (a)	-	-	20	-	-	9	.04
F	<i>Orthocarpus</i> spp. (a)	29	-	-	12	-	-	-
F	<i>Penstemon cyananthus</i>	a-	a4	b79	-	2	39	.43
F	<i>Penstemon</i> spp.	a-	b29	a-	-	16	-	-
F	<i>Penstemon subglaber</i>	3	-	-	2	-	-	-
F	<i>Phlox longifolia</i>	a128	b172	c57	48	72	28	.17
F	<i>Senecio multilobatus</i>	-	-	6	-	-	3	.06

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	
F	Unknown forb-perennial	-	5	-	-	2	-	-
Total for Forbs		446	366	323	203	178	157	2.48

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

BROWSE TRENDS --

Herd unit 01 , Study no: 6

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia nova	35	1.13
B	Artemisia tridentata tridentata	57	4.94
B	Chrysothamnus nauseosus	7	.36
B	Chrysothamnus viscidiflorus stenophyllus	8	.04
B	Gutierrezia sarothrae	8	.04
B	Juniperus osteosperma	3	4.12
B	Opuntia fragilis	1	.00
B	Pinus monophylla	0	.38
B	Purshia tridentata	9	1.57
Total for Browse		128	12.61

BASIC COVER --

Herd unit 01 , Study no: 6

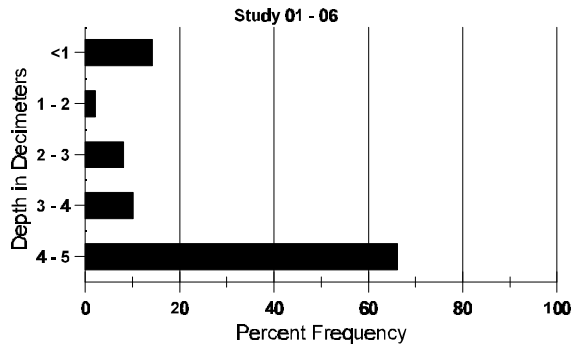
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	328	3.50	5.75	31.63
Rock	214	.75	1.00	13.21
Pavement	249	18.00	13.75	6.57
Litter	388	55.00	51.50	39.79
Cryptogams	102	2.00	1.75	1.90
Bare Ground	260	20.75	26.25	15.44

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 6

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
17.7	58.5 (17.4)	7.8	36.7	37.0	26.3	2.8	10.1	217.6	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 01 , Study no: 6

Type	Quadrat Frequency '96
Sheep	1
Rabbit	6
Deer	23

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 6

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia nova</i>																		
S	84	13	-	-	-	-	-	-	-	-	13	-	-	-	433		13	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	6	1	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	84	2	-	-	-	-	-	-	-	-	1	-	1	-	66	10	12	2
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	10	9	1
	96	37	18	-	-	1	-	-	-	-	56	-	-	-	1120	10	18	56
D	84	3	1	-	-	-	-	-	-	-	1	-	1	2	133		4	
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	96	2	3	-	-	-	-	-	-	-	5	-	-	-	100		5	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	420		21	
Total Plants/Acre (excluding Dead & Seedlings)												'84	199	Dec:	67%			
												'90	166		80%			
												'96	1360		7%			

A G E	YR	Form Class (No. of 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>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	16	-	-	1	-	-	-	-	-	17	-	-	-	566		17	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	84	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	90	48	-	-	1	-	-	-	-	-	48	1	-	-	1633		49	
	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340		17	
M	84	8	3	2	-	-	-	-	-	-	10	-	1	2	433	15	11	13
	90	22	3	-	-	-	-	-	-	-	23	2	-	-	833	18	18	25
	96	45	10	-	1	-	-	1	-	-	57	-	-	-	1140	22	28	57
D	84	9	12	7	-	-	-	-	1	-	1	-	10	18	966		29	
	90	19	2	-	1	-	-	-	-	-	18	1	1	2	733		22	
	96	13	12	3	-	-	-	-	-	-	25	-	-	3	560		28	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1700		85	
Total Plants/Acre (excluding Dead & Seedlings)												'84	1532	Dec:	63%			
												'90	3199		23%			
												'96	2040		27%			
<i>Chrysothamnus nauseosus</i>																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	4	-	-	-	-	-	-	-	-	2	-	2	-	80		4	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100	20	21	5
Total Plants/Acre (excluding Dead & Seedlings)												'84	33	Dec:	-			
												'90	0		-			
												'96	180		-			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	2	1	1	-	-	-	-	-	-	4	-	-	-	133	10	15	4
	90	4	2	-	1	-	-	-	-	-	7	-	-	-	233	11	15	7
	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220	12	18	11
D	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	232	Dec:	14%			
												'90	399		8%			
												'96	220		0%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Gutierrezia sarothrae</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	14	-	-	-	-	-	-	-	-	14	-	-	-	280		14	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	14	-	-	-	-	-	-	-	-	14	-	-	-	280		14	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	31	-	-	-	-	-	-	-	-	31	-	-	-	620	5	7	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	900		-			
<i>Juniperus osteosperma</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	1	-	-	-	1	-	2	-	-	-	66	69	187	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	236	276	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	33		-			
												'96	60		-			
<i>Opuntia fragilis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	4	-	-	-	-	-	-	-	-	4	-	-	-	133	4	8	
	90	5	-	-	-	-	-	-	-	-	5	-	-	-	166	6	15	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	5	13	
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	-			
												'90	199		-			
												'96	20		-			
<i>Purshia tridentata</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	3	3	3	-	-	-	-	-	-	9	-	-	-	180	17	39	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	1	-	-	-	-	-	-	1	-	-	1	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	260		15%			

TREND STUDY 1-7-96

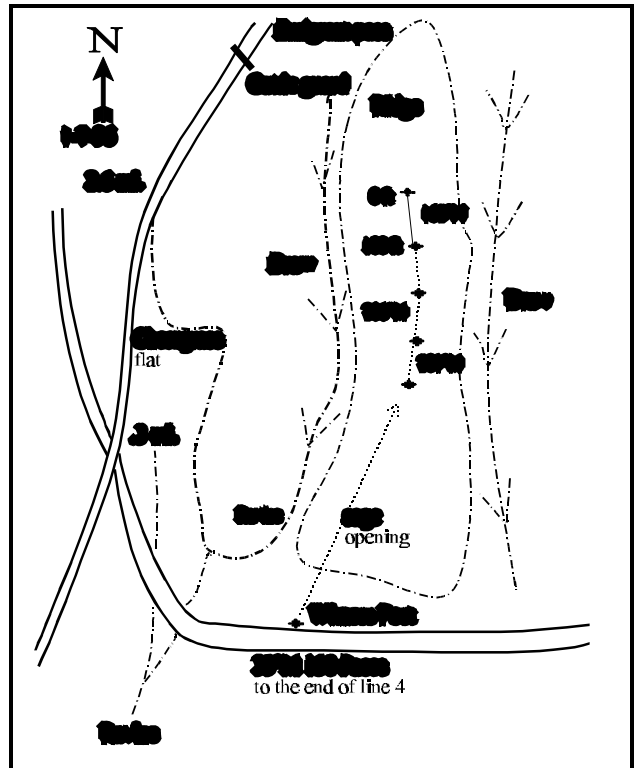
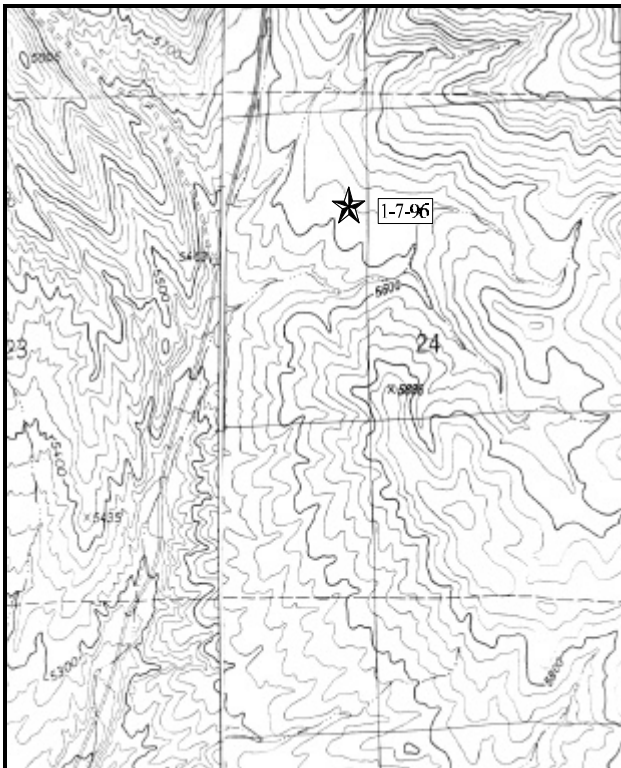
Study site name: South Side Emigrant Pass. Range type: Black sagebrush.

Compass bearing: frequency baseline 162 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the cattleguard at the summit of Emigrant Pass Road, travel 2.6 miles southwest to a cheatgrass flat on the east side of the road. Turn left. Cross the flat and the wash, proceeding 0.3 miles to the mouth of the first ravine on the north side of the canyon to a witness post. Stop here. Take a bearing of 33 degrees magnetic and walk 150 paces to the stake that marks the end of line four. The 0-foot stake is marked with a red browse tag, #7911. The baseline runs at a bearing of 162 degrees magnetic. The three-hundred foot baseline runs 206 degrees magnetic. The four-hundred foot baseline runs 201 degrees magnetic.



Map Name: Bovine, Utah and Emigrant Pass, Utah Diagrammatic Sketch

Township 9N Range 17W, Section 24, UTM: 2-70-900E 45-96-856N

DISCUSSION

Trend Study No. 1-7

This study samples a black sagebrush ridge within critical deer winter range on the south side of Emigrant Pass. The study site slopes gently (10%) to the southwest. Shallow draws containing a few junipers are located to either side of the study area. Elevation is approximately 5,610 feet. The area is also used as winter sheep range as part of the White Lakes allotment. This allotment is grazed from December 1 to March 31.

Soil is extremely rocky on the surface and appears "armored" with extensive areas of erosion pavement. The soil is shallow with an estimated effective root depth of 10 inches. Litter cover is scarce and vegetative cover is limited almost exclusively to black sagebrush crowns. Pedestaling of sagebrush plants is common, but not extreme.

Black sagebrush is the obvious key species. Although a variety of other shrubs can be found, they are either so low in numbers, poor forage producers, or are so poor in palatability that they are unsatisfactory for management purposes. The black sagebrush population is stable or even expanding which, although heavily hedged, appears to turn over rather rapidly. Seedlings and young plants are numerous and percent decadency in 1996 is low (8%). Mature shrubs average less than one foot in height and tend to be evenly spaced. Most reproduction occurs under or very near existing crowns. In spite of heavy use, black sagebrush exhibits good vigor. Other associated shrub species include narrowleaf low rabbitbrush, shadscale, bud sagebrush, and green molley summer cypress. Shadscale is light to moderately hedged and in good vigor.

Herbaceous plants constitute only a small portion of the vegetative composition. The most abundant species are two low-growing forbs, Cryptantha spp. and longleaf phlox. Neither have much value as forage plants. Grasses occur infrequently and produce less than 2% cover. The most common species are Indian ricegrass, bottlebrush squirreltail, and annual cheatgrass.

1984 APPARENT TREND ASSESSMENT

Soil trend is stable to slightly down. Ongoing erosion is rapid enough to result in some pedestaling of black sagebrush plants. However, erosion is slowed by the gentle terrain and the prevalence of erosion pavement. Vegetative trend is stable but at a relatively low condition rating. Plant diversity is low and shows few signs of improvement or further degradation. The dominant black sagebrush stand, although low-growing, heavily hedged and not highly productive, appears self-sustaining.

1990 TREND ASSESSMENT

Trend for browse appears stable even after extended years of drought. The shrubs showed light to moderate hedging. Canopy cover from black sage averages about 13%. The low rabbitbrush has not increased, although the population remains dominated by young plants. There is a high frequency of forbs, but none of the native species are especially valuable as forage. Herbaceous vegetation is somewhat restricted by the extensive pavement cover on the ground surface. Some soil loss through sheet erosion is still evident. Most grasses are increasing slowly, but Indian ricegrass is increasing much faster. It has gone from a quadrat frequency of 14% up to 31% and represents the most common grass on the site.

TREND ASSESSMENT

soil - stable but in poor condition

browse - stable

herbaceous understory - improving slightly, but in poor condition

1996 TREND ASSESSMENT

Trend for soil is slightly down and in poor condition. Percent bare ground increased from 7% to 9% while litter cover declined slightly. Pavement cover declined since 1990 from 67% to 45%. Some sheet erosion is still occurring but due to the gentle terrain, it is not severe. Trend for the key browse species, black sagebrush, is up slightly. Utilization is moderate to heavy with 39% of the mature and decadent plants displaying heavy use. Vigor is good and percent decadency has declined from 29% to 8%. The proportion of young plants declined from 41% to 25% and biotic potential (number of seedlings) dropped from 26% to 3%, but there are still sufficient numbers to maintain the population. Trend for the herbaceous understory is slightly up with an increase in the sum of nested frequency for grasses and forbs. Indian ricegrass declined significantly, while the sum of nested frequency for Canada bluegrass and squirreltail increased. The dominant forbs, cryptantha and longleaf phlox, both increased significantly in their sum of nested frequency values. However, the herbaceous understory is still depleted and in poor condition.

TREND ASSESSMENT

soil - slightly down

browse - slightly up

herbaceous understory - slightly up

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 7

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	-	2	-	-	1	-	.00
G	Bromus tectorum (a)	-	-	51	-	-	21	.13
G	Oryzopsis hymenoides	_a 26	_b 70	_b 54	14	31	27	.84
G	Poa compressa	_a 3	_{ab} 6	_b 19	2	3	9	.23
G	Sitanion hystrix	_{ab} 15	_a 9	_b 31	9	5	15	.26
Total for Grasses		44	87	155	25	40	72	1.47
F	Allium textile	5	-	3	3	-	1	.00
F	Astragalus newberryi	_a -	_a -	_b 23	-	-	10	.18
F	Astragalus utahensis	_{ab} 18	_a 23	_b 9	9	12	3	.01
F	Balsamorhiza hookeri	-	-	1	-	-	1	.00
F	Castilleja chromosa	5	-	-	2	-	-	.00
F	Caulanthus crassicaulis	_a -	_a -	_b 14	-	-	6	.06
F	Crepis acuminata	3	-	-	3	-	-	-
F	Cryptantha spp.	_a 116	_b 58	_a 92	57	28	42	.47
F	Cymopterus spp.	-	-	8	-	-	3	.01
F	Erigeron argentatus	-	2	1	-	1	1	.00
F	Erigeron spp	-	-	3	-	-	1	.03
F	Eriogonum ovalifolium	-	-	3	-	-	1	.00
F	Erigeron pumilus	-	-	3	-	-	1	.00

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	<i>Gilia</i> spp. (a)	-	-	38	-	-	16	.08
F	<i>Haplopappus acaulis</i>	_a 4	_b 32	_{ab} 18	2	17	7	.08
F	<i>Malcolmia africana</i>	-	-	5	-	-	3	.01
F	<i>Phlox hoodii</i>	57	43	34	29	24	16	.37
F	<i>Phlox longifolia</i>	_a 90	_{ab} 124	_b 133	47	56	63	.56
F	<i>Ranunculus testiculatus</i> (a)	-	-	2	-	-	1	.00
F	<i>Sphaeralcea coccinea</i>	-	2	-	-	1	-	-
F	<i>Sphaeralcea grossulariaefolia</i>	1	-	-	1	-	-	-
Total for Forbs		299	284	390	153	139	176	1.93

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

BROWSE TRENDS --

Herd unit 01 , Study no: 7

T y p e	Species	Strip Frequency '96	Average Cover % '96
B	<i>Artemisia nova</i>	99	17.45
B	<i>Atriplex confertifolia</i>	33	1.37
B	<i>Chrysothamnus viscidiflorus stenophyllus</i>	75	2.51
B	<i>Kochia americana</i>	23	.06
B	<i>Tetradymia nuttallii</i>	14	.30
Total for Browse		244	21.71

BASIC COVER --

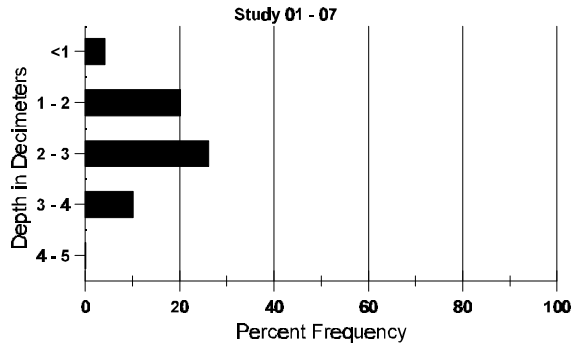
Herd unit 01 , Study no: 7

Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	290	3.25	9.75	25.04
Rock	263	5.75	11.00	11.69
Pavement	366	62.75	56.00	33.71
Litter	351	23.50	14.75	12.81
Cryptogams	235	1.50	1.50	2.55
Bare Ground	276	3.25	7.00	8.89

SOIL ANALYSIS DATA --
 Herd Unit 01, Study no: 7

Effective roting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.2	62.8 (9.7)	7.7	55.9	9.1	35.0	1.44	3.9	172.8	.6

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 01 , Study no: 7

Type	Quadrat Frequency '96
Rabbit	16
Deer	17

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 7

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia nova</i>																		
S	84	28	-	-	-	-	-	-	-	-	28	-	-	-	1866		28	
	90	38	-	-	-	-	-	-	-	-	38	-	-	-	2533		38	
	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340		17	
Y	84	40	23	6	-	-	-	-	-	-	68	-	1	-	4600		69	
	90	54	1	-	4	-	-	-	-	-	59	-	-	-	3933		59	
	96	79	63	1	-	1	-	-	-	-	144	-	-	-	2880		144	
M	84	9	46	10	-	-	-	-	-	-	62	-	3	-	4333	8 11	65	
	90	35	6	-	2	-	-	-	-	-	42	-	1	-	2866	11 14	43	
	96	20	176	143	-	34	3	5	-	-	381	-	-	-	7620	9 23	381	
D	84	3	8	6	-	-	1	-	-	5	12	-	11	-	1533		23	
	90	38	-	-	5	-	-	-	-	-	41	-	-	2	2866		43	
	96	5	23	20	-	-	2	-	-	-	39	-	-	11	1000		50	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	240		12	
Total Plants/Acre (excluding Dead & Seedlings)											'84	10466	Dec:	15%				
											'90	9665		30%				
											'96	11500		9%				
<i>Artemisia spinescens</i>																		
Y	84	9	-	-	-	-	-	-	-	-	9	-	-	-	600		9	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	1	9	8	-	-	-	-	-	1	18	-	1	-	1266	6 8	19	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	7 13	0	
D	84	-	-	1	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)											'84	1932	Dec:	3%				
											'90	0		0%				
											'96	0		0%				

A G E	YR	Form Class (No. of 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	84	4	6	1	-	-	-	-	-	-	11	-	-	-	733		11	
	90	-	-	-	-	-	-	1	-	-	1	-	-	-	66		1	
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
M	84	1	8	3	1	-	-	-	-	-	13	-	-	-	866	7 10	13	
	90	5	-	-	1	-	-	-	-	-	5	-	-	1	400	10 8	6	
	96	9	7	-	8	10	4	-	-	-	38	-	-	-	760	9 15	38	
D	84	-	4	3	1	1	-	-	-	6	5	-	9	1	1000		15	
	90	16	-	-	5	-	-	-	-	-	10	-	-	11	1400		21	
	96	-	1	-	-	1	-	-	-	-	2	-	-	-	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	2599	Dec:	38%			
												'90	1866		75%			
												'96	920		4%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	3	-	-	10	-	-	2	-	-	15	-	-	-	300		15	
Y	84	22	1	1	-	-	-	-	-	-	24	-	-	-	1600		24	
	90	21	-	-	6	-	-	-	-	-	27	-	-	-	1800		27	
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	84	2	5	9	-	-	-	-	-	1	17	-	-	-	1133	7 11	17	
	90	5	-	-	3	-	-	-	-	-	8	-	-	-	533	11 13	8	
	96	122	4	-	-	-	-	-	-	-	125	-	1	-	2520	8 15	126	
D	84	1	-	-	-	-	-	-	-	1	1	-	1	-	133		2	
	90	12	-	-	3	-	-	-	-	-	13	-	-	2	1000		15	
	96	18	-	-	2	-	-	-	-	-	17	-	-	3	400		20	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	2866	Dec:	5%			
												'90	3333		30%			
												'96	3100		13%			
<i>Ephedra nevadensis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	16 19	0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			

A G E	YR	Form Class (No. of 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>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Kochia americana</i>																		
S	84	-	2	1	2	-	-	-	-	-	-	5	-	-	333		5	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	84	14	1	1	-	-	-	-	-	-	15	-	1	-	1066		16	
	90	6	-	-	-	-	-	-	-	-	6	-	-	-	400		6	
	96	19	-	-	-	-	-	-	-	-	19	-	-	-	380		19	
M	84	4	-	-	-	-	-	-	-	-	4	-	-	-	266	2	2	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	28	-	-	1	-	-	-	-	-	29	-	-	-	580	4	6	
D	84	1	1	-	-	-	1	-	-	-	1	-	1	1	200		3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	1532	Dec:	13%			
												'90	400		0%			
												'96	960		0%			
<i>Tetradymia nuttallii</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	1	-	-	1	-	-	-	-	-	2	-	-	-	40	16	24	
D	84	1	-	-	1	-	-	-	-	1	1	-	2	-	200		3	
	90	6	-	-	2	-	-	-	-	-	5	-	-	3	533		8	
	96	7	1	-	2	-	-	2	-	-	7	-	-	5	240		12	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
Total Plants/Acre (excluding Dead & Seedlings)												'84	266	Dec:	75%			
												'90	866		62%			
												'96	280		86%			

TREND STUDY 1-8-96

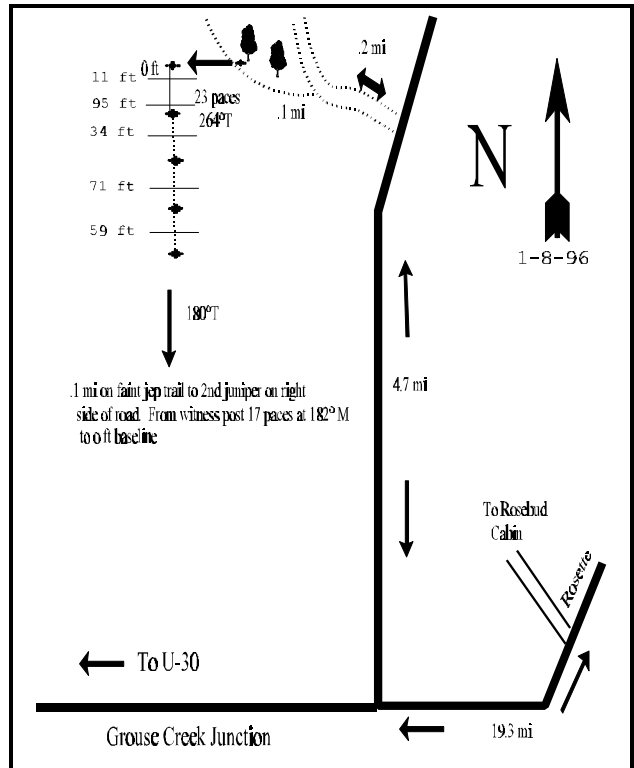
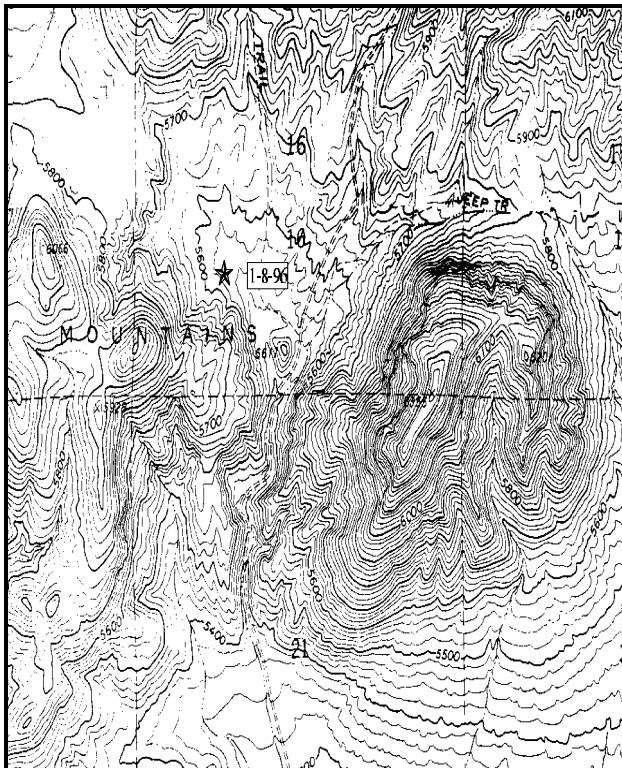
Study site name: Mud Springs Basin. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (71ft), line 4 (59ft).

LOCATION DESCRIPTION

On U-30 proceed 19.3 miles southwest from the Rosebud BLM station turn-off and turn right (north) onto a gravel road (just before mile marker 14). Proceed 4.7 miles and take a fork to the left for 0.2 miles. Take a very faint road to the left for 0.1 miles to a witness post on the right side of the road. From the witness post, walk 17 paces on an azimuth of 182 degrees magnetic to the 0-foot stake of the frequency baseline marked by browse tag #7913. Bearing of the baseline is 180 degrees true.



Map Name: Lucin NE, Utah

Diagrammatic Sketch

Township 9N, Range 17W, Section 16, UTM: 2-65-968E 45-97-889N

DISCUSSION

Trend Study No. 1-8

This study is located on critical deer winter range near the south end of the Grouse Creek Mountains approximately 2 miles southwest of "Mud Springs Basin." The elevation is 5,560 feet, slope is nearly level, and exposure is southeast. The small basin in which the study is located contains numerous small ridges occupied by sparse fingers of juniper and black sagebrush separated by swale areas occupied by the more deep rooted basin big sagebrush. The study site samples a large sagebrush swale because of their obvious importance during winters with deeper snow like the winter of 1983-84.

Soil is deep and alluvially deposited with minimal surface rockiness and a clay loam texture. Bare interspaces have pavement covering the surface, but the soil beneath is easily erodible. Ground cover is principally sagebrush crowns, native grasses, and cheatgrass. These provide good protection against erosion. The ample vegetation and litter cover combined with the lack of steep slope prevents serious soil erosion problems. A number of small drainage channels traverse the area, however none are deep or highly active. Most appear relatively stable.

Browse composition consists of a nearly pure stand of basin big sagebrush. Density was estimated at 5,866 in 1984. There was considerable rodent damage to plants encountered that year, yet percent decadency was still relatively low at 13%. The sagebrush stand appeared over mature and decadent at first glance in 1984 but examination of the shrub density data suggested an age structure more typical of an expanding or regenerating population. The surviving mature and decadent plants received very heavy deer use on those portions of the crown which protruded above the snow line but vigor was not seriously depressed. Thus, the surviving plants looked ragged, but nonetheless exhibited good vigor when examined in June of 1984. By 1990, average sagebrush canopy cover was 19%. Population density declined 25% and percent decadency increased to 28%. Utilization was light and vigor was good on all but 50% of the decadent plants. Density continued to decline as of 1996, but the number of mature plants increased from 1,400 plants/acre to 2,060. Much of the reduction in density can be attributed to the decline in the number of young plants (1,266 to 380). Utilization is mostly light and percent decadency declined to 24%. Canopy cover of big sagebrush also declined from 19% in 1990 to approximately 12% in 1996.

Other shrubs, such as prickly phlox, narrowleaf low rabbitbrush, black sagebrush, and Nevada ephedra are distinctly secondary in importance. Density of narrowleaf rabbitbrush increased dramatically from 199 plants/acre to 3,300 since 1990. Some of the increase is mostly due to the larger sample used in 1996 which better estimates shrub populations which have aggregated and/or discontinuous distributions.

Understory composition is dominated by a moderately dense stand of native perennial grasses consisting of bluebunch wheatgrass, Indian ricegrass, Canada bluegrass, and bottlebrush squirreltail. These grasses produce nearly 15% cover. Cheatgrass brome is also abundant and provides about 5% cover. Forbs are diverse with twenty species of perennial forbs encountered in 1996. Nine species of annual forbs also occur on the site combining to produce 22% of the herbaceous cover.

1984 TREND ASSESSMENT

Long term trend seems relatively stable. Although the dominant browse species suffered heavy damage in 1983-84, regeneration and recovery should occur rapidly. In this deteriorated condition, high numbers of wildlife could cause further losses to the big sagebrush population. Soil is potentially highly erodible even though the current rate of soil loss is low.

1990 TREND ASSESSMENT

Trend for soil is down due to a major increase in percent bare ground (13% to 30%). Litter cover also declined from 70% to 39%. Trend for basin big sagebrush is down. The number of mature plants declined from 3,066 to 1,400. Density of seedlings and young plants declined as well, but there appears to be sufficient numbers to maintain the population. Utilization of the sagebrush was light but percent decadency increased from 13% to 28%. Nearly half (44%) of the decadent plants appeared to be dying. The currently balanced age class structure, would indicate that the sagebrush population, heavily impacted by the harsh winters of the early 1980's is stabilizing. Trend for the herbaceous understory is up. All five perennial grasses increased in nested frequency and quadrat frequency values. For the forbs, a little over half had improved nested and quadrat frequency's.

TREND ASSESSMENT

soil - down

browse - down

herbaceous understory - up

1996 TREND ASSESSMENT

Trend for soil is up slightly. Percent bare ground declined from 30% to 13% while litter and cryptogamic cover increased slightly. Trend for the key browse species, basin big sagebrush, is stable since 1990. Density of mature plants increased while the number of seedling and young declined. Utilization was mostly light and percent decadence fell slightly from 28% to 24%. Vigor was good on all but 28% of the decadent sagebrush which were classified as dying. One cause for concern is the increase in density of narrowleaf low rabbitbrush which rose from 199 to 3,300 plants/acre. Due to the lack of seedlings and young during previous readings, some of the increase is likely due to the increased sample size used in 1996. Trend for the herbaceous understory is stable. Sum of nested frequency of grasses declined slightly while frequency of perennial forbs increased.

TREND ASSESSMENT

soil - up slightly

browse - stable

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

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 8

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron dasystachyum	a-	b16	a-	-	5	-	-
G	Agropyron spicatum	a46	b84	b78	23	39	37	3.88
G	Bromus tectorum (a)	-	-	154	-	-	55	5.38
G	Oryzopsis hymenoides	24	27	34	13	13	15	2.56
G	Poa compressa	a51	b182	b173	26	73	69	6.21
G	Poa secunda	-	-	3	-	-	1	.03
G	Sitanion hystrix	58	63	57	26	28	24	1.89
Total for Grasses		179	372	499	88	158	201	19.97

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	<i>Agoseris glauca</i>	1	-	-	1	-	-	-
F	<i>Alyssum alyssoides</i> (a)	-	-	6	-	-	2	.01
F	<i>Ambrosia artemisifolia</i>	-	2	-	-	1	-	-
F	<i>Antennaria</i> spp.	-	-	6	-	-	4	.07
F	<i>Astragalus beckwithii</i>	8	-	6	4	-	2	.18
F	<i>Astragalus cibarius</i>	a5	a6	b32	2	2	15	.47
F	<i>Astragalus newberryi</i>	a-	a-	b10	-	-	4	.07
F	<i>Astragalus utahensis</i>	-	8	1	-	4	1	.00
F	<i>Balsamorhiza hookeri</i>	2	-	7	1	-	5	.30
F	<i>Castilleja chromosa</i>	3	-	-	1	-	-	-
F	<i>Calochortus flexuosus</i>	3	-	-	1	-	-	-
F	<i>Camelina microcarpa</i> (a)	-	-	71	-	-	32	.18
F	<i>Chaenactis douglasii</i>	-	-	1	-	-	1	.00
F	<i>Crepis acuminata</i>	a1	b15	ab10	1	7	5	.25
F	<i>Cryptantha</i> spp.	a-	a-	b32	-	-	16	.35
F	<i>Descurainia pinnata</i> (a)	-	-	46	-	-	17	.47
F	<i>Erigeron</i> spp	a-	a-	b14	-	-	6	.05
F	<i>Eriogonum ovalifolium</i>	-	-	1	-	-	1	.00
F	<i>Gayophytum ramosissimum</i> (a)	-	-	19	-	-	8	.04
F	<i>Gilia</i> spp. (a)	-	-	8	-	-	4	.02
F	<i>Haplopappus acaulis</i>	a-	a-	b20	-	-	7	.46
F	<i>Halogeton glomeratus</i> (a)	-	10	-	-	4	-	-
F	<i>Hackelia patens</i>	a-	b16	c71	-	8	28	.18
F	<i>Lappula occidentalis</i> (a)	-	-	29	-	-	13	.11
F	<i>Malcolmia africana</i>	-	-	4	-	-	2	.01
F	<i>Mentzelia albicaulis</i> (a)	-	-	21	-	-	11	.08
F	<i>Penstemon cyananthus</i>	a-	a-	b17	-	-	6	.05
F	<i>Penstemon</i> spp.	-	-	1	-	-	1	.00
F	<i>Phlox hoodii</i>	a-	b13	c54	-	5	26	.72
F	<i>Phlox longifolia</i>	a29	b66	a30	12	28	12	.16
F	<i>Sisymbrium altissimum</i> (a)	-	-	14	-	-	6	.05
F	<i>Sphaeralcea grossulariaefolia</i>	3	-	-	1	-	-	-
F	<i>Taraxacum officinale</i>	-	-	3	-	-	1	.00
F	<i>Tragopogon dubius</i>	-	-	3	-	-	1	.03
F	Unknown forb-perennial	a-	b27	a-	-	12	-	-
F	<i>Veronica biloba</i> (a)	-	-	3	-	-	2	.01
Total for Forbs		55	163	540	24	71	239	4.39

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

BROWSE TRENDS --

Herd unit 01 , Study no: 8

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia nova	6	1.54
B	Artemisia tridentata tridentata	75	11.66
B	Chrysothamnus viscidiflorus stenophyllus	48	5.67
B	Juniperus osteosperma	2	.15
B	Leptodactylon pungens	5	.33
B	Opuntia fragilis	0	.00
Total for Browse		136	19.35

BASIC COVER --

Herd unit 01 , Study no: 8

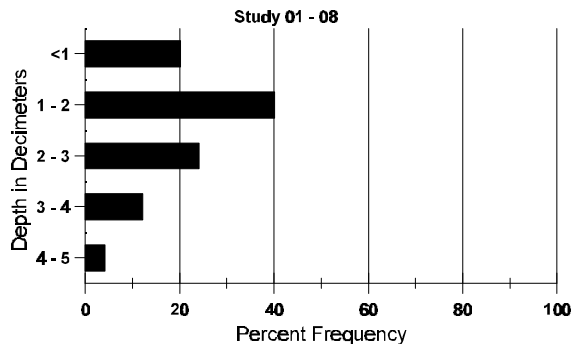
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	342	2.25	7.00	47.15
Rock	170	1.75	1.75	3.30
Pavement	241	12.00	21.25	13.01
Litter	390	70.25	39.00	41.55
Cryptogams	66	1.00	1.25	1.82
Bare Ground	243	12.75	29.75	12.91

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 8

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
20.3	56.6 (19.7)	7.8	43.4	32.4	25.3	2.3	6.3	540.8	.7

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 01 , Study no: 8

Type	Quadrat Frequency '96
Rabbit	10
Deer	53
Cattle	1

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 8

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia nova</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	1	-	3	-	-	-	-	-	-	4	-	-	-	80	8	25	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	2	8	-	-	-	-	-	-	6	-	-	5	220		11	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	320		69%			
<i>Artemisia tridentata tridentata</i>																		
S	84	380	-	-	-	-	-	-	-	-	380	-	-	-	25333		380	
	90	7	-	-	-	-	-	-	-	-	7	-	-	-	466		7	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	14	14	2	-	-	-	-	-	-	30	-	-	-	2000		30	
	90	18	-	-	1	-	-	-	-	-	19	-	-	-	1266		19	
	96	15	-	-	4	-	-	-	-	-	19	-	-	-	380		19	
M	84	8	20	18	-	-	-	-	-	-	44	-	2	-	3066	26	34	
	90	21	-	-	-	-	-	-	-	-	21	-	-	-	1400	22	22	
	96	90	2	2	9	-	-	-	-	-	103	-	-	-	2060	23	37	
D	84	2	3	7	-	-	-	-	-	-	8	-	1	3	800		12	
	90	16	-	-	-	-	-	-	-	-	8	-	1	7	1066		16	
	96	34	3	-	3	-	-	-	-	-	29	-	-	11	800		40	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	620		31	
Total Plants/Acre (excluding Dead & Seedlings)												'84	5866	Dec:	14%			
												'90	3732		29%			
												'96	3240		25%			

A G E	YR	Form Class (No. of 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>																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	14	-	-	-	-	-	-	-	-	14	-	-	-	280		14	
M	84	-	4	-	-	-	-	-	-	-	1	-	3	-	266	12 14	4	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133	10 9	2	
	96	139	-	-	8	-	-	-	-	-	147	-	-	-	2940	12 20	147	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	4	-	-	-	-	-	-	-	-	3	-	-	1	80		4	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	266	Dec:	0%			
												'90	199		0%			
												'96	3300		2%			
<i>Juniperus osteosperma</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	-	-	-	-	-	-	1	-	-	1	-	-	-	20	-	1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	40		-			
<i>Leptodactylon pungens</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	3	-	-	1	-	-	-	-	-	4	-	-	-	80	5 11	4	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	100		-			
<i>Opuntia fragilis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	5 14	0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			

TREND STUDY 1-9-96

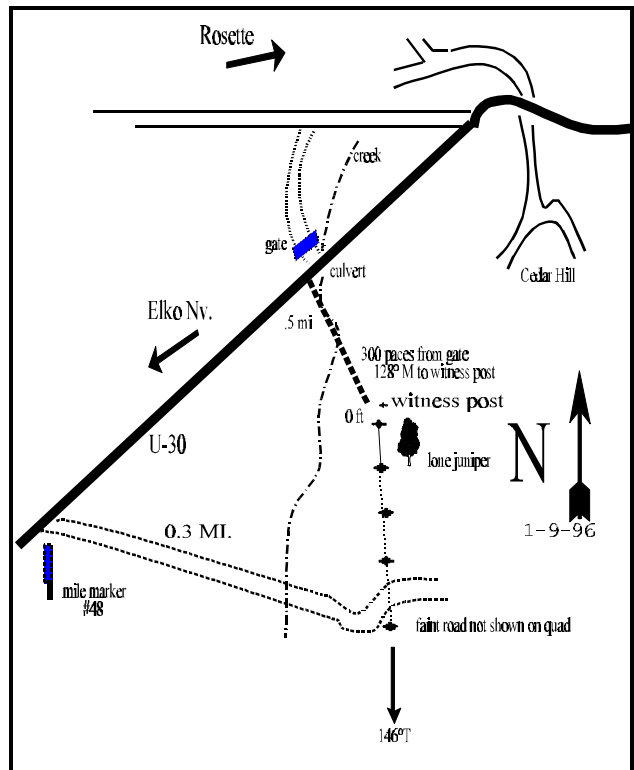
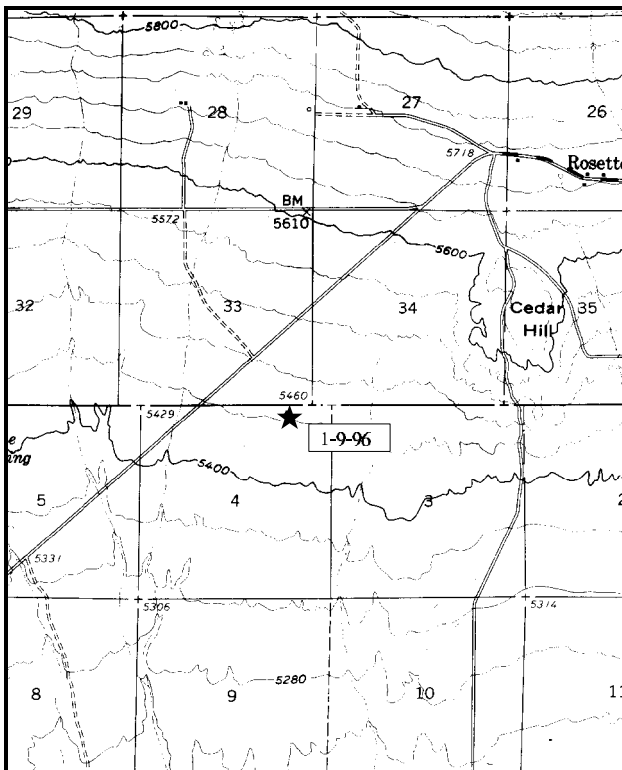
Study site name: South West Rosette. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 146 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

On U-30, proceed northeast towards Rosette. Travel 0.5 miles from mile marker 48 to a point where a gate passes north to south through a culvert. Park here and proceed to the west end of the gate. Take a bearing of 128 degrees magnetic and walk ~300 paces to the witness post. The 0-foot post of the baseline is a few paces south of the witness post and is marked by browse tag #7914. Please note that 300 paces will only be approximate due to the distance covered and the dense shrubs to be traversed. Use care to stay on specified bearing and look for a lone juniper towards end of baseline when approaching 300 paces. If one encounters a faint dirt road, backtrack as this road is just beyond the three hundred foot stake. Baseline bearing is 146 degrees true (163 degrees magnetic). The site can also be accessed by finding the faint road to the south and driving about 0.3 miles to the 300' stake which is just off the road on the north side.



Map Name: Park Valley, Utah

Diagrammatic Sketch

Township 12N Range 14W, Section 4, UTM. 2-96-602E 46-30-612N

DISCUSSION

Trend Study No. 1-9

This sagebrush-grass site is located southwest of Rosette on nearly flat terrain at an elevation of 5,440 feet. This site represents a compromise from the original goal to sample a winter deer concentration area north or northwest of Rosette. This area, however, is on private land for which we were unable to obtain permission to enter. The actual study site is on BLM land slightly south of the optimum location at a point where the density of juniper trees begins to thin out. Range type varies from sagebrush-grass and scattered Utah juniper to swales where perennial grasses have replaced the woody plants. The area is part of the Rosette allotment which is assigned for 60 cattle to use the area from mid October through January. However the area also appears to be used by sheep. Pellet groups and cattle droppings are infrequent.

Soil is deep, alluvially deposited with a moderately sandy clay loam texture and little surface rock. At the time the study was established (i.e., mid-June 1984), the soil was exceptionally moist. A small irrigation canal located one-quarter mile north may be the source of excess moisture, either as a result of sub-irrigation or occasional overflow. The net result was a development of a lush growth of perennial grass and death of big sagebrush in the lower swale areas. In addition, there were also patches of dead sagebrush in the vicinity which appear to have been sprayed with herbicide.

Status of the browse population was reported questionable in 1984. Wyoming big sagebrush, which is the dominant browse species, had been damaged by possible excess soil moisture and herbicides. With this loss, the increaser species, narrowleaf low rabbitbrush was almost twice as numerous and apparently increasing. The sagebrush population had a decadent appearance (32%). Utilization was reported moderate to heavy, coincidentally 32% of the population also displayed heavy use. Data from 1990 show a reduction in the number of mature plants from 2,666 plants/acre to 1,333. The number of decadent plants was similar but 40% of the decadent shrubs were classified as dying (666 plants/acre). Utilization was light to moderate. The increased sample used in 1996 estimated a density of 3,460 Wyoming big sagebrush plants/acre. Utilization was light to moderate and decadency declined to 30%. However, 30% percent of the shrubs encountered were dead (1,520 plants/acre) indicating a past die off. Density of the increaser, narrowleaf low rabbitbrush, has declined in density since 1984 (10,065 plants/acre to 5,460).

Grass cover and composition vary widely between microsites. However, even on the drier portion of the site, grasses are an important component. On these areas, vigorous clumps of Sandberg bluegrass, bottlebrush squirreltail, bluebunch wheatgrass, and western wheatgrass provide moderately good cover. Most of the species were green and succulent and showed evidence of current use at the time of study establishment (1984). Forbs are not abundant and include a number of annuals, especially on the drier areas. Most annual forbs are members of the mustard and borage families. The more prevalent perennials are longleaf phlox, hoods phlox, and Douglas chaenactis, none of which have appreciable forage value. Hoods phlox makes up 80% of the deficient forb cover.

1984 TREND ASSESSMENT

Soil trend is stable. There is very little erosion due primarily to the lack of slope. Vegetative trend is more difficult to predict. Our best assessment is that there is a stable or perhaps slightly declining stand of Wyoming big sagebrush. Conversely, narrowleaf low rabbitbrush and perennial grasses appear to be increasing over much of the area.

1990 TREND ASSESSMENT

Wyoming big sagebrush is declining. Nested frequency and quadrat frequency values have decreased on this valley winter range. Density of mature plants decreased 30% and the percentage of decadent sagebrush has increased from 32% to 53% since 1984, yet the sagebrush is only moderately hedged, and averages 17% canopy cover. Trend for the herbaceous understory is stable. Sum of nested frequency of grasses is stable while frequency of forbs declined slightly. There is a high percentage of bare soil, but this has decreased from 44% to 38% and basal vegetative cover increased from 2% to 14.5%. There are no obvious signs of erosion that would be a concern to management.

TREND ASSESSMENT

soil - up slightly
browse - declining
herbaceous understory - stable

1996 TREND ASSESSMENT

Trend for soil is up with a decrease in percent bare ground (38% to 21%) and an increase in litter cover (30% to 37%). Trend for browse is up slightly. Utilization is mostly light to moderate and percent decadency has declined from 53% to 30%. Density of mature plants nearly doubled since 1990 (1,333 plants/acre to 2,320). Another positive aspect to the browse trend is the decline in density of the increaser, narrowleaf low rabbitbrush (6,732 plants/acre to 5,460). The herbaceous trend is also up slightly. Sum of nested frequency for all three perennial grass species increased since 1990. The grasses make up 87% of the herbaceous understory cover. Frequency of forbs declined slightly but the most numerous forb, hoods phlox, increased.

TREND ASSESSMENT

soil - up
browse - up slightly
herbaceous understory - up slightly

HERBACEOUS TRENDS --
Herd unit 01 , Study no: 9

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron smithii	47	55	70	15	19	23	1.91
G	Bromus tectorum (a)	-	-	45	-	-	18	.19
G	Poa secunda	_a 167	_b 223	_b 252	67	79	85	5.60
G	Sitanion hystrix	_a 186	_b 135	_b 154	77	62	65	2.81
Total for Grasses		400	413	521	159	160	191	10.52
F	Allium spp.	1	-	-	1	-	-	-
F	Arabis spp.	1	2	1	1	2	1	.00
F	Astragalus beckwithii	-	2	4	-	1	2	.01
F	Astragalus utahensis	-	1	3	-	1	1	.03
F	Castilleja chromosa	-	1	-	-	1	-	-
F	Chaenactis douglasii	_a 41	_b -	_b -	21	-	-	-
F	Crepis acuminata	2	-	-	1	-	-	-

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	Cryptantha spp.	-	-	7	-	-	3	.01
F	Cymopterus spp.	_a -	_b 46	_a 7	-	22	3	.01
F	Delphinium nelsonii	3	-	-	1	-	-	-
F	Descurainia pinnata	-	-	6	-	-	2	.01
F	Erigeron pumilus	-	-	2	-	-	1	.00
F	Gayophytum ramosissimum	-	-	3	-	-	1	.00
F	Gilia congesta	-	5	-	-	3	-	-
F	Lappula occidentalis (a)	-	-	2	-	-	2	.01
F	Lygodesmia spinosa	-	-	1	-	-	1	.00
F	Machaeranthera spp	-	-	1	-	-	1	.00
F	Phlox hoodii	_a 14	_b 31	_c 67	7	17	28	1.28
F	Phlox longifolia	_a 112	_{ab} 85	_b 59	46	35	27	.16
F	Polygonum douglasii (a)	-	-	3	-	-	1	.00
F	Trifolium gymnocarpon	18	8	15	7	4	8	.04
F	Unknown forb-perennial	-	-	2	-	-	1	.00
Total for Forbs		192	181	183	85	86	83	1.61

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

BROWSE TRENDS --

Herd unit 01 , Study no: 9

T y p e	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata wyomingensis	82	12.09
B	Chrysothamnus nauseosus	2	-
B	Chrysothamnus nauseosus consimilis	8	.38
B	Chrysothamnus viscidiflorus stenophyllus	76	4.44
B	Leptodactylon pungens	17	.30
B	Opuntia fragilis	9	.21
Total for Browse		194	17.44

BASIC COVER --

Herd unit 01 , Study no: 9

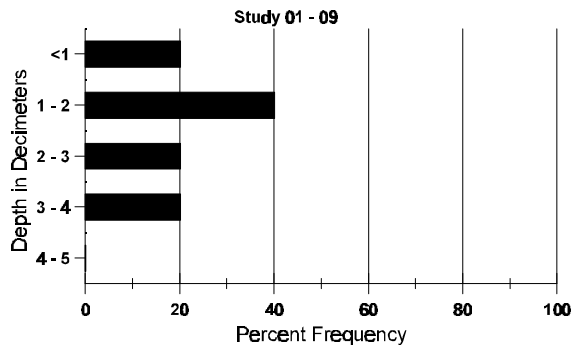
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	351	2.00	14.50	27.70
Rock	161	.75	2.25	1.90
Pavement	318	7.25	13.25	6.67
Litter	383	43.75	30.25	36.87
Cryptogams	145	2.25	2.00	2.69
Bare Ground	266	44.00	37.75	20.89

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 9

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.7	63.0 (11.0)	7.5	47.3	22.4	30.4	1.9	7.3	406.4	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 9

Type	Quadrat Frequency '96
Sheep	11
Rabbit	18
Deer	9
Cattle	1

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 9

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata wyomingensis</i>																		
S	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
Y	84	1	5	4	-	-	-	-	-	-	10	-	-	-	666		10	
	90	2	-	-	-	-	-	-	-	2	-	-	-	133		2		
	96	5	-	-	-	-	-	-	-	5	-	-	-	100		5		
M	84	3	28	9	-	-	-	-	-	39	-	1	-	2666	23	33	40	
	90	6	14	-	-	-	-	-	-	20	-	-	-	1333	22	25	20	
	96	71	44	1	-	-	-	-	-	111	-	3	2	2320	23	33	116	
D	84	3	10	11	-	-	-	-	-	22	1	1	-	1600		24		
	90	12	13	-	-	-	-	-	-	15	-	-	10	1666		25		
	96	26	26	-	-	-	-	-	-	34	-	2	16	1040		52		
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	-	-	-	-	-	-	-	-	-	-	-	1520		76		
Total Plants/Acre (excluding Dead & Seedlings)											'84	4932	Dec:	32%				
											'90	3132		53%				
											'96	3460		30%				
<i>Chrysothamnus nauseosus</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	1	-	-	-	-	-	-	-	1	-	-	-	20		1		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	-	-	-	1	-	-	-	-	1	-	-	-	20	23	32	1	
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-				
											'90	0		-				
											'96	40		-				
<i>Chrysothamnus nauseosus consimilis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	2	-	-	-	-	-	-	-	2	-	-	-	40		2		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	6	-	-	-	-	-	-	-	6	-	-	-	120	21	25	6	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	2	-	-	-	-	-	-	-	1	-	-	1	133		2		
	96	2	-	-	-	-	-	-	-	2	-	-	-	40		2		
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	0%				
											'90	133		100%				
											'96	200		20%				

A G E	YR	Form Class (No. of 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>																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	8	-	-	14	-	-	-	-	-	22	-	-	-	440		22	
Y	84	27	5	3	-	-	-	-	-	-	34	-	1	-	2333		35	
	90	7	-	-	1	-	-	-	-	-	8	-	-	-	533		8	
	96	3	-	-	1	-	-	-	-	-	4	-	-	-	80		4	
M	84	62	26	-	-	-	-	-	-	-	88	-	-	-	5866	11 14	88	
	90	40	-	-	6	-	-	-	-	-	46	-	-	-	3066	9 11	46	
	96	243	5	-	16	-	-	-	-	-	264	-	-	-	5280	10 15	264	
D	84	15	12	1	-	-	-	-	-	-	26	-	2	-	1866		28	
	90	45	-	-	2	-	-	-	-	-	38	-	-	9	3133		47	
	96	2	3	-	-	-	-	-	-	-	1	-	-	4	100		5	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	10065	Dec:	19%			
												'90	6732		47%			
												'96	5460		2%			
<i>Juniperus osteosperma</i>																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Leptodactylon pungens</i>																		
Y	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	7	-	-	-	-	-	-	-	-	7	-	-	-	466	7 6	7	
	90	7	-	-	1	-	-	-	-	-	8	-	-	-	533	6 8	8	
	96	27	-	-	6	-	-	-	-	-	33	-	-	-	660	8 13	33	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	-	-	-	-	-	-	-	-	1	-	-	2	200		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	666	Dec:	0%			
												'90	733		27%			
												'96	700		0%			
<i>Opuntia fragilis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	8	-	-	2	-	-	-	-	-	10	-	-	-	200	4 10	10	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	220		-			

TREND STUDY 1-10-96

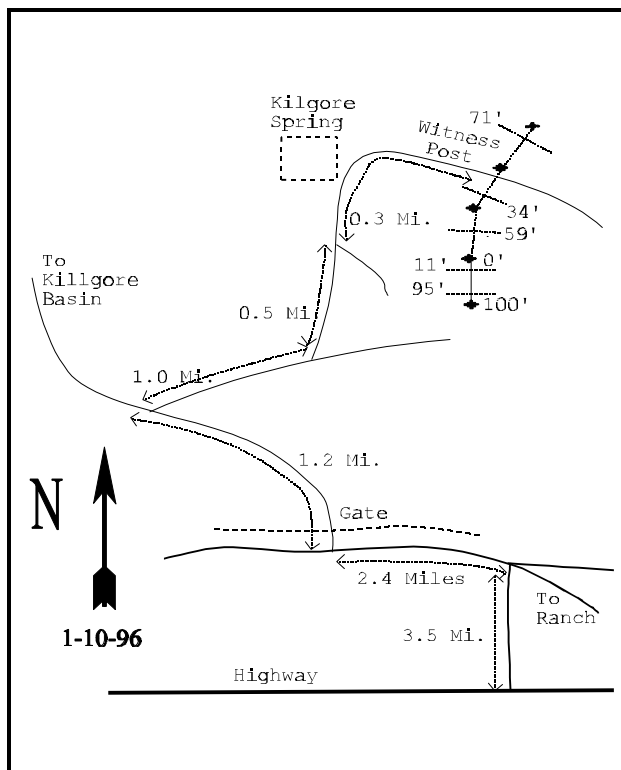
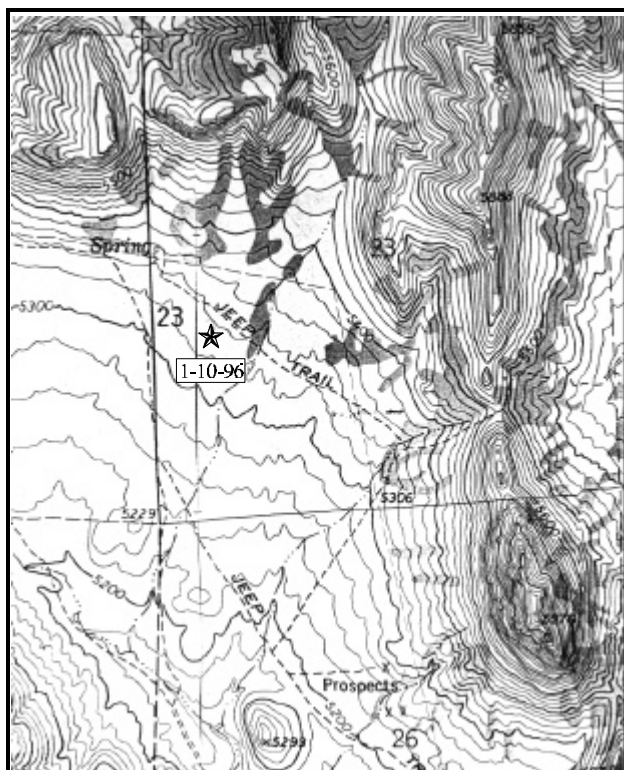
Study site name: Kilgore Basin. Range type: Black sagebrush.

Compass bearing: frequency baseline 155 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Traveling west on U-30 past Grouse Creek junction, proceed 0.6 miles past mile marker 6 and turn right. Travel 3.5 miles to a dryland farm. Continue north on road thru fields. At north edge of field turn left and proceed about 1.0 mile to intersection. Turn left at the intersection and travel 2.4 miles. Turn right and travel 1.2 miles (just after you turn right you will go through a gate). Turn right and continue 1.0 miles. Turn left and proceed 0.5 miles where there will be a road on the right. Continue straight for 0.3 miles passing Kilgore Spring to a witness post on the south side of the road. Walk 36 paces from the witness post on a bearing of 163 degrees true to the 0-foot stake of the frequency baseline. This stake marked by a red browse tag, #7910. Baseline bearing is 155 degrees true.



Map Name: Kilgore Basin

Diagrammatic Sketch

Township 9N, Range 19N, Section 23, UTM COOR: 2-49-604E 45-96-736N

DISCUSSION

Trend Study No. 1-10

This study, located west of Grouse Creek in Kilgore Basin, samples critical deer winter range. Terrain ranges from nearly level to gentle south facing slopes. Elevation is approximately 5,330 feet. The study site lies within a large basin surrounded by low hills that are nearly barren of tree cover. The sampled range type is a uniform, low-growing, evenly spaced stand of black sagebrush. Shrub interspecies are essentially barren of other vegetation. Within the basin, plant diversity is minimal. The bulk of the area is occupied by the black sagebrush type. The only variation is in small swales where the deeper rooted Wyoming and basin big sagebrush predominates along with a few isolated patches of juniper trees. This area is within the Kilgore allotment. It is used by 268 cattle and 30 horses during the winter (11/01 to 04/30). Deer pellet groups are moderately high with a quadrat frequency of 17%. Some elk sign was also noted.

Soil is alluvially deposited and has a long history of steady erosion. The bulk of the ground surface is occupied by rock and erosion pavement. Apart from shrub crowns there is very little aerial cover. Erosion continues at a slow but steady rate in spite of the gentle terrain. Plant pedestaling, exposed plant roots, and exposed lichen lines on rocks are all common. Soil erosion, however, has not seriously effected reproduction of black sagebrush, the key browse species.

Black sagebrush dominates the site with scattered amounts of narrowleaf low rabbitbrush, shadscale saltbush, winterfat, and spiny hopsage. All show evidence of use, although intensity is markedly greater on black sagebrush and winterfat. The population of black sagebrush appear relatively stable, but show a slight predominance of decadent plants as opposed to young plants and seedlings. Density of black sagebrush was estimated at 15,932 plants/acre in 1984. Utilization was heavy on 93% of the population and percent decadency was relatively high at 46%. During the 1990 reading, population density was estimated at 16,199 plants/acre. Utilization was more moderate with heavy use reported on 36% of the population. Percent decadency increased to 66% and 19% of those shrubs were classified as dying. Extended drought was responsible for most of the noticeable increase in percent decadency. By 1996, density declined to 13,600 plants/acre. Heavy use was found on only 12% of the population and percent decadency declined to 26%. There continues to be large numbers of seedlings and young which are more than adequate to maintain the population.

Understory plants are sparsely distributed and have little species diversity. Total herbaceous cover equals less than 4% cover. Most are low-growing xeric species with low palatability. The most prominent grasses include bottlebrush squirreltail, Sandberg bluegrass, and Indian ricegrass. Cheatgrass is present but rather rare. Forbs include longleaf phlox, milkvetch and rockcress. Livestock use, which includes horses, has had a negative effect on herbaceous density and composition.

1984 TREND ASSESSMENT

Nearly all of the indicators used to evaluate soil trend suggest a declining condition. However, it appears at least superficially that widespread sheet erosion has been occurring for a long time and has not greatly affected the plant community. This is a very dry site with low potential for producing grass or forbs under even the best of conditions. The current plant community appears quite stable. Black sagebrush should continue to dominate the site, even though the population is subject to heavy utilization.

1990 TREND ASSESSMENT

The relatively small statured adult population (excluding seedlings) of black sagebrush on this site is increasing. The high percentage of decadence is normal for high density stands like this one. Percent decadency has gone from 47% to 66%. This would be expected with extended drought. Sagebrush canopy cover averages about 21%. These shrubs were severely hedged in the past, but recently there has been lighter utilization and improved growth forms. The majority of the mature plants have normal vigor. Nested frequency of bottlebrush squirreltail declined and the other two grasses were not sampled. All forbs except hoods phlox decreased in sum of nested and quadrat frequencies. The majority of the ground cover is rock and pavement, with the current rate of erosion appearing slow.

TREND ASSESSMENT

soil - stable to slightly up but in poor condition with more than 40% cover for rock and pavement

browse - stable to slightly down due to moderately heavy use accompanied by prolonged drought which has caused poor vigor and high decadency

herbaceous understory - down and depleted, almost nonexistent

1996 TREND ASSESSMENT

Soil conditions are still poor, but trend is up due to a decrease in percent bare ground (17% to 9%) and an increase in litter cover (14% to 20%). Trend for black sagebrush is up. Total density has declined from 16,199 plants/acre to 13,600, but the number of mature plants has doubled while the percentage of decadent plants has decreased. Utilization is more moderate and vigor good on all but a few of the decadent plants. The herbaceous understory is still depleted, yet sum of nested frequency for perennial grasses and forbs has increased.

TREND ASSESSMENT

soil - up but in poor condition, more than 40% rock and pavement cover

browse - up

herbaceous understory - up but still depleted contributing less than 4% total cover

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 10

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	
G	Bromus tectorum (a)	-	-	53	-	-	20	.20
G	Oryzopsis hymenoides	2	-	5	1	-	4	.31
G	Poa secunda	_a 10	_b -	_a 22	6	-	9	.30
G	Sitanion hystrix	_{ab} 73	_a 50	_b 89	35	27	42	1.02
Total for Grasses		85	50	169	42	27	75	1.83
F	Allium spp.	_a 8	_b -	_b -	4	-	-	-
F	Arabis drummondii	_a 12	_b -	_b -	5	-	-	-
F	Astragalus beckwithii	_a 7	_a 1	_b 29	3	1	16	.42
F	Cruciferae (a)	-	-	11	-	-	7	.03
F	Cryptantha spp.	_a -	_a -	_b 20	-	-	10	.05
F	Gilia spp. (a)	-	-	9	-	-	6	.03

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	Lappula occidentalis (a)	-	-	11	-	-	3	.04
F	Navarretia intertexta (a)	-	-	19	-	-	9	.04
F	Phlox hoodii	_a 51	_b 87	_{ab} 61	26	36	26	.65
F	Phlox longifolia	_a 80	_b 57	_a 94	39	26	42	.58
F	Townsendia spp.	-	-	3	-	-	1	.03
Total for Forbs		158	145	257	77	63	120	1.88

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

BROWSE TRENDS --

Herd unit 01 , Study no: 10

T y p e	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia nova	100	24.95
B	Artemisia tridentata wyomingensis	3	.03
B	Atriplex confertifolia	18	1.43
B	Chrysothamnus viscidiflorus stenophyllus	76	5.37
B	Ephedra nevadensis	2	.03
B	Grayia spinosa	3	.30
B	Juniperus osteosperma	1	.15
B	Kochia americana	2	-
B	Opuntia fragilis	7	.00
Total for Browse		212	32.27

BASIC COVER --

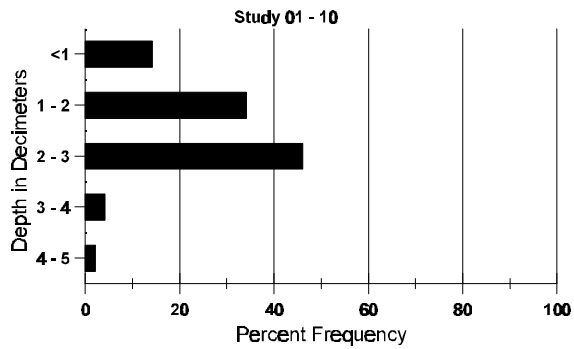
Herd unit 01 , Study no: 10

Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	296	0	5.50	36.16
Rock	236	11.00	6.75	11.82
Pavement	347	40.00	55.25	28.72
Litter	357	21.50	13.75	19.58
Cryptogams	165	1.50	1.50	1.84
Bare Ground	252	26.00	17.25	9.20

SOIL ANALYSIS DATA --
 Herd Unit 01, Study no: 10

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.4	65.0 (10.8)	8.1	48.9	27.1	24.0	1.2	6.3	444.8	.6

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 01 , Study no: 10

Type	Quadrat Frequency '96
Rabbit	2
Elk	1
Deer	17
Cattle	1

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 10

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia nova</i>																		
S	84	27	-	-	-	-	-	-	-	-	26	-	1	-	1800		27	
	90	14	-	-	-	-	-	-	-	-	14	-	-	-	933		14	
	96	28	-	-	-	-	-	-	-	-	28	-	-	-	560		28	
Y	84	15	-	-	-	-	-	-	-	-	15	-	-	-	1000		15	
	90	18	1	4	-	-	-	-	-	-	23	-	-	-	1533		23	
	96	56	15	9	3	-	-	-	-	-	83	-	-	-	1660		83	
M	84	-	-	112	-	-	-	-	-	-	86	-	26	-	7466	12 21	112	
	90	10	23	26	-	-	-	-	-	-	51	-	7	1	3933	9 17	59	
	96	106	185	48	6	67	5	-	-	-	417	-	-	-	8340	8 20	417	
D	84	1	-	111	-	-	-	-	-	-	62	-	50	-	7466		112	
	90	55	49	57	-	-	-	-	-	-	98	2	31	30	10733		161	
	96	60	54	8	-	48	10	-	-	-	173	-	-	7	3600		180	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	880		44	
Total Plants/Acre (excluding Dead & Seedlings)											'84	15932	Dec:	47%				
											'90	16199		66%				
											'96	13600		26%				
<i>Artemisia tridentata wyomingensis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	19 23	1	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	2	-	-	1	-	-	-	3	-	-	-	60		3	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	0%				
											'90	0		0%				
											'96	80		75%				

A G E	YR	Form Class (No. of 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	84	2	3	-	-	-	-	-	-	-	5	-	-	-	333	12 12	5	
	90	6	-	-	-	-	-	-	-	-	5	-	-	1	400	7 10	6	
	96	10	8	3	1	7	-	-	-	-	29	-	-	-	580	10 14	29	
D	84	1	11	3	-	-	-	-	-	-	11	-	4	-	1000		15	
	90	11	-	2	-	-	-	-	-	-	9	-	-	4	866		13	
	96	-	-	-	-	1	-	-	-	-	1	-	-	-	20		1	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	1399	Dec:	71%			
												'90	1399		62%			
												'96	740		3%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	25	-	-	-	-	-	-	-	-	25	-	-	-	500		25	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	5	5	-	-	-	-	-	-	-	10	-	-	-	666		10	
	96	3	-	-	1	-	-	-	-	-	4	-	-	-	80		4	
M	84	9	12	3	-	-	-	-	-	-	22	-	2	-	1600	6 7	24	
	90	33	5	-	1	-	-	-	-	-	39	-	-	-	2600	7 11	39	
	96	208	5	-	11	1	-	-	-	-	225	-	-	-	4500	9 15	225	
D	84	5	16	2	-	-	-	-	-	-	18	-	5	-	1533		23	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	3199	Dec:	48%			
												'90	3399		4%			
												'96	4620		1%			
<i>Ephedra nevadensis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	-	-	2	-	-	-	-	-	-	2	-	-	-	40	9 13	2	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	1	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	60		33%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Grayia spinosa</i>																		
M	84	-	-	1	-	-	-	-	-	-	-	-	1	-	66	16	4	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	2	-	-	-	-	-	-	-	-	-	-	-	40	15	33	2
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	2	-	-	1	-	-	-	-	-	-	3	-	60			3
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	0%			
												'90	0		0%			
												'96	100		60%			
<i>Juniperus osteosperma</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	-	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
<i>Kochia americana</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	-	-	-	-	40	2	4	2
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	40		-			
<i>Opuntia fragilis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	-	-	-	-	66			1
	96	2	-	-	-	-	-	-	-	-	-	-	-	-	40			2
M	84	1	-	-	-	-	-	-	-	-	-	-	-	-	66	4	4	1
	90	1	-	-	-	-	-	-	-	-	-	-	-	-	66	3	4	1
	96	4	-	-	-	-	-	-	-	-	-	-	-	-	80	4	8	4
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	-	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	0%			
												'90	132		0%			
												'96	140		14%			

TREND STUDY 1-11-96

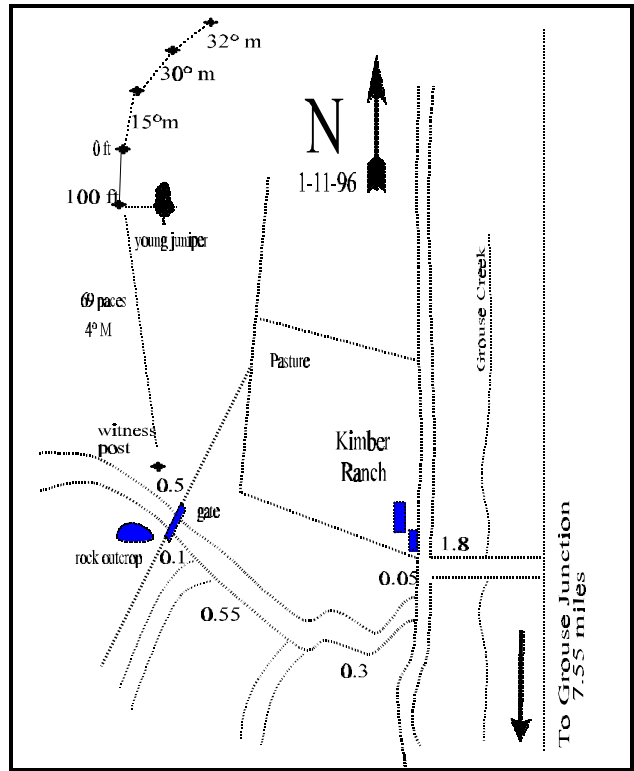
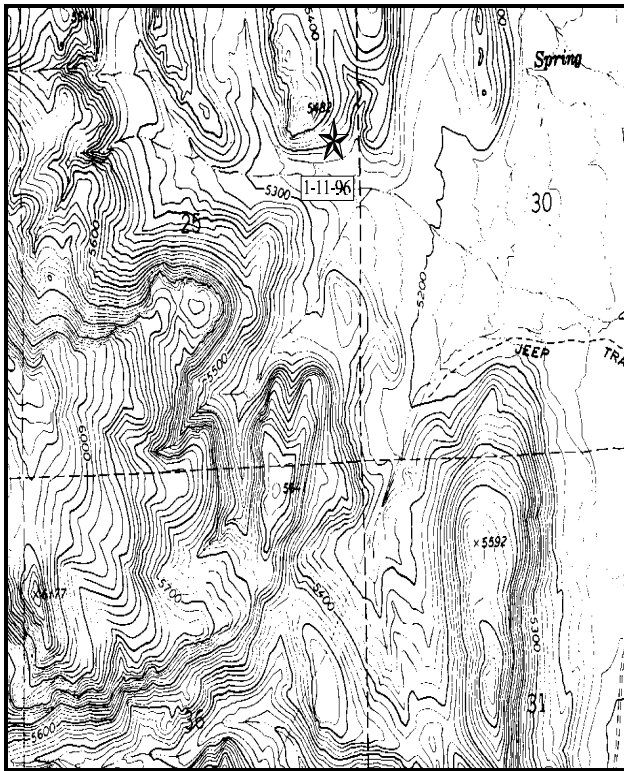
Study site name: Kimber Ranch. Range type: Black sagebrush.

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Proceed on U-30 to Grouse Creek junction, turn right and travel north 9.1 miles. Turn left at the ranch complex and proceed 1.8 miles to the Kimber Ranch. At ranch house stay left for 0.05 miles. Stay left for another 0.3 miles, then turn right going west for 0.55 miles. Turn right for 0.1 miles to a gate. Continue up the road 0.5 miles to a witness post on the right side of the road. From the witness post walk 69 paces at 4 degrees magnetic to the 100' post. The 0' is 100' to the north. The 0-foot stake is marked by browse-tag #7912.



Map Name: Toms Cabin Spring

Diagrammatic Sketch

Township 10N Range 19W, Section 25, UTM: 2-52-682E 46-05-215N

DISCUSSION

Trend Study No. 1-11

This study samples a similar range type as study #10. Location, however, is a few miles north on a gentle (20%) south slope just west of the Kimber Ranch with an elevation of approximately 5,300 feet. Winter use from deer on this black sagebrush type was very heavy in 1984. Additional use comes from cattle and horses.

Soil, which is derived from alluvially deposited basalt, is very well drained and has considerable surface rockiness. Protective ground cover (vegetation and litter cover) is poor and comprised primarily of dead cheatgrass litter and shrub crowns with large amounts of rock and erosion pavement. Apart from cheatgrass, herbaceous cover is insufficient at barely 5%.

Browse composition is dominated by a low-growing, evenly spaced stand of black sagebrush. The population was heavily hedged in 1984. Seedlings were not encountered and young are not as abundant as on site #10. The dense stand of cheatgrass seems to be offering significant competition to seedling establishment in association with the extended drought. During the 1990 reading, density remained similar and use was light to moderate. Similar to site #10, percent decadency increased from 34% to 68%. The larger sample that was better distributed was used in 1996 and estimated a population density of 7,980 plants/acre. Utilization was moderate and vigor good on most plants. Percent decadency declined to only 16%. Seedling and young plants appear to be found in sufficient numbers to maintain the population.

Other associated shrubs include Wyoming big sagebrush and shadscale. The Wyoming big sagebrush numbered 1,532 plants/acre and were heavily hedged in 1984. The population declined to only 399 plants/acre by 1990 and were not encountered in 1996. This was a marginal site for Wyoming big sagebrush and with extended drought conditions and shallow rocky soils, it was unable to survive the duration of the drought.

Herbaceous composition consists chiefly of grasses, especially cheatgrass which makes up 64% of the grass cover. The most important perennials include bluebunch wheatgrass, Thurber needlegrass, bottlebrush squirreltail, Indian ricegrass, and Sandberg bluegrass. Perennial grass density is greater here than at Kilgore Basin, but grasses are still not an important forage component. Forbs are rare and include a number of annuals. The most conspicuous perennial forbs include desert Indian paintbrush and longleaf phlox.

1984 TREND ASSESSMENT

Excessive, almost year-round use by deer, cattle, and horses have severely impacted this site, along with winter injury through the bad winters of 1983 and 1984. The apparent result is increased soil movement, increased abundance of cheatgrass and other annual plants and an apparent decline in the key browse species. Vigor of most plants is predominantly poor. Overall trend appears to be declining.

1990 TREND ASSESSMENT

Quadrat frequency, sum of nested frequency, and density of black sagebrush appear to all be declining. The only significant change since 1984 is an increase in the percentage of decadent black sage from 34% to 69% of the population. The sagebrush showed light to moderate hedging and appeared to have normal vigor, but low production. This low production would be expected with the extended drought. The high density of cheatgrass also inhibits sagebrush reproduction. Black

sagebrush canopy cover averages 21%. The grasses have been heavily grazed yet sum of nested frequency has increased. Cheatgrass is still fairly dense (recall there are no quantitative measures for annuals before 1992). The forb component is depleted and decreasing. Also typical of this range site type, the soil surface is dominated by erosion pavement.

TREND ASSESSMENT

soil - stable, but in poor condition with rock-pavement cover at 56%

browse - stable to slightly declining with 68% decadence for black sagebrush

herbaceous understory - down

1996 TREND ASSESSMENT

Protective ground cover conditions are still poor with relatively low values for vegetative cover and a decrease in litter cover. Percent bare ground increased from 3% to 7% while pavement and litter cover declined. Probably the result of some overland flows covering some of the rock and pavement. Sum of nested frequency for grasses also declined. Trend for soil is considered slightly down. Browse trend is up due to increased density, improved vigor and reduced decadence (68% to 16%). Trend for the herbaceous understory is Slightly down. Sum of nested frequency of perennial grasses declined slightly while that of forbs increased, but the forbs only make up 7% of the herbaceous cover. Sum of nested frequency for bluebunch wheatgrass and Indian ricegrass increased while frequency of squirreltail and Thurber needlegrass declined. Overall, perennial grass trend is slightly down and it contributes 93% of the herbaceous cover.

TREND ASSESSMENT

soil - slightly down

browse - up

herbaceous understory - slightly down

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 11

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	a-	b9	c62	-	5	27	.73
G	Bromus tectorum (a)	-	-	321	-	-	99	3.11
G	Oryzopsis hymenoides	a4	ab21	b25	3	10	16	.34
G	Poa secunda	6	8	-	2	3	-	.00
G	Sitanion hystrix	a79	ab58	b43	40	29	20	.41
G	Stipa thurberiana	a99	a106	b28	47	47	12	.21
G	Vulpia octoflora (a)	-	-	22	-	-	9	.04
Total for Grasses		188	202	501	92	94	183	4.86
F	Astragalus beckwithii	1	-	4	1	-	2	.01
F	Astragalus utahensis	ab11	a3	b23	6	2	13	.14
F	Castilleja chromosa	a28	b-	b6	13	-	3	.02
F	Chaenactis douglasii	1	-	-	1	-	-	-
F	Cryptantha spp.	-	-	3	-	-	2	.01
F	Descurainia spp. (a)	-	-	3	-	-	1	.00
F	Erigeron aphanactis	4	-	-	2	-	-	-

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	Eriogonum caespitosum	5	2	3	2	2	1	.00
F	Gilia spp. (a)	-	-	2	-	-	1	.00
F	Hymenopappus spp.	-	-	8	-	-	3	.06
F	Lygodesmia spp.	-	-	3	-	-	2	.03
F	Navarretia intertexta (a)	-	-	2	-	-	2	.01
F	Orobanche fasciculata	-	1	6	-	1	2	.01
F	Phlox longifolia	13	9	6	9	4	4	.02
F	Streptanthus cordatus	-	1	-	-	1	-	-
F	Unknown forb-perennial	-	1	-	-	1	-	-
Total for Forbs		63	17	69	34	11	36	0.34

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

BROWSE TRENDS --

Herd unit 01 , Study no: 11

T y p e	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia nova	98	14.88
B	Atriplex confertifolia	15	1.27
B	Chrysothamnus viscidiflorus stenophyllus	16	.42
B	Gutierrezia sarothrae	8	.00
B	Juniperus osteosperma	2	1.62
B	Kochia americana	9	.07
B	Opuntia fragilis	0	.00
Total for Browse		148	18.29

BASIC COVER --

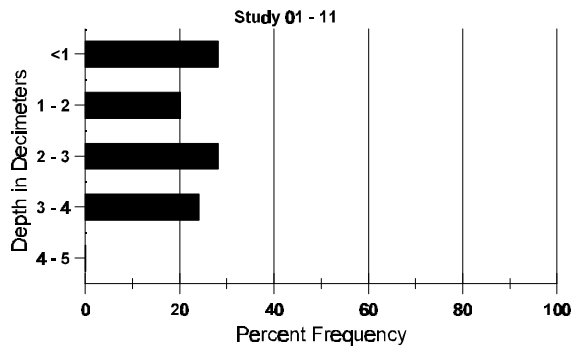
Herd unit 01 , Study no: 11

Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	335	1.75	9.00	25.21
Rock	315	19.50	26.50	17.69
Pavement	352	40.50	43.50	37.90
Litter	366	35.75	17.75	12.99
Cryptogams	14	0	0	.08
Bare Ground	187	2.50	3.25	6.77

SOIL ANALYSIS DATA --
 Herd Unit 01, Study no: 11

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.9	73.0 (10.5)	7.8	42.9	29.1	28.0	1.9	7.0	134.4	.5

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 01 , Study no: 11

Type	Quadrat Frequency '96
Rabbit	6
Horse	1
Deer	17

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 11

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia nova</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340		17	
Y	84	2	3	8	-	-	-	-	-	-	13	-	-	-	866		13	
	90	5	1	-	-	-	-	-	-	-	6	-	-	-	400		6	
	96	40	4	-	1	-	-	-	-	-	45	-	-	-	900		45	
M	84	1	3	39	-	-	-	-	-	-	35	-	5	3	2866	7	17	43
	90	12	6	-	-	-	-	-	-	-	16	1	1	-	1200	9	15	18
	96	107	169	8	-	4	-	-	-	-	288	-	-	-	5760	12	24	288
D	84	-	1	28	-	-	-	-	-	-	24	-	5	-	1933		29	
	90	43	9	-	1	-	-	-	-	-	31	1	2	19	3533		53	
	96	19	47	-	-	-	-	-	-	-	56	-	-	10	1320		66	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	620		31	
Total Plants/Acre (excluding Dead & Seedlings)												'84	5665	Dec:	34%			
												'90	5133		69%			
												'96	7980		17%			
<i>Artemisia tridentata wyomingensis</i>																		
Y	84	5	1	6	-	-	-	-	-	-	12	-	-	-	800		12	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	1	3	3	-	-	-	-	-	-	7	-	-	-	466	17	21	7
	90	1	-	-	1	-	-	-	-	-	1	-	1	-	133	11	14	2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	1	3	-	-	-	-	-	-	2	-	2	-	266		4	
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	1532	Dec:	17%			
												'90	399		50%			
												'96	0		0%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Atriplex confertifolia</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	24	-	-	-	1	-	-	-	-	25	-	-	-	500		25	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	13	3	-	-	3	-	-	-	-	19	-	-	-	380	9	17	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	880		-			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	12	4	-	-	-	-	-	-	-	16	-	-	-	1066	11	15	
	90	12	-	-	-	-	-	-	-	-	12	-	-	-	800	11	16	
	96	20	-	-	1	-	-	-	-	-	21	-	-	-	420	11	20	
D	84	1	4	-	-	-	-	-	-	-	4	-	1	-	333		5	
	90	3	-	-	-	-	-	-	-	-	-	-	-	3	200		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	1465	Dec:	23%			
												'90	1000		20%			
												'96	420		0%			
<i>Gutierrezia sarothrae</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340	7	9	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	360		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Juniperus osteosperma</i>																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	66	65	55	1	
	96	2	-	-	-	-	-	-	-	-	2	-	-	40	-	-	2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	66		-			
												'96	40		-			
<i>Kochia americana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	-	-	1	-	-	-	-	-	1	-	-	20		1		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	7	-	-	-	-	-	-	-	-	7	-	-	140		7		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0		
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0		
	96	15	-	-	-	-	-	-	-	-	15	-	-	300	4	6	15	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	1	-	-	-	-	-	-	-	1	-	-	20		1		
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	460		4%			
<i>Opuntia fragilis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	1	-	-	-	-	-	-	-	-	-	1	-	66		1		
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	66		-			
												'96	0		-			

TREND STUDY 1-12-96

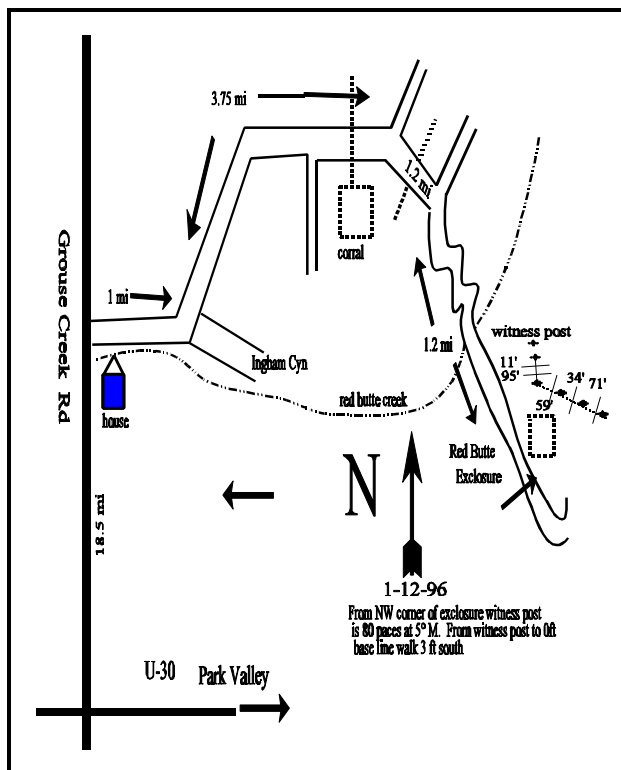
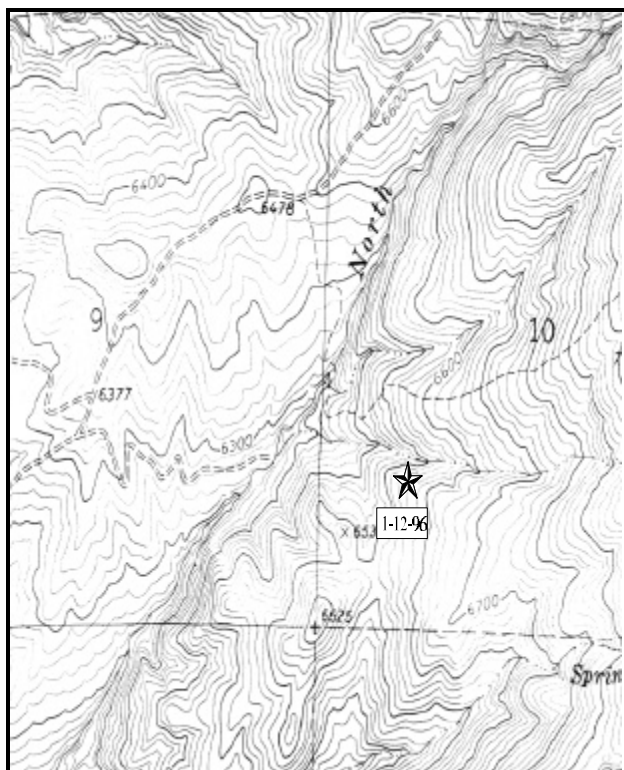
Study site name: Red Butte Enclosure. Range type: Big sagebrush.

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft).

LOCATION DESCRIPTION

A four-wheel drive vehicle is needed to access this study. Proceed ~18.5 miles north from Grouse Creek Junction and turn right onto Ingham Canyon Road. Travel 1.0 miles to the first significant fork and turn left. Proceed 3.0 miles to a fence with a corral on the east side. Continue east and north for 0.75 miles to a fork and turn right. Proceed 0.60 miles to a fence, go through the fence and proceed down the hill to the creek. From the creek, proceed up the dugway for 0.55 miles to the southwest corner of the Red Butte enclosure. From the northwest corner of the enclosure, walk 84 paces at 21 degrees true to the 0-foot stake of the baseline. Stake is marked by browse-tag #7915. Bearing of the baseline is 180 degrees true.



Map Name: Ingham Canyon

Diagrammatic Sketch

Township 11N, Range 17W, Section 10, UTM: 2-68-169E 46-18-669N

DISCUSSION

Trend Study No. 1-12

This study is located on the west slope of the Grouse Creek Mountains near the Red Butte enclosure. Elevation (6,540 ft.) is such that the study site constitutes "preferred" winter range. During most years it is used as a key "staging" area, where deer remain in fall and winter as long as snow conditions permit. As snow depths increase, deer migrate further south to Mud Springs Basin, Bovine, and Devils Playground. Vegetative and topographic characteristics suggest that spring use and fawning are also possibilities. The range type is basin big sagebrush-grass with significant associations with antelope bitterbrush, mountain Snowberry, and Saskatoon serviceberry. The study site is a gentle (15%) south to southwest facing slope. Deer use, as judged from pellet group frequency and browse utilization, appears light. Probably more significant is summer cattle grazing. Cattle were on the area at the time the study was established in 1984 and had already made a noticeable impact, especially on grasses and forbs. This area is within the Ingham allotment which is used from May 1 to September 15 by 802 cattle.

The soil is moderately deep and fertile with a sandy loam texture and a moderate amount of surface rock. Effective rooting depth estimates taken in 1996 average just over 20 inches with an average temperature of 53°F at that depth. Although numerous areas of bare ground are exposed, the thickness and permanence of vegetation and litter cover on the remaining area has prevented serious soil loss.

Shrubs are abundant and account for 52% of the vegetation cover on this site. The key browse species is basin big sagebrush. Even though shrubs such as narrowleaf low rabbitbrush and mountain Snowberry are more numerous, the combination of big sagebrush's relative palatability, larger size, and abundance are more vital to management. Of interest is an apparent mixture of sagebrush subspecies or ecotypes. Although the bulk of big sagebrush plants appear to be subspecies *tridentata*, there is a substantial portion (10%-20%) which more closely resembles the *vaseyana* subspecies. Utilization of sagebrush is generally light with no obvious differences between subspecies, nor are there any apparent differences in age structure or vigor. The overall big sagebrush population has declined in density, but it is less decadent and displays better vigor in 1996.

Populations of mountain snowberry and stickyleaf low rabbitbrush appear to have stable populations with densities of 3,640 and 3,820 plants/acre respectively. Preferred shrubs such as bitterbrush and serviceberry occur only occasionally and like almost all other shrubs, suffered some vole and pocket gopher damage in 1983-84. In spite of damage, bitterbrush currently displays light to moderate use, improved vigor, and reduced decadency.

Perennial grasses comprise an important part of the understory. Unfortunately, annual cheatgrass is the most abundant grass on the site. It accounts for 74% of the total grass cover. The most abundant perennial species is thickspike wheatgrass, an open sod former that tends to increase with heavy livestock use. Sandberg bluegrass is also fairly abundant. Other grass species occur much less frequently but almost all showed evidence of use in 1984. Perhaps most notable is Great Basin wildrye, a robust bunchgrass, which although not encountered on the study plots, is obviously the most preferred grass species in midsummer.

The study site has a good mixture of forbs that includes a few conspicuous and desirable species in addition to larger numbers of less desirable ones. Showy forbs include arrowleaf balsamroot, narrowleaf Lomatium, tapertip hawksbeard, and Penstemon.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable. Although there is some surface disturbance and exposed bare ground, the erosion rate is limited by a generally good vegetative and litter cover. Vegetative trend is more difficult to access. It appears that several undesirable increaser shrub, grass, and forb species are expanding. Although basin big sagebrush seems relatively stable, it is difficult to see how it can persist if species such as snowberry, low rabbitbrush, and western wheatgrass continue to increase in density.

1990 TREND ASSESSMENT

narrowleaf low rabbitbrush is the most frequent shrub on this moderately high site. The big sagebrush population is essentially stable. The sagebrush shows light to moderate hedging but an unsatisfactory 52% decadency rate. However, this is lower than in 1984 when decadency was estimated at 60%. Sagebrush canopy cover is 12%. Bitterbrush has shown little changed except that percent decadency has declined from 50% to 24%. Bitterbrush cover is estimated at 3%. The bitterbrush is more heavily hedged but still maintains good vigor. Low rabbitbrush has not increased. There is a fair diversity of grasses and forbs. On this higher site, five of the seven grasses have increased with thickspike wheatgrass greatly increasing to 95% quadrat frequency. This increase would be expected on a high elevation site. Sum of nested frequency for forbs has increased slightly. Sum of nested frequency for arrowleaf balsamroot has remained constant while the most numerous forb, long leaf phlox, has increased significantly. The soil condition appears stable, even with the 30% bare soil which hasn't really changed much since 1984.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable with increasing grass densities

1996 TREND ASSESSMENT

The soil trend has improved due to a major decline in percent bare ground and an increase in litter cover (54% to 60%). Trend for the key browse species, basin big sagebrush, is up slightly. The density has declined due to a loss of some of the decadent plants. Density of young and mature plants are similar to 1990 estimates. Utilization is mostly light and percent decadency has declined from 52% to 23%. Antelope bitterbrush and snowberry appear to have stable trends compared to 1984 numbers. The increaser, narrowleaf low rabbitbrush, shows a stable trend with the only major change being a reduced decadency rate (27% to 0%). Trend for the herbaceous understory is down due to a decline in the sum of nested frequency of perennial grasses and forbs. Thickspike wheatgrass declined significantly in sum of nested frequency. False dandelion increased significantly in nested frequency while frequency of arrowleaf balsamroot and long leaf phlox declined significantly. The majority of the decline in sum of nested frequency is due to significant declines in less desirable forbs including tapertip hawksbeard, larkspur, and longleaf phlox.

TREND ASSESSMENT

soil - up

browse - up slightly for basin big sagebrush and stable for bitterbrush and snowberry

herbaceous understory - down

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 12

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	<i>Agropyron dasystachyum</i>	ab237	a267	b185	89	95	67	2.44
G	<i>Agropyron spicatum</i>	a-	a-	b21	-	-	8	.56
G	<i>Bromus tectorum</i> (a)	-	-	320	-	-	86	15.28
G	<i>Koeleria cristata</i>	2	-	5	1	-	2	.18
G	<i>Oryzopsis hymenoides</i>	-	-	8	-	-	3	.04
G	<i>Poa compressa</i>	a7	b-	b-	4	-	-	-
G	<i>Poa fendleriana</i>	a-	b102	a-	-	44	-	-
G	<i>Poa secunda</i>	a47	a47	b91	23	23	38	2.19
G	<i>Sitanion hystrix</i>	a-	ab1	b13	-	1	4	.04
G	<i>Stipa comata</i>	-	1	-	-	1	-	-
Total for Grasses		293	418	643	117	164	208	20.75
F	<i>Agoseris glauca</i>	66	43	57	34	19	24	.15
F	<i>Allium acuminatum</i>	a94	b36	b21	50	17	12	.06
F	<i>Antennaria</i> spp.	-	8	3	-	3	1	.15
F	<i>Arabis</i> spp.	a-	ab1	b10	-	1	5	.02
F	<i>Astragalus beckwithii</i>	a13	b-	ab5	5	-	2	.03
F	<i>Astragalus cibarius</i>	16	26	25	7	13	11	.18
F	<i>Astragalus convallarius</i>	-	2	-	-	1	-	-
F	<i>Balsamorhiza sagittata</i>	60	60	56	27	32	26	5.59
F	<i>Camelina microcarpa</i> (a)	-	-	1	-	-	1	.00
F	<i>Collomia linearis</i> (a)	-	-	15	-	-	9	.04
F	<i>Comandra pallida</i>	2	7	1	2	3	1	.00
F	<i>Collinsia parviflora</i> (a)	-	-	217	-	-	78	1.45
F	<i>Crepis acuminata</i>	a56	a70	b9	31	34	4	.02
F	<i>Cryptantha</i> spp.	a-	a-	b27	-	-	11	.08
F	<i>Delphinium nelsonii</i>	a22	a18	b-	15	10	-	-
F	<i>Eriogonum umbellatum</i>	-	6	6	-	3	3	.18
F	<i>Gayophytum ramosissimum</i>	-	-	1	-	-	1	.00
F	<i>Haplopappus acaulis</i>	-	-	7	-	-	2	.03
F	<i>Hackelia patens</i>	11	13	16	6	7	7	.14
F	<i>Holosteum umbellatum</i> (a)	-	-	3	-	-	1	.00
F	<i>Lomatium</i> spp.	4	-	3	2	-	3	.01
F	<i>Lomatium triternatum</i>	a17	a24	b-	9	11	-	-
F	<i>Machaeranthera</i> spp	-	-	4	-	-	2	.01
F	<i>Phlox longifolia</i>	a154	b217	c81	68	80	34	.56
F	<i>Polygonum douglasii</i> (a)	-	-	46	-	-	20	.10
F	<i>Ranunculus testiculatus</i> (a)	-	-	2	-	-	1	.00

T Y P e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	Sedum lanceolatum	-	-	6	-	-	2	.01
F	Tragopogon dubius	-	-	-	-	-	-	.00
F	Unknown forb-perennial	_{ab} 4	_a -	_b 13	3	-	5	.07
F	Veronica persica	-	-	3	-	-	1	.00
F	Viguiera spp.	_a -	_a -	_b 8	-	-	4	.04
Total for Forbs		519	531	646	259	234	271	9.02

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

BROWSE TRENDS --

Herd unit 01 , Study no: 12

T Y P e	Species	Strip Frequency '96	Average Cover % '96
B	Amelanchier utahensis	3	.30
B	Artemisia tridentata tridentata	48	9.52
B	Chrysothamnus nauseosus consimilis	2	.15
B	Chrysothamnus viscidiflorus stenophyllus	76	6.46
B	Eriogonum microthecum	2	.15
B	Opuntia basilaris basilaris	49	3.35
B	Purshia tridentata	31	6.71
B	Symphoricarpos oreophilus	53	6.17
Total for Browse		264	32.82

BASIC COVER --

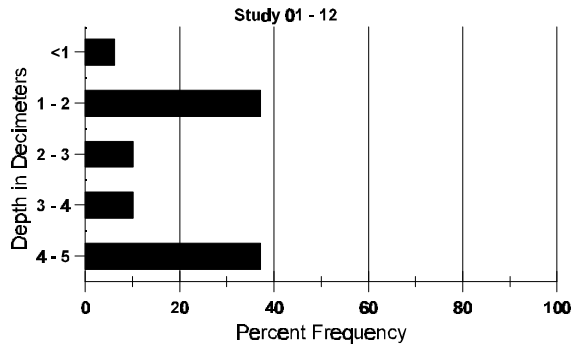
Herd unit 01 , Study no: 12

Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	376	3.00	11.50	56.69
Rock	113	1.75	1.00	4.32
Pavement	205	3.00	2.50	4.30
Litter	389	59.25	54.25	59.50
Cryptogams	19	2.50	.75	.34
Bare Ground	159	30.50	30.00	6.39

SOIL ANALYSIS DATA --
Herd Unit 01, Study no: 12

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
20.3	52.6 (17.1)	6.8	68.6	15.4	16.0	2.6	20.7	201.6	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 01 , Study no: 12

Type	Quadrat Frequency '96
Deer	6
Cattle	4

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 12

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Amelanchier utahensis																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	1	-	-	-	1	-	-	-	20	24	26	1
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	1	-	-	1	-	-	2	-	-	-	40			2
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	266		0%			
												'96	60		67%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata tridentata</i>																		
S	84	10	-	-	-	-	-	-	-	-	10	-	-	-	666		10	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	84	4	-	-	-	-	-	-	-	4	-	-	-	266		4		
	90	4	-	-	-	-	-	-	-	3	-	1	-	266		4		
	96	9	-	-	2	-	-	-	-	11	-	-	-	220		11		
M	84	6	4	-	-	-	-	-	-	7	-	3	-	666	33	33	10	
	90	13	1	-	-	-	-	-	-	14	-	-	-	933	24	30	14	
	96	34	6	-	4	-	-	-	-	43	1	-	-	880	28	35	44	
D	84	8	11	1	-	-	1	-	-	16	-	5	-	1400		21		
	90	15	4	1	-	-	-	-	-	19	1	-	-	1333		20		
	96	12	5	-	-	-	-	-	-	11	-	-	6	340		17		
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	-	-	-	-	-	-	-	-	-	-	-	520		26		
Total Plants/Acre (excluding Dead & Seedlings)												'84	2332	Dec:	60%			
												'90	2532		53%			
												'96	1440		24%			
<i>Chrysothamnus nauseosus consimilis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	2	-	-	3	-	-	-	-	5	-	-	-	100	21	20	5	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	100		-			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	84	2	-	-	-	-	-	-	-	2	-	-	-	133		2		
	90	4	-	-	-	-	-	-	-	4	-	-	-	266		4		
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Y	84	16	1	-	-	-	-	-	-	17	-	-	-	1133		17		
	90	21	3	1	-	-	-	-	-	25	-	-	-	1666		25		
	96	14	-	-	3	-	-	-	-	17	-	-	-	340		17		
M	84	22	2	-	-	-	-	-	-	23	1	-	-	1600	11	10	24	
	90	16	1	1	-	-	-	-	-	16	-	2	-	1200	15	17	18	
	96	158	3	-	4	-	-	-	-	165	-	-	-	3300	17	27	165	
D	84	11	9	-	-	-	-	-	-	19	-	1	-	1333		20		
	90	11	3	2	-	-	-	-	-	15	-	1	-	1066		16		
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Total Plants/Acre (excluding Dead & Seedlings)												'84	4066	Dec:	33%			
												'90	3932		27%			
												'96	3640		0%			
<i>Eriogonum microthecum</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	2	1	-	-	-	-	-	-	3	-	-	-	60	10	11	3	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	60		-			

A G E	YR	Form Class (No. of 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>Opuntia basilaris basilaris</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	1	-	-	-	-	-	-	-	4	-	-	-	266		4	
	96	1	-	-	4	-	-	-	-	-	5	-	-	-	100		5	
M	84	24	-	-	-	-	-	-	-	-	24	-	-	-	1600	4	3	24
	90	5	-	-	-	-	-	-	-	-	4	-	1	-	333	4	10	5
	96	74	-	-	9	-	-	-	-	-	81	-	2	-	1660	5	16	83
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	-	-	-	-	-	-	-	-	-	-	3	-	200		3	
	96	3	-	-	-	-	-	-	-	-	-	-	-	3	60		3	
Total Plants/Acre (excluding Dead & Seedlings)												'84	1600	Dec:	0%			
												'90	799		25%			
												'96	1820		3%			
<i>Purshia tridentata</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	-	1	1	-	-	-	-	-	-	2	-	-	-	133	11	13	2
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200	13	17	3
	96	17	14	1	2	-	-	-	-	-	34	-	-	-	680	24	47	34
D	84	-	-	2	-	-	-	-	-	-	1	-	1	-	133		2	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	2	-	-	-	-	-	-	-	-	1	-	-	1	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
Total Plants/Acre (excluding Dead & Seedlings)												'84	266	Dec:	50%			
												'90	266		25%			
												'96	780		5%			
<i>Symphoricarpos oreophilus</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	96	5	-	-	2	-	-	-	-	-	7	-	-	-	140		7	
Y	84	57	-	-	-	-	-	-	-	-	57	-	-	-	3800		57	
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	71	-	-	4	-	-	1	-	-	76	-	-	-	1520		76	
M	84	10	-	-	-	-	-	-	-	-	10	-	-	-	666	17	46	10
	90	6	1	-	-	-	-	-	-	-	7	-	-	-	466	10	15	7
	96	92	3	-	15	-	-	2	-	-	112	-	-	-	2240	17	38	112
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	2	-	-	-	-	-	-	2	-	-	1	60		3	
Total Plants/Acre (excluding Dead & Seedlings)												'84	4466	Dec:	0%			
												'90	532		0%			
												'96	3820		2%			

TREND STUDY 1-13-96

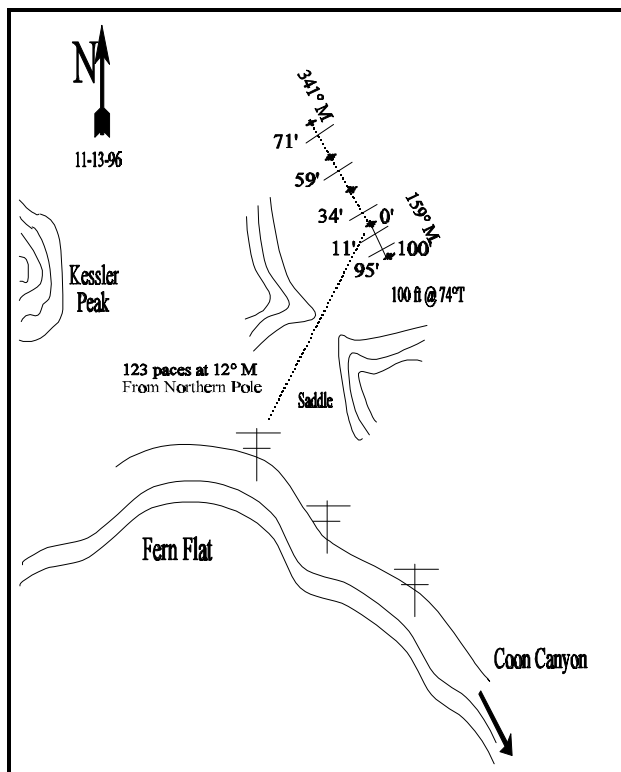
Study site name: Raft River Narrows . Range type: Sagebrush/grass .

Compass bearing: frequency baseline 159 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Lynn, proceed to the bridge over the Raft River just before the Upper Narrows. Proceed east 0.95 miles from the bridge to a set of double power poles. From the northernmost pole, walk 123 paces at 12 degrees magnetic, to the 0-foot stake of the frequency baseline, marked with browse tag #7917. The bearing of the baseline is 159 degrees magnetic. The rest of the baseline runs 341 degrees magnetic from the 0 foot baseline stake.



Map Name: Yost, Utah

Diagrammatic Sketch

Township 14N , Range 16W , Section 9 , ATM: 2-76-686E 46 48 115N

DISCUSSION

Trend Study No. 1-13

This study samples one of the more unique sites on the herd unit. Located on the north side of the Raft River Narrows, the site is critical deer winter range subject to perhaps the most intense browsing use seen on the unit in 1984. It is within the big sagebrush-grass range type and is located on a moderately steep (30% to 35%) southwest facing slope at 5,800 feet elevation. The area is in the Junction Creek allotment which is grazed by 589 cattle in the spring and fall. Cattle were seen grazing along the river bottom but no sign of livestock grazing was noted on the steeper slopes where the transect is located.

Soils are rocky on the surface and in the profile. Texture is a sandy clay loam. The parent material appears to be metamorphic rock, perhaps a granite schist. Soil depth (effective rooting depth, see methods) is moderately shallow (8.6 in.), but the underlying parent material must contain numerous fractures to allow deeper rooted (12-14 inches) Wyoming big sagebrush to establish. Erosion, although ongoing, is not excessive. A uniform litter cover composed primarily of dead cheatgrass seems effective in enhancing penetration of water into the soil and thus reducing runoff.

Browse composition is dominated by Wyoming big sagebrush, contributing 63% of the browse cover. Basin big sagebrush dominates the flatter areas down slope where the soil is significantly deeper. Greasewood is also found in greater numbers there, but some plants have encroached up slope. The sagebrush were very heavily hedged in 1984 with 92% of the population showing heavy use. Many of these shrubs displayed a club-like growth form due to persistent heavy use. During the 1990 reading, density and percent decadence remained similar, yet use was only light to moderate. Persistent drought did not allow them to recover in a more timely manner. In 1996, the original baseline was lengthened from 100 ft to 400 ft. This increased sample estimated a much larger density for Wyoming big sagebrush. Currently there are an estimated 8,260 mature and decadent plants/acre. Seedlings and especially young are very numerous with estimated densities of 1,092 and 13,080 plants/acre respectively. Use is mostly moderate on mature plants.

Narrowleaf low rabbitbrush is also very numerous, however it is much smaller in stature and producing half as much cover as Wyoming big sagebrush. Although moderately browsed in 1984, it appeared to be not utilized in 1990 and 1996. Other shrubs occasionally seen include shadscale, broom snakeweed, threadleaf rubber rabbitbrush, and greasewood. With respect to trend, it will be important to monitor age and form class structure of the dominant sagebrush and low rabbitbrush. The current situation indicates a high level of decadence (i.e., 46%-51%) for both groups making them not as competitive with the younger plants.

Herbaceous understory is depleted to the point where cheatgrass comprises the most significant component, 63% of the grass cover. Perennial grasses are sparse and consist of isolated clumps of bluebunch wheatgrass, bottlebrush squirreltail, and Sandberg bluegrass. Perennial forbs are even more rare.

1984 APPARENT TREND ASSESSMENT

The remaining soil on this site is protected by four factors. These include sagebrush crowns, cheatgrass litter, rock and erosion pavement. Although these would not normally be adequate to prevent widespread runoff and erosion, there is little evidence that such has occurred. Apparent trend is therefore stable, but could easily decline. Vegetative trend is down. The intensity of deer use has had a significant effect, especially on big sagebrush. The existing stand appears to be gradually thinning and being replaced by less desirable browse

plants.

1990 TREND ASSESSMENT

The frequency, density and age class structure of the key species of the Wyoming big sagebrush, appears stable. Utilization is light to moderate and percent decadency has declined slightly. Narrowleaf low rabbitbrush decreased in frequency and density. Although the data shows slight increases in the sum of nested and quadrat frequencies for grasses and forbs, the understory remains in a depleted and poor condition with very high densities of cheatgrass. Trend for soil is up slightly due to a reduction in bare ground and an increase in basal vegetative cover. The soil is easily disturbed on the 25% slope and erosion potential is moderately high. However, protective ground cover is sufficient to control erosion.

TREND ASSESSMENT

soil - up slightly

browse - stable

herbaceous understory - slightly upward but still poor

1996 TREND ASSESSMENT

Ground cover conditions appear stable. Since 1990, percent bare ground increased due a reduction in cover of pavement. Ground cover numbers from 1996 are very similar to 1984 data. Data from 1990, show increased pavement and less bare ground. Some of the changes could be expected because of modifications in methodology. Trend for the Wyoming big sagebrush is up. Density increased while heavy use and decadency declined. Seedlings and young are abundant indicating a dynamic reproductive potential. Some of the change in density may be partially due to the lengthening of the baseline which increased the area sampled. Density of mature plants increased from 1,133 plants/acre to 7,620. Vigor is good on most plants. Trend for the undesirable narrowleaf low rabbitbrush appears stable. Trend for the herbaceous understory appears up. Sum of nested frequency for grasses and forbs increased since 1990. Nested frequency of bluebunch wheatgrass declined significantly while frequency of all other perennial grasses increased. Annual cheatgrass is still dominant. Forbs are nearly absent but frequency has increased.

TREND ASSESSMENT

soil - stable

browse - up

herbaceous understory - up but in poor condition providing only about 7% total cover

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 13

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	8	10	12	3	8	5	.31
G	Bromus tectorum (a)	-	-	287	-	-	92	3.48
G	Oryzopsis hymenoides	5	8	11	2	5	5	.07
G	Poa secunda	_a 3	_b 35	_b 44	2	18	18	.68
G	Sitanion hystrix	16	13	35	10	8	17	.56
G	Stipa comata	_a -	_a -	_b 16	-	-	7	.31

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	<i>Vulpia octoflora</i> (a)	-	-	11	-	-	5	.07
Total for Grasses		32	66	416	17	39	149	5.50
F	<i>Arabis</i> spp.	-	3	4	-	1	3	.01
F	<i>Astragalus beckwithii</i>	_a 6	_a 4	_b 19	2	2	10	.22
F	<i>Castilleja chromosa</i>	-	-	5	-	-	2	.06
F	<i>Caulanthus crassicaulis</i>	-	-	2	-	-	1	.03
F	<i>Chaenactis douglasii</i>	_a 1	_a 16	_b 36	1	8	17	.16
F	<i>Collinsia parviflora</i> (a)	-	-	4	-	-	2	.01
F	<i>Cryptantha</i> spp.	-	-	9	-	-	4	.04
F	<i>Descurainia pinnata</i>	-	-	23	-	-	14	.07
F	<i>Eriogonum caespitosum</i>	-	3	5	-	1	3	.04
F	<i>Erigeron ovinus</i>	_a 1	_a -	_b 11	1	-	7	.10
F	<i>Gilia</i> spp. (a)	-	-	7	-	-	4	.02
F	<i>Lappula occidentalis</i> (a)	-	-	15	-	-	7	.03
F	<i>Lactuca serriola</i>	-	-	1	-	-	1	.00
F	<i>Lepidium</i> spp. (a)	-	-	11	-	-	4	.02
F	<i>Machaeranthera</i> spp	-	-	3	-	-	1	.00
F	<i>Oenothera</i> spp.	-	-	5	-	-	2	.03
F	<i>Phlox hoodii</i>	5	5	9	4	3	6	.15
F	<i>Tragopogon dubius</i>	-	-	1	-	-	1	.00
Total for Forbs		13	31	170	8	15	89	1.05

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

BROWSE TRENDS --

Herd unit 01 , Study no: 13

T y p e	Species	Strip Frequency '96	Average Cover % '96
B	<i>Artemisia tridentata</i> <i>wyomingensis</i>	96	14.67
B	<i>Atriplex</i> <i>confertifolia</i>	2	-
B	<i>Chrysothamnus</i> <i>viscidiflorus</i> <i>stenophyllus</i>	91	7.21
B	<i>Leptodactylon pungens</i>	1	-
B	<i>Opuntia fragilis</i>	16	1.12
B	<i>Sarcobatus</i> <i>vermiculatus</i>	2	.15
Total for Browse		208	23.16

BASIC COVER --

Herd unit 01 , Study no: 13

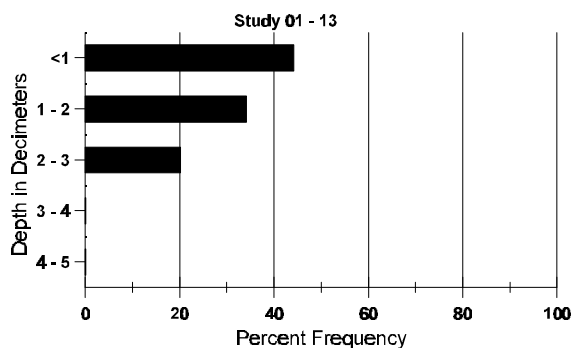
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	330	2.00	5.50	30.90
Rock	317	18.25	24.50	26.53
Pavement	320	10.50	31.00	8.90
Litter	378	56.50	31.75	29.68
Cryptogams	146	.50	2.25	2.19
Bare Ground	250	12.25	5.00	12.53

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 13

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
8.6	59.6 (7.8)	8.2	46.5	23.4	30.0	1.7	3.6	441.6	1.9

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 13

Type	Quadrat Frequency '96
Rabbit	4
Deer	15

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 13

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tripartita tripartita</i>																		
M	84	-	-	5	-	-	-	-	-	-	5	-	-	-	166	13	17	5
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	1	-	-	-	-	-	-	1	-	-	-	33			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Total Plants/Acre (excluding Dead & Seedlings)												'84	199	Dec:	17%			
												'90	0		0%			
												'96	0		0%			
<i>Artemisia tridentata wyomingensis</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	96	694	-	-	16	-	-	-	-	-	710	-	-	-	14200			710
Y	84	-	1	3	-	-	-	-	-	-	4	-	1	-	166			5
	90	5	-	-	-	-	-	-	-	-	4	-	1	-	166			5
	96	654	-	-	-	-	-	-	-	-	654	-	-	-	13080			654
M	84	-	3	30	-	-	-	-	-	-	32	1	-	-	1100	26	42	33
	90	22	7	3	2	-	-	-	-	-	29	-	5	-	1133	27	31	34
	96	75	305	1	-	-	-	-	-	-	379	1	-	1	7620	24	37	381
D	84	-	1	37	-	1	-	-	-	-	34	-	4	2	1333			40
	90	31	4	-	1	-	-	-	-	-	27	-	4	5	1200			36
	96	20	11	-	1	-	-	-	-	-	28	-	-	4	640			32
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	500			25
Total Plants/Acre (excluding Dead & Seedlings)												'84	2599	Dec:	51%			
												'90	2499		48%			
												'96	21340		3%			
<i>Atriplex confertifolia</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33	9	9	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	13	21	1
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Total Plants/Acre (excluding Dead & Seedlings)												'84	33	Dec:	0%			
												'90	33		100%			
												'96	40		0%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Chrysothamnus nauseosus consimilis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	36	40	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	96	29	-	-	3	-	-	-	-	-	32	-	-	-	640			32
Y	84	37	2	-	-	-	-	-	-	-	39	-	-	-	1300			39
	90	12	-	-	3	-	-	-	-	-	15	-	-	-	500			15
	96	63	-	-	8	-	-	-	-	-	71	-	-	-	1420			71
M	84	26	45	6	1	-	-	-	-	-	78	-	-	-	2600	7	9	78
	90	97	-	-	19	-	-	7	-	-	117	-	6	-	4100	8	10	123
	96	180	2	-	13	-	-	-	-	-	195	-	-	-	3900	12	19	195
D	84	26	55	21	1	-	-	-	-	-	98	1	2	2	3433			103
	90	58	-	-	4	-	-	-	-	-	53	-	6	3	2066			62
	96	37	11	-	4	-	-	-	-	-	39	-	-	13	1040			52
Total Plants/Acre (excluding Dead & Seedlings)												'84	7333	Dec:	47%			
												'90	6666		31%			
												'96	6360		16%			
<i>Leptodactylon pungens</i>																		
Y	84	15	-	-	-	-	-	-	-	-	15	-	-	-	500			15
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	3	-	-	-	-	-	-	-	-	3	-	-	-	100	3	2	3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	9	10	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	600	Dec:	-			
												'90	0		-			
												'96	20		-			
<i>Opuntia fragilis</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	1	-	-	1	-	-	-	33			1
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	5	-	-	6	-	-	-	200			6
	96	1	-	-	1	-	-	-	-	-	2	-	-	-	40			2
M	84	5	-	-	-	-	-	-	-	-	5	-	-	-	166	6	7	5
	90	7	-	-	2	-	-	-	-	-	9	-	-	-	300	5	9	9
	96	10	-	-	3	-	-	-	-	-	13	-	-	-	260	4	14	13
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2
Total Plants/Acre (excluding Dead & Seedlings)												'84	166	Dec:	0%			
												'90	500		0%			
												'96	340		12%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Sarcobatus vermiculatus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	1	-	-	-	-	-	-	-	-	-	-	-	33	35	35	1	
	96	2	-	-	-	-	-	-	-	-	-	-	-	40	36	62	2	
D	84	-	1	-	-	-	-	-	-	-	-	-	-	33			1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	33	Dec:	100%			
												'90	33		0%			
												'96	40		0%			

TREND STUDY 1-14-96

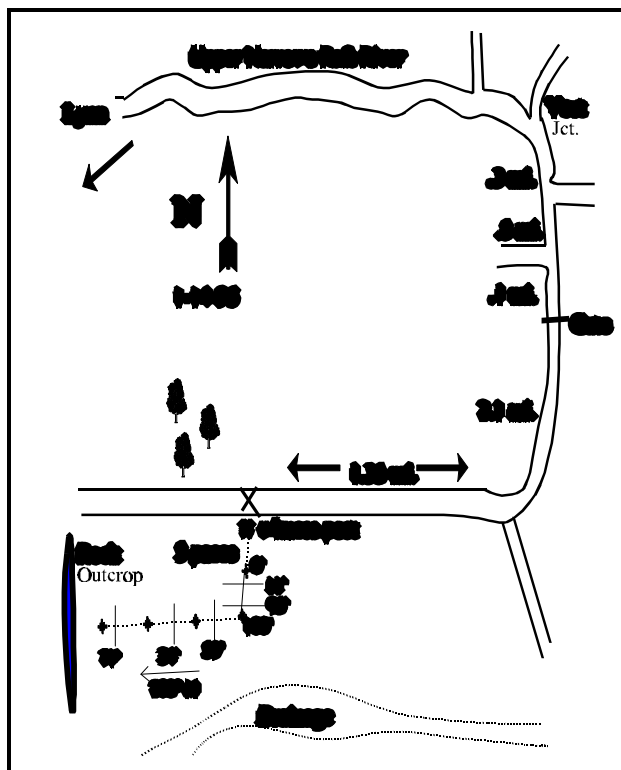
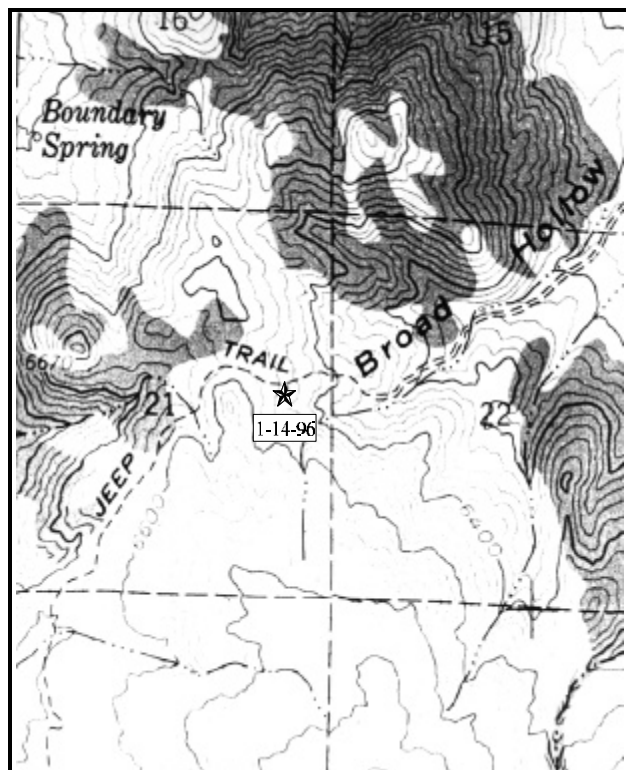
Study site name: Broad Hollow. Range type: Mixed mountain brush.

Compass bearing: frequency baseline 160 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft).

LOCATION DESCRIPTION

From the junction of U-30 and the Morris Ranch Road, proceed 29.2 miles to Yost junction, passing through Lynn and crossing the Raft River. Turn right and proceed past the creek and the cattle guard for 0.30 miles. Turn right and travel 0.45 miles and take the left fork (right fork leads to a bridge). Proceed 0.10 miles and pass through the gate, continue 1.1 miles to the Forest Service fence and sign. Continue 0.9 miles, turn right and proceed 1.35 miles to a witness post on left (road is steep, winding and rough). From the rockpile, walk five paces at a bearing of 152 degrees true, to the 0-foot stake of the baseline marked by browse tag #7916. Bearing of the baseline is 160 degrees magnetic. From the 100 foot baseline stake, the baseline doglegs and runs 208 degrees magnetic.



Map Name: Yost, Utah

Diagrammatic Sketch

Township 14N, Range 16W, Section 21, UTM: 2-77-348E 46-45-185N

DISCUSSION

Trend Study No. 1-14

This study is located on a higher elevation (6,500 feet) normal or preferred winter range in upper Broad Hollow. Slope is 20% and faces southeast. Judging from browse utilization and pellet group frequency, deer use is relatively intense, although depending on weather conditions, sometimes less than at the nearby Raft river Narrows location. The area is currently occupied by mixed mountain brush, however, evidence of a fire before study establishment in 1984, suggests the area once had a dispersed stand of Utah juniper.

Soil is relatively deep (effective rooting depth of almost 16 inches, (see methods), sandy loam-textured, and in places it is quite rocky on the surface. Vegetative, litter cover, and soil organic content are adequate except in some of the larger shrub interspaces where bare soil can be found. Soil erosion does not currently appear to be a serious problem.

As is typical of mountain brush types, browse composition consists of several preferred forage species. The key browse species are antelope bitterbrush, serviceberry, and mountain big sagebrush. Together, these species comprise 46% of the estimated browse cover. Serviceberry occurs in relatively small numbers. The average mature plant measures approximately 3½ to 4 feet in height. Utilization was extremely heavy in 1990, but current use is moderate. Bitterbrush currently have an estimated density of 900 plants/acre, 87% of which are mature. Utilization is moderately heavy with heavy use ranging from 30% in 1990 to 24% in 1996. Decadence is low and vigor is good. Mountain big sagebrush is the most numerous preferred species. It accounts for 28% of the shrub. Density was estimated at 1,465 plants/acre in 1984, increasing to 2,880 by 1996. Sagebrush use was highly variable in 1990, with some plants displaying heavy use while others show little use, indicating hybridization with other less palatable sagebrush species. Overall, use is light to moderate. Decadency was low at 4% in both 1984 and 1996, and 19% in 1990. All plants display normal vigor.

The most numerous browse on the site is the strong increaser, stickyleaf low rabbitbrush. It accounts for 19% of the browse cover. These shrubs show mostly light use. The population has declined in density from 7,066 plants/acre in 1984 to 4,700 by 1996.

The herbaceous understory has a diverse composition and provides substantial ground cover. Unfortunately, annual cheatgrass is the dominate species, accounting for 65% of the grass cover. Perennial grasses combine to produce the other 35% of the grass cover. Among perennial grasses, the most prevalent are thickspike wheatgrass and Sandberg bluegrass. Other grasses include Indian ricegrass, bottlebrush squirreltail, bluebunch wheatgrass, needle and thread, and occasional clumps of Great Basin wildrye. Forbs are also productive and include several desirable species. Important forbs include arrowleaf balsamroot, narrowleaf lomatium, yampa, sulfur eriogonum, and tapertip hawksbeard. Arrowleaf balsamroot is the dominant forb, comprising 55% of the forb cover. Current utilization of grasses and forbs is light.

1984 APPARENT TREND ASSESSMENT

Soil trend is stable or even improving. The rate of erosion is slow and further site stabilization is likely as shrub density and cover continue to improve. Vegetatively, secondary or post-fire succession is still in progress. Vegetative cover and density are increasing and are especially noticeable within the shrub component. Two species, mountain snowberry and stickyleaf low rabbitbrush, may eventually gain a measure of dominance on the site. This would be an unfavorable development if deer winter habitat was the only thing being considered.

1990 TREND ASSESSMENT

Trend for soil is down slightly due to a substantial decrease in litter cover and an increase in percent bare ground from 27% to 31%. This is somewhat counteracted by an increase in basal vegetation cover, an increase in cryptogamic cover and a higher sum of nested frequency for grasses. The key browse species, sagebrush, bitterbrush, and serviceberry show evidence of moderate to heavy hedging. Vigor is good, but the populations of these shrubs appear to be slightly decreasing. Snowberry and low rabbitbrush densities have also declined slightly. Trend for browse is considered slightly down. The herbaceous understory has a high species diversity with 6 species of perennial grasses and 15 species of perennial forbs encountered. All of the grasses except squirreltail have increasing sum of nested and quadrat frequencies. Sum of nested frequency of forbs declined slightly, but they only contribute 26% of the herbaceous cover. Overall trend is up slightly.

TREND ASSESSMENT

soil - stable to slightly declining

browse - slightly down

herbaceous understory - slightly up

1996 TREND ASSESSMENT

The soil trend appears up due to a decline in percent bare ground and an increase in litter cover. The browse trend is also up with increased densities of the key browse species, serviceberry, mountain big sagebrush, and antelope bitterbrush. Utilization is lighter than that observed in 1990 and percent decadency is lower. Trend for the herbaceous understory is slightly down for perennial grasses, but up for forbs. Annual cheatgrass continues to dominate the site and sum of nested frequency of the most common perennial grass declined significantly. Overall, trend is considered stable.

TREND ASSESSMENT

soil - up

browse - up

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 14

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron dasystachyum	152	135	131	53	54	50	1.80
G	Agropyron spicatum	_a 9	_a -	_b 21	3	-	9	.47
G	Bromus tectorum (a)	-	-	363	-	-	98	12.29
G	Elymus cinereus	3	-	1	1	-	1	.03
G	Oryzopsis hymenoides	1	4	15	1	3	6	.54
G	Poa fendleriana	_a 27	_{ab} 20	_b 2	13	8	1	.00
G	Poa secunda	_a 55	_b 174	_b 150	24	69	56	3.32
G	Sitanion hystrix	4	1	9	2	1	4	.02
G	Stipa comata	_a 26	_a 42	_b 10	13	21	6	.28
G	Vulpia octoflora (a)	-	-	3	-	-	1	.00
Total for Grasses		277	376	705	110	156	232	18.78

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	Agoseris glauca	a39	b12	a52	17	6	22	.11
F	Alyssum spp. (a)	-	-	10	-	-	4	.02
F	Arabis spp.	a3	a4	b27	2	3	11	.08
F	Astragalus beckwithii	5	3	3	2	1	3	.18
F	Astragalus utahensis	-	2	-	-	1	-	-
F	Balsamorhiza sagittata	a9	a11	b35	4	5	17	3.65
F	Calochortus nuttallii	-	3	-	-	1	-	-
F	Chaenactis douglasii	6	6	4	3	3	2	.01
F	Collomia spp. (a)	-	-	2	-	-	1	.00
F	Comandra pallida	-	-	5	-	-	2	.01
F	Collinsia parviflora (a)	-	-	155	-	-	65	.47
F	Crepis acuminata	54	66	43	25	29	25	.51
F	Cryptantha circumscissa	a-	a-	b30	-	-	13	.06
F	Cryptantha spp.	a-	a-	b25	-	-	12	.08
F	Descurainia pinnata	-	-	4	-	-	2	.01
F	Eriogonum umbellatum	a12	ab7	b1	8	4	1	.03
F	Gayophytum ramosissimum	-	-	1	-	-	1	.00
F	Hackelia patens	a3	b17	b18	1	9	8	1.07
F	Lappula occidentalis (a)	-	-	10	-	-	4	.02
F	Lepidium spp.	-	-	3	-	-	1	.00
F	Lomatium triternatum	3	2	-	1	1	-	-
F	Machaeranthera spp	-	-	3	-	-	1	.03
F	Phlox hoodii	a5	b1	b-	3	1	-	-
F	Phlox longifolia	12	5	7	7	2	3	.01
F	Polygonum douglasii (a)	-	-	5	-	-	3	.01
F	Ranunculus testiculatus (a)	-	-	3	-	-	1	.00
F	Senecio multilobatus	-	3	1	-	1	1	.15
F	Tragopogon dubius	a18	b3	b-	9	1	-	-
Total for Forbs		169	145	447	82	68	203	6.58

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

BROWSE TRENDS --

Herd unit 01 , Study no: 14

T y p e	Species	Strip Frequency '96	Average Cover % '96
B	Amelanchier utahensis	5	2.00
B	Artemisia tridentata wyomingensis	70	9.48

Type	Species	Strip Frequency '96	Average Cover % '96
B	Chrysothamnus viscidiflorus stenophyllus	78	6.49
B	Eriogonum microthecum	1	.03
B	Leptodactylon pungens	4	.30
B	Opuntia fragilis	53	4.37
B	Purshia tridentata	28	4.19
B	Symphoricarpos oreophilus	35	7.39
Total for Browse		274	34.27

BASIC COVER --

Herd unit 01 , Study no: 14

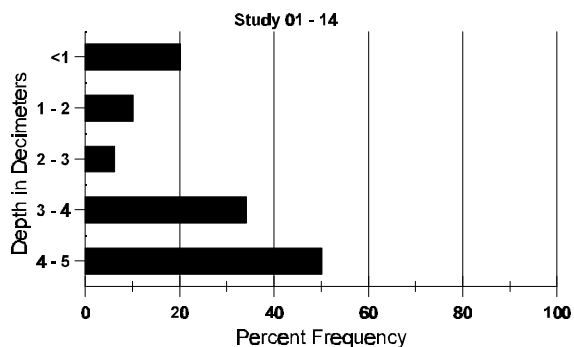
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	377	2.00	13.00	49.77
Rock	85	7.00	6.50	2.10
Pavement	127	1.00	1.00	1.33
Litter	398	62.50	46.25	62.24
Cryptogams	77	1.00	2.50	1.36
Bare Ground	203	26.50	30.75	10.75

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 14

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.52	59.0 (13)	7.2	63.7	19.0	17.3	1.6	9.1	121.6	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 01 , Study no: 14

Type	Quadrat Frequency '96
Rabbit	17
Deer	32
Cattle	3

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 14

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Amelanchier utahensis</i>																		
M	84	-	2	-	-	-	-	-	-	-	2	-	-	-	133	31	32	2
	90	-	-	1	-	-	-	-	-	-	-	-	1	-	66	33	28	1
	96	1	4	-	-	-	-	-	-	-	5	-	-	-	100	43	62	5
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	-			
												'90	66		-			
												'96	100		-			
<i>Artemisia tridentata vaseyana</i>																		
S	84	8	3	-	-	-	-	-	-	-	11	-	-	-	733			11
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
Y	84	5	5	-	-	-	-	-	-	-	10	-	-	-	666			10
	90	3	3	2	1	-	-	-	-	-	9	-	-	-	600			9
	96	27	-	-	-	-	-	-	-	-	27	-	-	-	540			27
M	84	5	5	1	-	-	-	-	-	-	11	-	-	-	733	14	19	11
	90	3	3	1	-	-	-	-	-	-	7	-	-	-	466	16	17	7
	96	94	12	-	2	2	-	-	-	-	110	-	-	-	2200	21	32	110
D	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	3	1	-	-	-	-	-	-	-	3	1	-	-	266			4
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	220			11
Total Plants/Acre (excluding Dead & Seedlings)												'84	1465	Dec:	5%			
												'90	1332		20%			
												'96	2880		5%			
<i>Chrysothamnus nauseosus</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21	30	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	84	9	-	-	-	-	-	-	-	-	9	-	-	600			9	
	90	1	-	-	-	-	-	-	-	-	1	-	-	66			1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
Y	84	18	-	-	-	-	-	-	-	-	18	-	-	1200			18	
	90	6	4	3	3	-	-	-	-	-	16	-	-	1066			16	
	96	27	-	-	7	-	-	-	-	-	34	-	-	680			34	
M	84	60	13	-	-	-	-	-	-	-	69	-	-	4866	17	26	73	
	90	19	8	-	4	-	-	-	-	-	29	-	1	2066	16	14	31	
	96	176	1	-	10	5	-	-	-	-	192	-	-	3840	16	22	192	
D	84	11	4	-	-	-	-	-	-	-	11	-	-	1000			15	
	90	32	3	2	-	-	-	-	-	-	35	-	-	2466			37	
	96	5	4	-	-	-	-	-	-	-	9	-	-	180			9	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	40			2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	7066	Dec:	0%			
												'90	5598		0%			
												'96	4700		4%			
<i>Eriogonum microthecum</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	20	5	9	1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
<i>Leptodactylon pungens</i>																		
Y	84	3	-	-	-	-	-	-	-	-	3	-	-	200			3	
	90	1	-	-	-	-	-	-	-	-	1	-	-	66			1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
M	84	10	-	-	-	-	-	-	-	-	10	-	-	666	10	12	10	
	90	6	-	-	2	-	-	-	-	-	8	-	-	533	5	9	8	
	96	7	-	-	-	-	-	-	-	-	7	-	-	140	11	13	7	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	1	-	-	-	-	-	-	-	-	-	-	1	66			1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	866	Dec:	0%			
												'90	665		10%			
												'96	140		0%			

A G E	YR	Form Class (No. of 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>Opuntia fragilis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	9	-	-	-	-	-	-	-	-	9	-	-	-	600		9	
	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
M	84	15	-	-	-	-	-	-	-	-	15	-	-	-	1000	3	8	15
	90	14	-	-	4	-	-	-	-	-	14	-	4	-	1200	4	17	18
	96	97	-	-	9	-	-	-	-	-	106	-	-	-	2120	4	17	106
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	-	-	1	-	66		1	
	96	11	-	-	1	-	-	-	-	-	7	-	-	5	240		12	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	1000	Dec:	0%			
												'90	1866		4%			
												'96	2520		10%			
<i>Purshia tridentata</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	4	-	-	-	-	-	-	-	4	-	-	-	266		4	
	90	1	3	-	-	-	-	-	-	-	4	-	-	-	266		4	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	84	-	4	4	-	-	-	-	-	-	8	-	-	-	533	20	31	8
	90	-	2	3	-	-	-	-	-	-	5	-	-	-	333	19	20	5
	96	14	14	10	1	-	-	-	-	-	39	-	-	-	780	23	43	39
D	84	-	-	-	3	-	-	-	-	-	2	-	-	1	200		3	
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	999	Dec:	20%			
												'90	665		10%			
												'96	900		2%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Symphoricarpos oreophilus</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
Y	84	11	-	-	-	-	-	-	-	-	11	-	-	-	733			11
	90	2	1	1	-	-	-	-	-	-	4	-	-	-	266			4
	96	12	-	-	-	-	-	-	-	-	12	-	-	-	240			12
M	84	20	7	-	-	-	-	-	-	-	27	-	-	-	1800	23	23	27
	90	13	-	-	4	-	-	-	-	-	17	-	-	-	1133	19	29	17
	96	56	-	-	-	-	-	-	-	-	56	-	-	-	1120	27	47	56
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	6	-	-	-	-	-	-	-	-	5	-	-	1	400			6
	96	1	2	-	-	-	-	-	-	-	2	-	-	1	60			3
Total Plants/Acre (excluding Dead & Seedlings)												'84	2533	Dec:	0%			
												'90	1799		22%			
												'96	1420		4%			
<i>Tetradymia canescens</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	14	36	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			

TREND STUDY 1-15-96

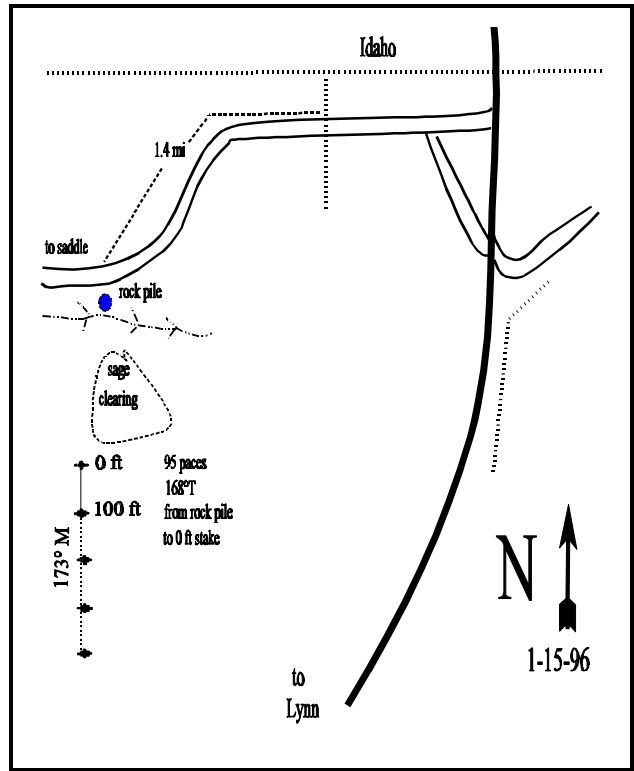
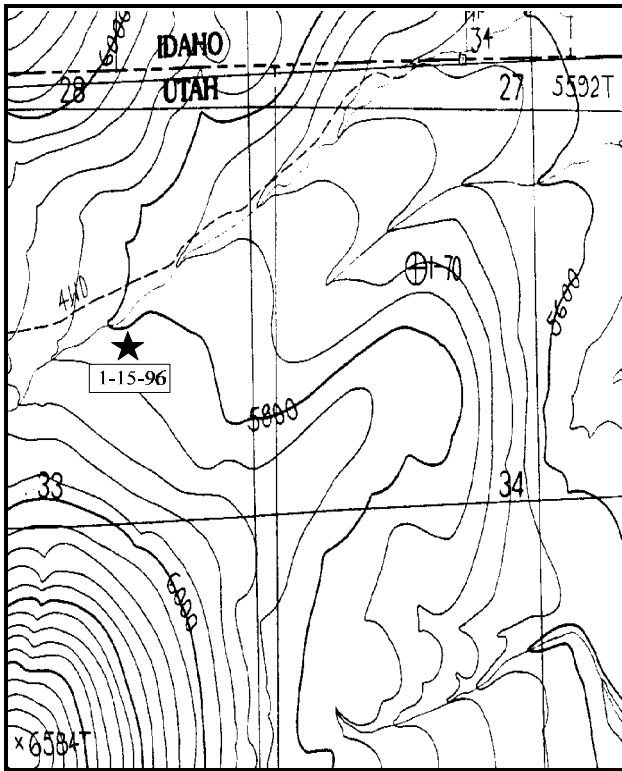
Study site name: Cedar Hills. Range type: Juniper-pinyon.

Compass bearing: frequency baseline 173 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the town of Lynn, drive north to the Utah-Idaho border to a cattleguard. From the cattleguard at the border, follow a faint road up along a fence (on south side) for 0.55 miles to a gate. Go through the next seeded pasture 0.65 miles to where the road turns away from the fence. Continue 0.75 miles to a small rock pile on the south side of the road. Cross the drainage walking about 95 paces southeast to the 0-foot stake off the baseline in the trees. The 0-foot baseline stake is labeled with a browse tag #49.



Map Name: Buckhorn, Utah-Idaho

Diagrammatic Sketch

Township 15N Range 16W, Section 33, UTM: 2-77-580E 46-51-640N

DISCUSSION

Trend Study No. 1-15

A range trend study was established in the Cedar Hills area in 1990, to provide baseline data for a proposed habitat improvement project. The site is on a deer wintering area on the Utah-Idaho border. The area is managed by the BLM and is allotted for spring and fall cattle use as part of the Junction Creek allotment. The study site receives limited use as there are more attractive seeded areas in the unit. There is light deer use due to the limited forage.

The study site is on a 3-5% north-facing slope with an elevation of 5,800 feet. Originally, the site had a significant component of big sagebrush, but juniper and pinyon trees now dominate. The site has a higher potential for successful treatment than the shallow soils of east-facing juniper and black sagebrush slopes to the south.

The soil is a fine-textured clay loam of moderate depth. There is abundant litter under the trees, but in the interspaces there are bare locations and areas of concentrated pavement. Pavement comprises 9% of the ground cover, while bare soil is exposed on 9% of the surface. There is some evidence of significant sheet erosion.

The mountain big sagebrush on the site tend to be only lightly hedged, but have reduced vigor due to competition from the pinyon-juniper overstory. In 1990, the sagebrush population was mostly decadent and had poor vigor. Sagebrush canopy cover was estimated at 5% in 1990 and down to 1% by 1996. Population density was estimated at 2,232 plants/acre in 1990, declining to 1,160 in 1996. Percent decadency was extremely high in 1990 when 86% of the population was classified as decadent. Fifty-seven percent of the sagebrush displayed poor vigor and 66% of the decadent shrubs were considered dying. By 1996, a small portion of these decadent plants recovered but most died. Dead shrubs, first inventoried in 1996, numbered more than those alive (1,860 plants/acre). Percent decadency is currently 44% with poor vigor expressed in 22% of the population. Wildlife use of these shrubs is light.

Singleleaf pinyon and Utah juniper dominate the site. Point-centered quarter data, taken in 1990, estimated a density of 318 pinyon/acre, 70% were seedling trees. A density of 407 juniper/acre was also determined, only 15% were seedling and young trees. Data from a larger sample taken in 1996, estimate a density of 80 single leaf pinyon and 459 Utah juniper trees/acre. Average diameter of pinyon was 5 inches while that of juniper was 4 inches. Ten percent of the pinyon and 40% of the juniper trees have diameters of 3 inches or less. Overhead canopy cover of pinyon and juniper was estimated, using line intercept, at 35% which is beyond where it suppresses understory species.

The healthy but limited perennial grasses and fair diversity of forbs indicate a good site potential. Four native perennial grasses combine to produce 5.5% cover, or just 42% of the herbaceous understory cover. The most common species is Sandberg bluegrass which provides 77% of the grass cover. Thickspike wheatgrass and bluebunch wheatgrass are also fairly abundant. Forbs are very diverse and provide nearly 8% total cover or 58% of the herbaceous cover. Common species include several milkvetch species, stemless goldenweed, thickleaf penstemon and hoods phlox.

1990 APPARENT TREND ASSESSMENT

Sagebrush is declining on this range site. There are few young shrubs, poor vigor and a high percentage of decadent plants. Production of desirable forage is lessened due to factors related to the increasing overstory of pinyon and

juniper trees. Without treatment, soil and vegetative trends will continue to decline.

1996 TREND ASSESSMENT

Soil conditions have improved since 1990 due to a decline in percent bare ground. However, litter cover declined from 55% to 41% and erosion is still occurring in the interspaces. Soil trend is considered up slightly. Trend for mountain big sagebrush is in an overall state of decline but shows some improvements since 1990. Density has declined 48% since the last reading due to a reduction in decadent plants. This has improved the decadency ratio and overall vigor, but reproduction is limited. Without some sort of treatment, all of the sagebrush will eventually die out from competition with the overstory of P-J trees and prolonged drought. Trend is considered down. Trend for the herbaceous understory is up due to increased sum of nested frequency of grasses and forbs.

TREND ASSESSMENT

soil - up slightly

browse - down

herbaceous understory - up

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 15

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover % '96
		'90	'96	'90	'96	
G	Agropyron dasystachyum	76	60	36	21	.76
G	Agropyron spicatum	37	*71	15	25	.48
G	Poa secunda	256	269	90	94	4.23
G	Sitanion hystrix	-	2	-	1	.01
Total for Grasses		369	402	141	141	5.49
F	Agoseris glauca	-	2	-	1	.00
F	Antennaria spp.	1	*10	1	6	.08
F	Arabis spp.	3	*19	2	8	.04
F	Astragalus beckwithii	-	*116	-	54	2.27
F	Astragalus convallarius	-	3	-	1	.00
F	Astragalus spp.	6	11	4	6	.08
F	Astragalus utahensis	3	*21	1	11	.13
F	Castilleja chromosa	-	4	-	2	.01
F	Caulanthus crassicaulis	-	-	-	-	.00
F	Chaenactis douglasii	10	13	4	5	.05
F	Collinsia parviflora (a)	-	87	-	32	.18
F	Crepis acuminata	3	9	2	3	.10
F	Cryptantha spp.	7	5	4	2	.04
F	Erigeron spp	2	6	1	4	.04
F	Erigeron pumilus	-	1	-	1	.00
F	Haplopappus acaulis	9	*25	6	12	.38
F	Penstemon spp.	2	-	2	-	-

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover % '96
		'90	'96	'90	'96	
F	Penstemon platyphyllus	-	*14	-	6	.43
F	Phlox hoodii	111	*178	52	70	3.77
F	Senecio multilobatus	14	29	8	14	.07
F	Townsendia spp.	-	4	-	2	.01
F	Zigadenus paniculatus	-	-	-	-	.01
Total for Forbs		171	557	87	240	7.73

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

BROWSE TRENDS --

Herd unit 01 , Study no: 15

T y p e	Species	Strip Frequency	Average Cover %
		'96	'96
B	Artemisia tridentata vaseyana	35	1.05
B	Chrysothamnus nauseosus consimilis	1	.03
B	Chrysothamnus viscidiflorus stenophyllus	7	.04
B	Juniperus osteosperma	34	9.75
B	Opuntia fragilis	1	-
B	Pinus monophylla	9	1.65
B	Symphoricarpos oreophilus	7	.30
Total for Browse		94	12.84

BASIC COVER --

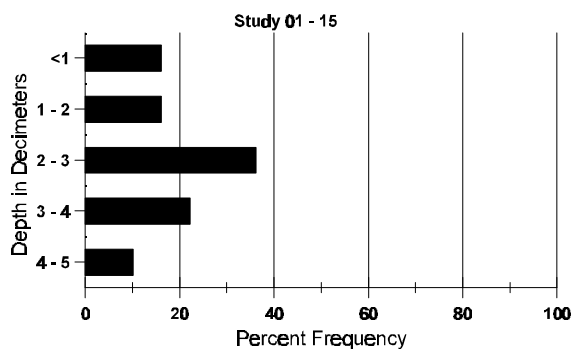
Herd unit 01 , Study no: 15

Cover Type	Nested Frequency '96	Average Cover %	
		'90	'96
Vegetation	331	4.00	26.79
Rock	82	1.50	.71
Pavement	242	11.25	9.01
Litter	388	54.75	40.83
Cryptogams	249	7.75	12.89
Bare Ground	201	20.75	9.32

SOIL ANALYSIS DATA --
Herd Unit 01, Study no: 15

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.7	57.4 (13.0)	7.8	30.7	40	29.3	3.0	6.7	390.4	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 01 , Study no: 15

Type	Quadrat Frequency '96
Rabbit	14
Deer	4

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 15

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	33			1
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	7	-	-	1	-	-	-	-	-	7	1	-	-	266	20	18	8
	96	20	2	-	5	-	-	-	-	-	26	-	-	1	540	15	18	27
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	56	1	-	1	-	-	-	-	-	20	-	-	38	1933			58
	96	22	2	-	2	-	-	-	-	-	14	-	-	12	520			26
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1860			93

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Total Plants/Acre (excluding Dead & Seedlings)													'84	0	Dec:	0%		
													'90	2232		87%		
													'96	1160		45%		
Chrysothamnus nauseosus consimilis																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)													'84	0	Dec:	-		
													'90	0		-		
													'96	20		-		
Chrysothamnus viscidiflorus stenophyllus																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	6	-	-	-	-	-	-	-	-	6	-	-	-	200		6	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	7	8	
	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160	7	7	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	9	-	-	4	-	-	-	-	-	7	-	-	6	433		13	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)													'84	0	Dec:	0%		
													'90	666		65%		
													'96	200		0%		
Juniperus osteosperma																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	13	-	-	-	-	-	-	-	-	12	-	1	-	433	108	61	
	96	25	-	-	-	-	-	1	10	-	36	-	-	-	720	-	-	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)													'84	0	Dec:	0%		
													'90	499		7%		
													'96	900		2%		
Opuntia fragilis																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	5	9	
Total Plants/Acre (excluding Dead & Seedlings)													'84	0	Dec:	-		
													'90	0		-		
													'96	20		-		

AGE	YR	Form Class (No. of 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	-	-	2	-	-	-	-	-	4	-	1	-	166		5	
	96	8	-	-	1	-	-	-	-	-	9	-	-	-	180		9	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66	157	97	
	96	3	-	-	-	-	-	-	1	-	4	-	-	-	80	-	-	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	66		-			
												'96	180		-			
Symphoricarpos oreophilus																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	1	-	-	-	-	-	6	-	-	-	120		6	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	6	9	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	11	17	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	33		-			
												'96	160		-			

TREND STUDY 1-16-96

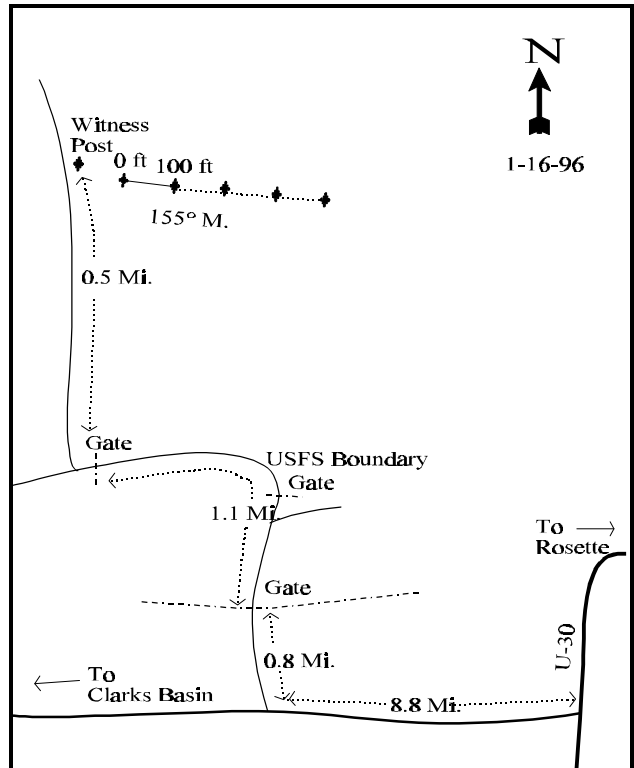
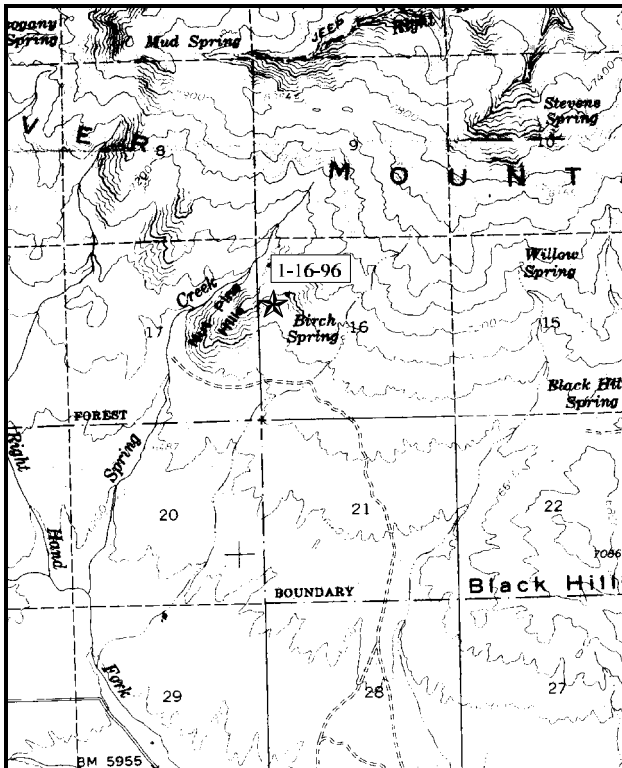
Study site name: Nut Pine Hills. Range type: Mixed mountain brush.

Compass bearing: frequency baseline 155 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From U-30, travel up the road to Clark's Basin for 8.8 miles. Turn right and travel 0.8 miles to a gate. Continue 1.1 miles through a gate marking the forest boundary to another gate. Just after the gate take a right for .5 miles to a witness post. The zero foot post is just east of the witness post.



Map Name: Yost '15

Diagrammatic Sketch

Township 13N Range 15W, Section 16

DISCUSSION

Trend Study No. 1-16

This is a new trend study set up to monitor important deer winter range in the Nut Pine Hills area on a south slope of the Raft River mountains. The area supports a mixed mountain brush community type with scattered pinyon and juniper trees. The site is on U.S. Forest Service land as part of the Sawtooth National Forest. It has a slope of 20% to 23% with a southwest aspect and an elevation of approximately 7,000 feet. Deer also use this area in the spring and a deer was flushed from the site during establishment. Pellet group frequency of deer was moderately high. Cattle also use this area as part of the large Yost allotment. This allotment has been combined with the Raft River allotment. Combined, these allotments are grazed by 1,418 cattle in the spring and fall.

The soil is moderately deep with a sandy clay loam texture. Effective rooting depth (see methods) was estimated at 19 inches but depth must be restricted in some areas where black sagebrush and stemless goldenweed occur. Vegetative and litter cover are abundant (43% and 46% respectively) which can adequately protect the soil from serious erosion. Pavement is concentrated on the surface in isolated open interspaces. Rocks are common throughout the profile.

The site is dominated by browse species. Thirteen shrub species combine to produce 37% total cover (75% of the total vegetative cover). Key species include serviceberry, mountain big sagebrush, and antelope bitterbrush. Mature serviceberry average 3 feet in height. Density is approximately 860 plants/acre with 14% of which displayed heavy use. Vigor is good on all plants and percent decadency is moderately low at 9%. Mountain big sagebrush has an estimated density of 1,140 plants/acre with 84% of which are mature. Utilization is heavy on a few individual plants but light to moderate use overall. The population appears stable with sufficient seedlings and young combined with low percent decadence (3%). Antelope bitterbrush is abundant and accounts for 33% of the shrub cover. Average mature bitterbrush plants measure 2 feet in height with a 4 foot crown. Utilization of these shrubs is heavy with more than half (55%) displaying heavy use. Yet, vigor is good and percent decadency is low at only 2% of the population.

Snowberry is the most abundant shrub on the site comprising 35% of the shrub density with an estimated 4,840 plants/acre. Utilization of these less preferred shrubs is mostly light. Other shrubs found on the site include small numbers of black sagebrush, threadleaf rubber rabbitbrush, stickyleaf low rabbitbrush, slenderbush eriogonum, broom snakeweed, chokecherry, wax currant, woods rose and gray horsebrush. Most of these shrubs were unutilized. A few tree size and highlined curlleaf mahogany occur on the site.

The herbaceous understory is diverse and produces a total of 12% cover or 25% of the total vegetative cover. Grasses are diverse with 8 perennial species inventoried. The more abundant species include, thickspike wheatgrass, bluebunch wheatgrass, and Canada bluegrass. Annual cheatgrass brome is present but only in small numbers, only producing 3% of the grass cover. Forbs are also abundant with 32 perennial and 7 annual species counted. Several useful species are present including, paintbrush, sulfur eriogonum, lambstongue groundsel, and lobeleaf groundsel. These and other forbs provide useful spring forage for big game.

1996 APPARENT TREND ASSESSMENT

The soil trend appears stable due to the abundant protective vegetation and litter cover. The browse component dominates the vegetational aspects of the site and provides useful forage for wintering big game. The three key species,

serviceberry, mountain big sagebrush, and antelope bitterbrush appear to have stable trends with good reproductive potentials, low decadency and good vigor. Utilization of bitterbrush is heavy but not to the point that it reduces vigor of the shrubs. The herbaceous understory is very diverse with some useful species present. Increases in the shrub component could eventually cause a decline in the understory.

HERBACEOUS TRENDS --
Herd unit 01 , Study no: 16

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
G	<i>Agropyron dasystachyum</i>	140	48	.88
G	<i>Agropyron spicatum</i>	141	51	2.15
G	<i>Bromus tectorum</i> (a)	47	17	.16
G	<i>Elymus cinereus</i>	10	3	.04
G	<i>Koeleria cristata</i>	22	11	.37
G	<i>Oryzopsis hymenoides</i>	1	1	.03
G	<i>Poa compressa</i>	86	31	1.08
G	<i>Poa fendleriana</i>	11	5	.63
G	<i>Poa secunda</i>	21	8	.40
Total for Grasses		479	175	5.76
F	<i>Agoseris glauca</i>	68	25	.15
F	<i>Arabis</i> spp.	5	3	.01
F	<i>Astragalus beckwithii</i>	4	1	.00
F	<i>Astragalus newberryi</i>	6	3	.01
F	<i>Aster</i> spp.	17	5	.10
F	<i>Astragalus utahensis</i>	3	1	.03
F	<i>Castilleja chromosa</i>	4	2	.03
F	<i>Calochortus nuttallii</i>	3	1	.00
F	<i>Chaenactis douglasii</i>	22	12	.06
F	<i>Cirsium</i> spp.	8	4	.06
F	<i>Collomia linearis</i> (a)	16	6	.03
F	<i>Comandra pallida</i>	105	49	.49
F	<i>Collinsia parviflora</i> (a)	131	42	.43
F	<i>Crepis acuminata</i>	31	14	.12
F	<i>Cryptantha</i> spp.	22	11	.22
F	<i>Delphinium nelsonii</i>	9	3	.04
F	<i>Descurainia pinnata</i>	16	5	.05
F	<i>Erysimum asperum</i>	3	2	.01
F	<i>Eriogonum cernuum</i> (a)	10	4	.02
F	<i>Eriogonum microthecum</i>	4	2	.18
F	<i>Erigeron pumilus</i>	1	1	.00

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
F	Eriogonum umbellatum	46	21	1.25
F	Gilia spp. (a)	21	13	.09
F	Haplopappus acaulis	16	7	.37
F	Hackelia patens	69	29	.91
F	Lesquerella spp.	5	3	.01
F	Lithospermum ruderales	25	12	.41
F	Lomatium spp.	21	8	.41
F	Phlox austromontana	44	20	.30
F	Phlox longifolia	86	33	.18
F	Polygonum douglasii (a)	7	3	.01
F	Senecio integerrimus	20	6	.40
F	Senecio multilobatus	59	27	.29
F	Taraxacum officinale	5	1	.00
F	Unknown forb-annual	8	5	.02
F	Viola spp.	21	10	.07
Total for Forbs		941	394	6.84

BROWSE TRENDS --

Herd unit 01 , Study no: 16

Type	Species	Strip Frequency '96	Average Cover % '96
B	Amelanchier utahensis	32	3.92
B	Artemisia nova	12	.01
B	Artemisia tridentata vaseyana	41	4.09
B	Chrysothamnus nauseosus consimilis	5	.00
B	Chrysothamnus viscidiflorus stenophyllus	45	1.56
B	Eriogonum microthecum	23	.14
B	Gutierrezia sarothrae	11	.12
B	Juniperus osteosperma	4	.71
B	Mahonia repens	4	.04
B	Opuntia fragilis	3	.03
B	Prunus virginiana	2	-
B	Purshia tridentata	48	11.98
B	Rosa woodsii	2	-
B	Symphoricarpos oreophilus	72	13.26

Type	Species	Strip Frequency '96	Average Cover % '96
B	Tetradymia canescens	34	.67
Total for Browse		338	36.58

BASIC COVER --

Herd unit 01 , Study no: 16

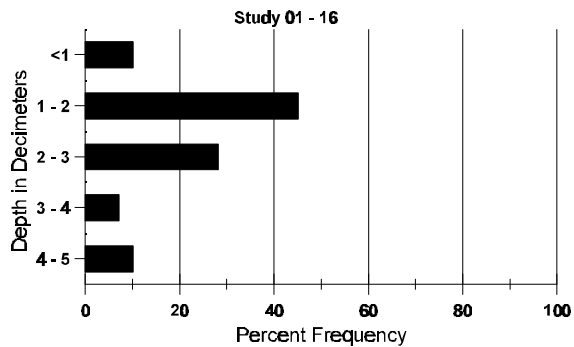
Cover Type	Nested Frequency '96	Average Cover % '96
Vegetation	420	43.29
Rock	206	2.98
Pavement	249	3.84
Litter	487	45.58
Cryptogams	19	.13
Bare Ground	276	12.81

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 16

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
19.1	51.4 (17.6)	8.1	50.9	25.1	24.0	2.1	8.5	544.0	1.1

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 16

Type	Quadrat Frequency '96
Rabbit	2
Deer	22
Cattle	6

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 16

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Amelanchier utahensis</i>																		
Y	96	6	-	-	4	-	1	-	-	-	11	-	-	-	220		11	
M	96	5	7	4	4	7	1	-	-	-	28	-	-	-	560	36	42	
D	96	-	2	-	1	1	-	-	-	-	4	-	-	-	80		4	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
Total Plants/Acre (excluding Dead & Seedlings)												'96	860	Dec:	9%			
<i>Artemisia nova</i>																		
Y	96	1	2	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	96	-	2	3	-	-	1	-	-	-	6	-	-	-	120	7	13	
D	96	1	2	2	2	-	-	-	-	-	5	-	-	2	140		7	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
Total Plants/Acre (excluding Dead & Seedlings)												'96	320	Dec:	44%			
<i>Artemisia tridentata vaseyana</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	96	3	-	-	3	-	1	-	-	-	7	-	-	-	140		7	
M	96	21	11	-	15	-	1	-	-	-	47	1	-	-	960	19	29	
D	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	280		14	
Total Plants/Acre (excluding Dead & Seedlings)												'96	1140	Dec:	4%			
<i>Chrysothamnus nauseosus consimilis</i>																		
Y	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	26	33	
D	96	3	-	-	-	-	-	-	-	-	1	-	-	2	60		3	
Total Plants/Acre (excluding Dead & Seedlings)												'96	120	Dec:	50%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	96	3	-	-	-	-	-	1	-	-	4	-	-	-	80		4	
Y	96	10	-	-	2	-	-	1	-	-	13	-	-	-	260		13	
M	96	42	2	-	14	-	-	-	-	-	58	-	-	-	1160	16	20	
D	96	3	-	-	-	-	-	-	-	-	2	-	-	1	60		3	
Total Plants/Acre (excluding Dead & Seedlings)												'96	1480	Dec:	4%			
<i>Eriogonum microthecum</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	96	28	-	-	-	-	-	-	-	-	28	-	-	-	560	5	8	
Total Plants/Acre (excluding Dead & Seedlings)												'96	660	Dec:	-			

A G E	YR	Form Class (No. of 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	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
Y	96	20	-	-	-	-	-	-	-	-	20	-	-	-	400		20	
M	96	38	-	-	-	-	-	-	-	-	38	-	-	-	760	4	4	38
D	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'96	1180	Dec:	2%			
<i>Juniperus osteosperma</i>																		
Y	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	96	2	-	-	-	-	-	-	1	-	3	-	-	-	60	-	-	3
Total Plants/Acre (excluding Dead & Seedlings)												'96	140	Dec:	-			
<i>Mahonia repens</i>																		
Y	96	18	-	-	-	-	-	-	-	-	18	-	-	-	360		18	
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	3	3	0
Total Plants/Acre (excluding Dead & Seedlings)												'96	360	Dec:	-			
<i>Opuntia fragilis</i>																		
M	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80	5	16	4
D	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'96	100	Dec:	20%			
<i>Prunus virginiana</i>																		
Y	96	1	-	-	-	-	-	1	-	-	2	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'96	40	Dec:	-			
<i>Purshia tridentata</i>																		
S	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	96	1	2	1	1	-	1	-	-	-	6	-	-	-	120		6	
M	96	-	11	35	1	15	4	-	-	-	66	-	-	-	1320	23	49	66
D	96	1	-	-	-	1	-	-	-	-	1	-	-	1	40		2	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
Total Plants/Acre (excluding Dead & Seedlings)												'96	1480	Dec:	3%			
<i>Ribes cereum cereum</i>																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4	62	0
Total Plants/Acre (excluding Dead & Seedlings)												'96	0	Dec:	-			
<i>Rosa woodsii</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	96	-	-	-	-	-	1	-	-	-	1	-	-	-	20		1	
M	96	-	-	-	-	-	2	-	-	-	2	-	-	-	40	10	4	2
Total Plants/Acre (excluding Dead & Seedlings)												'96	60	Dec:	-			

A G E	YR	Form Class (No. of 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	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	96	31	-	-	24	-	-	-	-	-	55	-	-	-	1100		55	
M	96	106	14	-	62	2	-	3	-	-	187	-	-	-	3740	18	29	187
Total Plants/Acre (excluding Dead & Seedlings)												'96	4840	Dec:	-			
Tetradymia canescens																		
S	96	-	-	-	-	-	-	1	-	-	1	-	-	-	20		1	
Y	96	11	-	-	3	-	-	-	-	-	14	-	-	-	280		14	
M	96	30	-	-	5	-	-	-	-	-	35	-	-	-	700	8	11	35
D	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Total Plants/Acre (excluding Dead & Seedlings)												'96	1040	Dec:	6%			

TREND STUDY 1-17-96

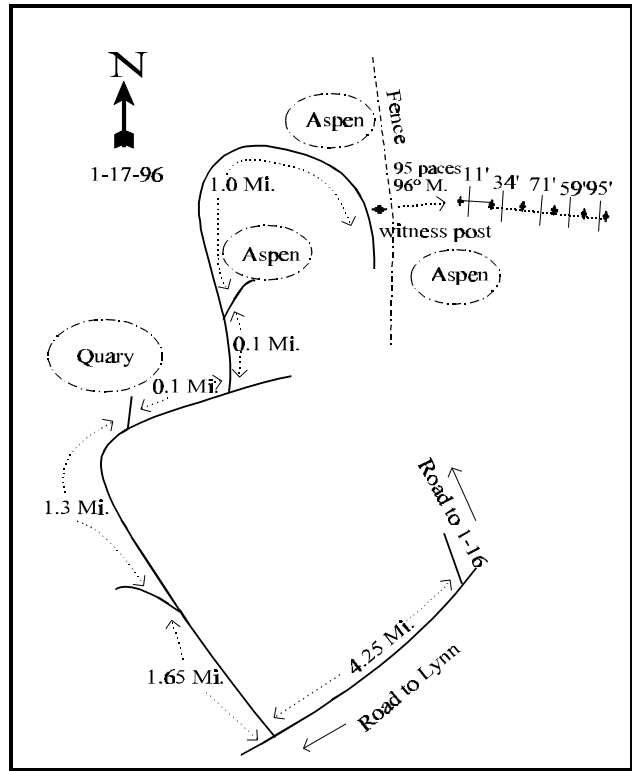
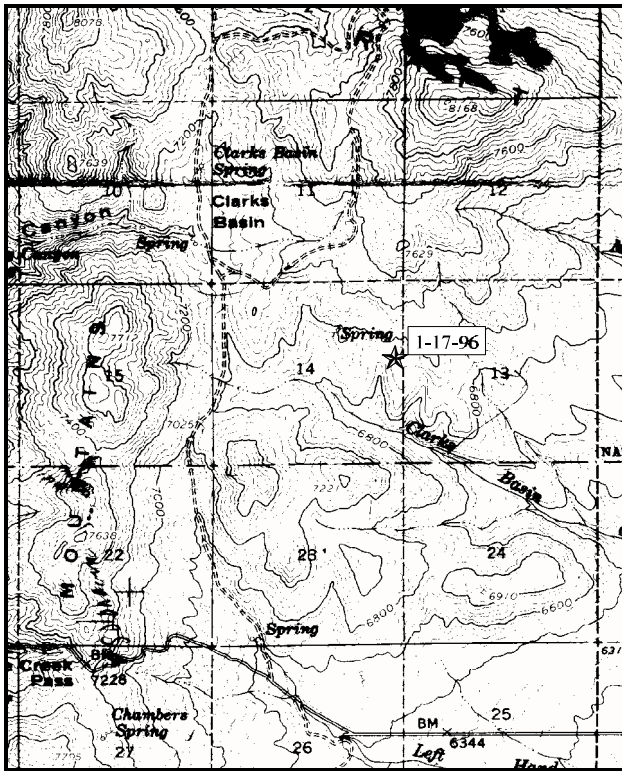
Study site name: Clark's Basin. Range type: Mixed mountain brush.

Compass bearing: frequency baseline 100 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From the intersection of the road to Clark's Basin and U-30, travel southwest on U-30 for 4.25 miles. Take a right and drive 1.65 miles to a fork in the road. Stay right and continue for another 1.3 miles to another fork. Stay right and continue for 0.1 miles. Take a left, proceed 0.1 miles taking a left and proceed 1.0 miles to a witness post. From the witness post, walk 95 paces at a bearing of 96 degrees magnetic to the 0-foot baseline stake. The baseline runs 100 degrees magnetic.



Map Name: Yost '15

Diagrammatic Sketch

Township 13N, Range 16W, Section 14, UTM: 2-81-364E 46-36-634N

DISCUSSION

Trend Study No. 1-17

This is a new study placed to sample mixed mountain brush near one of the few aspen clones in the Clark's Basin area. It is considered an important fawning habitat for deer. The site is on a bench with a ridge to the north and ravines to the south. The site is on a gentle 3% to 5% slope at an elevation of approximately 6,740 feet. This area is grazed by livestock as part of the Yost Pasture allotment. Season of use is May 1 to June 20 and November 1 to December 31 by 1,206 cattle. Water is readily available in nearby springs and livestock water developments.

The soil is deep with some surface rock. Texture is a clay loam. Erosion is not a problem due to the abundant herbaceous cover and little exposed bare soil.

The site is a mixture of a mixed mountain brush with a good grass and forb understory which can provide important early summer forage for deer. Several preferred browse species occupy the site including serviceberry, black sagebrush, basin big sagebrush, antelope bitterbrush, and woods rose. The dominant browse is basin big sagebrush, providing 54% of the browse cover. Intermixed with the basin big sagebrush is serviceberry, black sagebrush, bitterbrush, and mountain snowberry. Basin big sagebrush population density is estimated at 3,500 plants/acre, 89% of which are mature. Utilization is light to moderate, percent decadency is low and vigor good. There is a high number of dead sagebrush along baselines 1 and 2 which appear to have died several years ago, probably during the severe winter of 1983-84 for form class on the dead individuals would not explain these losses.

Serviceberry is moderate to heavily hedged with a high decadency rate of 41% and provides only 5% of the browse cover with an estimated density of 340 plants/acre. Nearly half (43%) of the decadent individuals were classified as dying. Antelope bitterbrush also occur in relatively small numbers (420 plants/acre and 3% of the browse cover) but provides preferred forage. Utilization of these shrubs is severe with 48% of the population displaying heavy use. Percent decadency is fairly high (33%) with 43% of these shrubs classified as dying.

Some black sagebrush occurs in patches along belts 3 and 4 with an estimated density of 1,560 plants/acre. They provide 11% of the browse cover and are moderately hedged with low decadency and good vigor. Less preferred browse include rubber rabbitbrush, mountain low rabbitbrush, creeping barberry, snowberry, and gray horsebrush.

The herbaceous understory is diverse and well developed. Ten species of perennial grass produce over 14% cover. The dominant species include thickspike wheatgrass and Sandberg bluegrass. Bluebunch wheatgrass, a sedge, and Kentucky bluegrass are also fairly common. Forbs are extremely diverse with 41 species producing 11% cover. Several useful species occur including paintbrush, silvery lupine, lambstongue groundsel, sulfur eriogonum, and Penstemon.

1996 APPARENT TREND ASSESSMENT

Protective ground cover is excellent for soil protection. Vegetation and litter cover are abundant and well distributed and no significant erosion appears to be occurring. Trend for the key browse species; Serviceberry, basin big sagebrush, black sagebrush, and antelope bitterbrush, appears stable for the most part only for the sagebrush species. Extremely heavy use of serviceberry and bitterbrush are cause for concern. Percent decadency is 41% for serviceberry, but no dead plants were encountered. Some plants near the site have grown out of reach to

browsing deer. Bitterbrush has a percent decadency of 33% and heavy use on 48% of the shrubs. Young plants are present for both species but no seedlings were encountered. The herbaceous understory is diverse and abundant. The sod forming thickspike wheat grass and Kentucky bluegrass may increase in the future.

HERBACEOUS TRENDS --
Herd unit 01 , Study no: 17

Y P e	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
G	<i>Agropyron dasystachyum</i>	279	72	6.03
G	<i>Agropyron spicatum</i>	46	16	1.37
G	<i>Bromus tectorum</i> (a)	17	7	.06
G	<i>Carex</i> spp.	52	16	1.12
G	<i>Koeleria cristata</i>	4	2	.06
G	<i>Melica bulbosa</i>	4	3	.04
G	<i>Poa compressa</i>	3	1	.15
G	<i>Poa fendleriana</i>	3	3	.01
G	<i>Poa pratensis</i>	49	12	1.04
G	<i>Poa secunda</i>	216	63	4.51
Total for Grasses		673	195	14.42
F	<i>Achillea millefolium</i>	62	21	.57
F	<i>Agoseris glauca</i>	112	41	.69
F	<i>Allium</i> spp.	22	13	.06
F	<i>Arabis</i> spp.	8	4	.02
F	<i>Astragalus beckwithii</i>	1	1	.03
F	<i>Astragalus cibarius</i>	8	5	.39
F	<i>Aster</i> spp.	178	57	2.19
F	<i>Astragalus</i> spp.	5	2	.06
F	<i>Castilleja chromosa</i>	1	1	.03
F	<i>Calochortus nuttallii</i>	4	2	.01
F	<i>Cirsium</i> spp.	3	2	.07
F	<i>Collomia</i> spp. (a)	85	30	.20
F	<i>Comandra pallida</i>	15	7	.06
F	<i>Collinsia parviflora</i> (a)	287	87	2.28
F	<i>Crepis acuminata</i>	3	1	.00
F	<i>Crepis intermedia</i>	10	6	.05
F	<i>Cryptantha</i> spp.	7	2	.01
F	<i>Cymopterus</i> spp.	12	3	.04
F	<i>Cynoglossum officinale</i>	1	1	.03
F	<i>Delphinium bicolor</i>	7	4	.02
F	<i>Delphinium occidentale</i>	2	1	.03
F	<i>Equisetum</i> spp.	4	2	.01

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
F	Eriogonum umbellatum	16	5	.12
F	Geranium spp.	1	1	.01
F	Hackelia patens	10	4	.04
F	Hydrophyllum spp.	41	22	.39
F	Lomatium triternatum	2	2	.01
F	Lupinus argenteus	4	4	.19
F	Machaeranthera spp	53	20	.10
F	Penstemon spp.	7	3	.01
F	Phlox longifolia	68	26	.36
F	Polygonum douglasii (a)	9	5	.02
F	Senecio integerrimus	77	29	1.19
F	Taraxacum officinale	30	12	.16
F	Tragopogon dubius	3	3	.01
F	Unknown forb-annual	3	1	.15
F	Unknown forb-perennial	32	12	.22
F	Veronica biloba (a)	3	1	.03
F	Viguiera multiflora	70	29	.14
F	Viola spp.	15	7	.35
F	Wyethia amplexicaulis	4	2	.18
F	Zigadenus paniculatus	14	8	.12
Total for Forbs		1299	489	10.73

BROWSE TRENDS --

Herd unit 01 , Study no: 17

Type	Species	Strip Frequency '96	Average Cover % '96
B	Amelanchier utahensis	16	1.56
B	Artemisia nova	16	3.40
B	Artemisia tridentata tridentata	76	17.25
B	Chrysothamnus nauseosus	2	-
B	Chrysothamnus viscidiflorus lanceolatus	38	1.82
B	Mahonia repens	3	.01
B	Purshia tridentata	18	1.07
B	Rosa woodsii	10	.51
B	Symphoricarpos oreophilus	58	6.44

Type	Species	Strip Frequency '96	Average Cover % '96
B	Tetradymia canescens	3	-
Total for Browse		240	32.10

BASIC COVER --

Herd unit 01 , Study no: 17

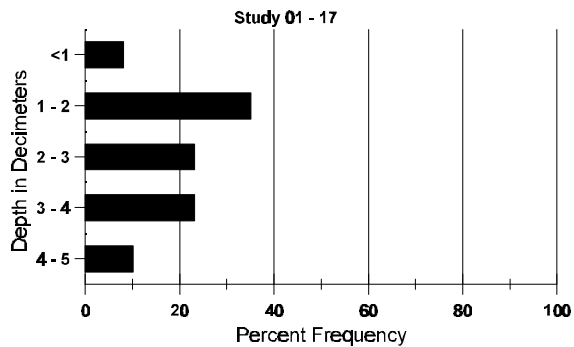
Cover Type	Nested Frequency '96	Average Cover % '96
Vegetation	478	55.89
Rock	161	2.41
Pavement	187	2.48
Litter	495	52.18
Cryptogams	26	.31
Bare Ground	263	9.58

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 17

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
20.5	50.0 (19.7)	6.8	31.7	35	33.3	3.3	24.2	553.6	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 17

Type	Quadrat Frequency '96
Rabbit	2
Deer	4
Cattle	6

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 17

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Amelanchier utahensis</i>																		
Y	96	1	3	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	96	1	2	2	-	1	-	-	-	-	6	-	-	-	120	27	32	6
D	96	-	-	1	1	5	-	-	-	-	4	-	-	3	140		7	
Total Plants/Acre (excluding Dead & Seedlings)												'96	340	Dec:	41%			
<i>Artemisia nova</i>																		
Y	96	-	4	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	96	8	51	11	2	-	-	-	-	-	72	-	-	-	1440	9	19	72
D	96	-	1	-	1	-	-	-	-	-	-	-	-	2	40		2	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'96	1560	Dec:	3%			
<i>Artemisia tridentata tridentata</i>																		
S	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	96	12	3	-	-	-	-	-	-	-	15	-	-	-	300		15	
M	96	111	41	1	3	-	-	-	-	-	156	-	-	-	3120	20	30	156
D	96	1	-	-	2	1	-	-	-	-	3	-	-	1	80		4	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	640		32	
Total Plants/Acre (excluding Dead & Seedlings)												'96	3500	Dec:	2%			
<i>Chrysothamnus nauseosus</i>																		
M	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20	15	19	1
D	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'96	40	Dec:	50%			
<i>Chrysothamnus viscidiflorus lanceolatus</i>																		
S	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	96	51	10	-	6	1	-	-	-	-	68	-	-	-	1360	13	18	68
D	96	1	4	-	-	-	-	-	-	-	5	-	-	-	100		5	
Total Plants/Acre (excluding Dead & Seedlings)												'96	1600	Dec:	6%			
<i>Mahonia repens</i>																		
M	96	-	-	-	5	-	-	-	-	-	5	-	-	-	100	3	4	5
Total Plants/Acre (excluding Dead & Seedlings)												'96	100	Dec:	-			
<i>Purshia tridentata</i>																		
Y	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	96	-	4	1	1	1	5	-	-	1	13	-	-	-	260	17	28	13
D	96	-	-	2	2	2	-	-	-	1	4	-	-	3	140		7	
Total Plants/Acre (excluding Dead & Seedlings)												'96	420	Dec:	33%			

A G E	YR	Form Class (No. of 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	96	-	-	-	-	-	-	-	-	-	-	-	-	0	11	26	0	
Total Plants/Acre (excluding Dead & Seedlings)												'96	0	Dec:	-			
Rosa woodsii																		
Y	96	26	-	-	-	-	-	-	-	-	26	-	-	520			26	
M	96	10	-	-	3	-	-	-	-	-	13	-	-	260	19	17	13	
Total Plants/Acre (excluding Dead & Seedlings)												'96	780	Dec:	-			
Symphoricarpos oreophilus																		
S	96	8	-	-	1	-	-	1	-	-	10	-	-	200			10	
Y	96	29	2	-	5	-	-	-	-	-	36	-	-	720			36	
M	96	71	22	2	10	-	-	-	-	-	105	-	-	2100	16	27	105	
D	96	2	1	-	2	-	-	-	-	-	4	-	-	100			5	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	40			2	
Total Plants/Acre (excluding Dead & Seedlings)												'96	2920	Dec:	3%			
Tetradymia canescens																		
M	96	2	3	-	-	-	-	-	-	-	5	-	-	100	15	18	5	
Total Plants/Acre (excluding Dead & Seedlings)												'96	100	Dec:	-			

TREND STUDY 1-18-96

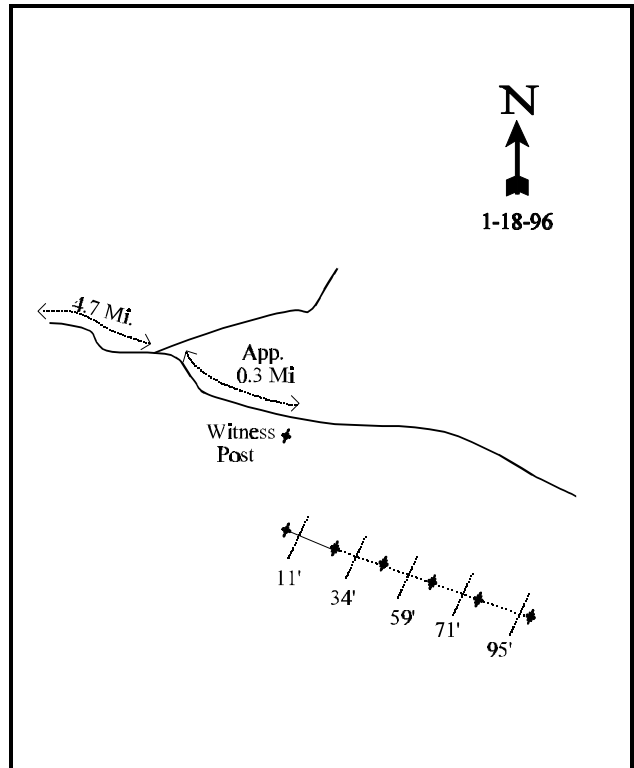
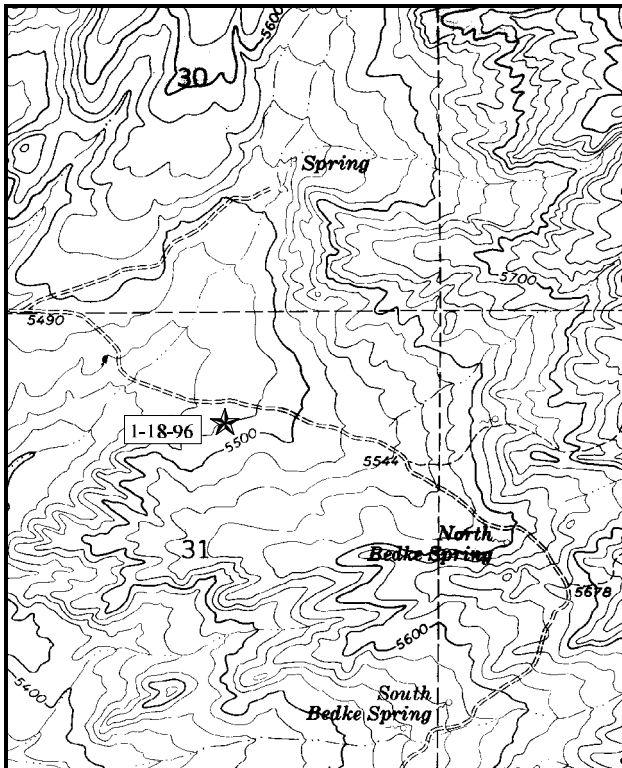
Study site name: Bedke Spring. Range type: Wyoming big sagebrush.

Compass bearing: frequency baseline runs in an easterly direction.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From the Grouse Creek Junction on U-30 travel north for 16.7 miles and take a right turn. Continue for about 4.7 miles to another fork and turn right. Drive approximately 0.3 miles down the road to a witness post on the right hand side of the road. The baseline is approximately 300 feet in a southerly direction. The baseline runs in a east-southeast direction.



Map Name: Ingham Canyon

Diagrammatic Sketch

Township 11N Range 17W, Section 31

DISCUSSION

Trend Study No. 1-18

This is a new site located just west of North Bedke Spring. It samples a Wyoming big sagebrush flat surrounded by juniper and pinyon. The site has a gentle 3% to 5% slope with a west, northwest exposure and an elevation of approximately 5,640 feet. Cattle use the area during the spring (April 1-April 30) as part of the combined Red Butte\Pine Creek allotment which is grazed by 1,148 cattle and 5 horses. There were numerous elk pellet groups around some of the juniper trees just north of the 0 foot baseline stake, yet few were encountered on the site.

The soil is deep but very compacted making it difficult to prob very deep for soil pentrometer readings. Effective rooting depth (see methods) was estimated at 18 inches but is probably deeper. Texture is a clay loam with few rocks on the surface and in the profile. The soil is light colored in the interspaces with little organic matter buildup in the surface horizon. There are large areas of unprotected bare soil (28% bare ground). Under the sagebrush canopies there is considerable cryptogamic development. Water movement is evident on the surface as the soil is pedestaled under shrubs. There are no active gullies on the site and erosion is not severe due to the gentle slope.

The site is dominated by a relatively dense stand of Wyoming big sagebrush. Narrowleaf low rabbitbrush is also abundant. Density of big sagebrush is approximately 3,360 plants/acre, with 68% classified as mature. Utilization is mostly light and percent decadency is 25%. There were a considerable number of dead plants sampled (1,040 plants/acre), indicating a past die off. Currently, age class structure indicates a stable population. Because of mostly light use, other factors would have to have been more responsible for these losses. For example, prolonged drought and/or winter injury have been found responsible for most losses to the sagebrush type in other areas of the state.

Other shrubs contributing additional forage include small numbers of black sagebrush, an apparently expanding population of shadscale (mostly young age structure), and a few scattered spiny hopsage. Utilization of these shrubs is light with the exception of a few heavily hedged spiny hopsage which occur in very low numbers.

Narrowleaf low rabbitbrush (an increaser) is a co-dominant with Wyoming big sagebrush. It accounts for 43% of the shrub cover with an estimated density of 6,600 plants/acre. Ninety four percent of the plants are mature, measuring 11 inches high, with a 15 inch crown. Greasewood and threadleaf rubber rabbitbrush are increasers also found on the site in small numbers.

The herbaceous understory is well developed for a Wyoming big sagebrush site (??? then it isn't artrw). Grasses are diverse and produce 6% cover. The most abundant perennial species consist of Sandberg bluegrass, bottlebrush squirreltail, and bluebunch wheatgrass. Annual cheatgrass is also present, but produces less than 1% total cover. The forb composition is also diverse with twelve perennial and eight annual species sampled. Hood's phlox is the most abundant forb, producing 78% of the forb cover.

1996 APPARENT TREND ASSESSMENT

Soil trend is stable with no serious erosion occurring. Protective ground cover is average for a Wyoming big sagebrush type. The key browse species, Wyoming big sagebrush, appears to have a stable population. Utilization is light, vigor good, and percent decadency is low. The population of the increaser, narrowleaf low rabbitbrush, appears stable with the majority (94%) of the shrubs classified as mature. The herbaceous understory is diverse and fairly abundant for a

Wyoming big sagebrush type. It will likely not increase without a significant reduction in sagebrush canopy cover.

HERBACEOUS TRENDS --
Herd unit 01 , Study no: 18

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
G	Agropyron cristatum	7	3	.30
G	Agropyron dasystachyum	30	14	.19
G	Agropyron spicatum	51	18	.72
G	Bromus tectorum (a)	115	36	.30
G	Elymus spp.	10	4	.12
G	Festuca spp.	2	1	.03
G	Poa fendleriana	2	1	.03
G	Poa secunda	216	76	2.92
G	Sitanion hystrix	135	60	1.19
Total for Grasses		568	213	5.82
F	Allium acuminatum	1	1	.00
F	Arabis spp.	5	3	.04
F	Astragalus beckwithii	21	9	.12
F	Astragalus cibarius	35	15	.20
F	Astragalus utahensis	13	9	.14
F	Castilleja spp.	2	1	.03
F	Chaenactis douglasii	23	11	.05
F	Collomia spp. (a)	4	2	.01
F	Collinsia parviflora (a)	32	16	.10
F	Cryptantha spp.	12	8	.06
F	Descurainia pinnata	11	3	.01
F	Eriogonum ovalifolium	1	1	.00
F	Erigeron pumilus	50	18	.34
F	Gilia spp. (a)	2	2	.01
F	Lappula occidentalis (a)	22	13	.06
F	Orthocarpus spp. (a)	2	1	.00
F	Penstemon cyananthus	24	10	.25
F	Phlox hoodii	240	82	6.65
F	Phlox longifolia	67	30	.32
F	Ranunculus testiculatus (a)	11	3	.01
F	Unknown forb-annual	4	2	.03
Total for Forbs		582	240	8.48

BROWSE TRENDS --

Herd unit 01 , Study no: 18

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia nova	1	.76
B	Artemisia tridentata wyomingensis	76	7.83
B	Atriplex confertifolia	23	.31
B	Chrysothamnus nauseosus consimilis	2	-
B	Chrysothamnus viscidiflorus stenophyllus	86	7.31
B	Opuntia fragilis	7	.15
B	Sarcobatus vermiculatus	2	.38
B	Unknown browse	0	.30
Total for Browse		197	17.04

BASIC COVER --

Herd unit 01 , Study no: 18

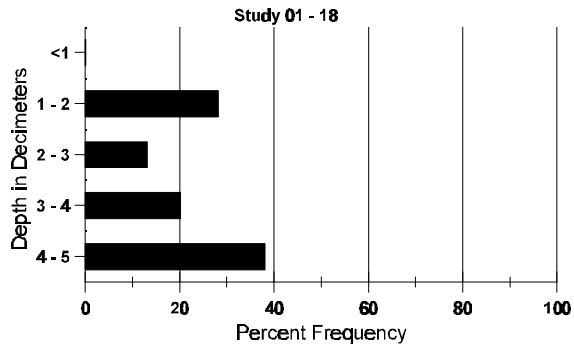
Cover Type	Nested Frequency '96	Average Cover % '96
Vegetation	409	29.98
Rock	198	2.48
Pavement	334	6.25
Litter	483	28.97
Cryptogams	189	7.75
Bare Ground	389	27.96

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 18

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
18.0	57.2 (16.6)	7.7	36.7	30.0	33.3	2.2	5.4	387.2	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 01 , Study no: 18

Type	Quadrat Frequency '96
Rabbit	7
Elk	3
Deer	6
Cattle	1

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 18

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia nova</i>																		
M	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20	10	26	1
D	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4
Total Plants/Acre (excluding Dead & Seedlings)												'96	40	Dec:	50%			
<i>Artemisia tridentata wyomingensis</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200			10
M	96	106	9	-	-	-	-	-	-	-	115	-	-	-	2300	22	31	115
D	96	26	11	-	4	2	-	-	-	-	34	-	2	7	860			43
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1040			52
Total Plants/Acre (excluding Dead & Seedlings)												'96	3360	Dec:	26%			
<i>Atriplex confertifolia</i>																		
S	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200			10
Y	96	41	-	-	3	-	-	-	-	-	44	-	-	-	880			44
M	96	9	-	-	4	1	-	-	-	-	14	-	-	-	280	8	10	14
Total Plants/Acre (excluding Dead & Seedlings)												'96	1160	Dec:	-			

A G E	YR	Form Class (No. of 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 consimilis</i>																		
Y	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
M	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	21	31	1
Total Plants/Acre (excluding Dead & Seedlings)												'96	40	Dec:	-			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	96	10	1	-	-	-	-	-	-	-	11	-	-	-	220		11	
M	96	300	-	-	11	-	-	-	-	-	311	-	-	-	6220	11	15	311
D	96	7	1	-	-	-	-	-	-	-	7	-	1	-	160		8	
Total Plants/Acre (excluding Dead & Seedlings)												'96	6600	Dec:	2%			
<i>Grayia spinosa</i>																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	18	40	0
Total Plants/Acre (excluding Dead & Seedlings)												'96	0	Dec:	-			
<i>Opuntia fragilis</i>																		
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	96	4	-	-	1	-	-	-	-	-	5	-	-	-	100	5	9	5
Total Plants/Acre (excluding Dead & Seedlings)												'96	140	Dec:	-			
<i>Sarcobatus vermiculatus</i>																		
Y	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	26	33	0
Total Plants/Acre (excluding Dead & Seedlings)												'96	80	Dec:	-			

TREND STUDY 1-19-96

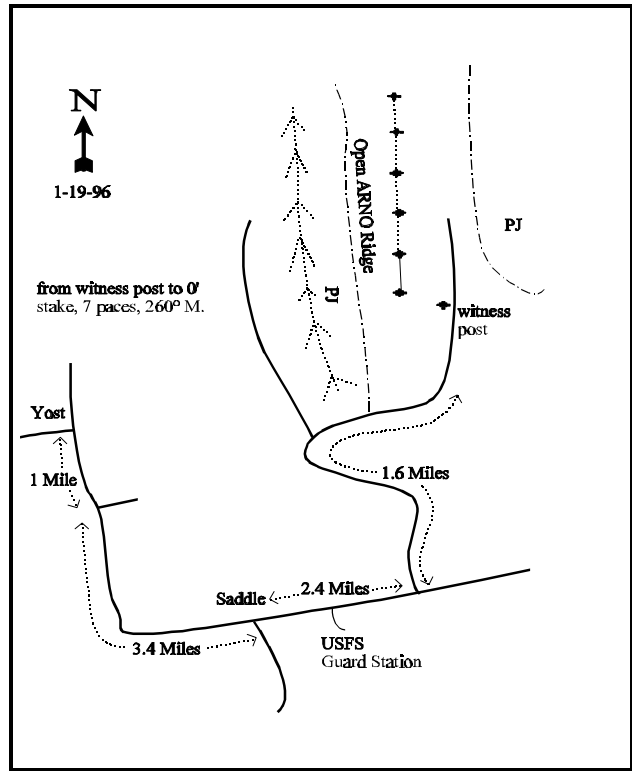
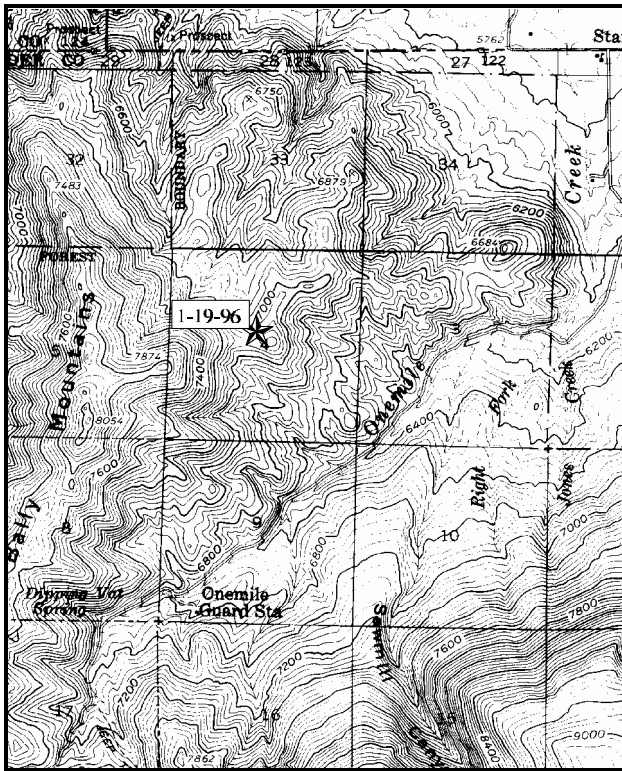
Study site name: Bally Mountain. Range type: Black sagebrush.

Compass bearing: frequency baseline 0 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From the yield sign east of the town of Yost, travel south and then west towards Bally Mountain for 1.0 miles. Stay right and continue for 3.4 miles. Stay left and travel 2.4 miles. Take a left and continue 1.6 miles to a witness post. From the witness post to the 0' stake, walk 7 paces at 260 degrees magnetic. The baseline runs 0 degrees magnetic.



Map Name: Park Valley '15

Diagrammatic Sketch

Township 15N, Range 25E, Section 4, UTM: 2-96-546E 46-49-400N

DISCUSSION

Trend Study No. 1-19

The Bally Mountain study site samples a open west facing ridge top surrounded by pinyon, juniper and curlleaf mountain mahogany. Slope of the ridge is 20% to 25% with an elevation of approximately 7,160 feet. Deer concentrate here during the winter because the slope remains open. Cattle also graze the area and a trail runs through the site. This area is within the Sawtooth National Forest. It is within the combined Raft River\Yost Pastures allotment which is grazed by 1,418 cattle in the spring and fall.

Soil depth is limited to an effective rooting depth (see methods) of about 13 inches. The profile is rocky throughout with mostly gravel and some cobble size rocks. Rock and pavement has a cover value of 18% with only 5% bare soil. Soil texture is a clay loam. Due to the abundant vegetation and litter cover, erosion is not a serious problem.

This open ridge is dominated by a low growing population of black sagebrush. It has an estimated density of 13,432 plants/acre with 54% classified as mature. The average mature plant measures only 5 inches high with a 15 inch crown. Utilization is moderate with only 3% classified as heavily hedged. Vigor is good on all plants except 21% of the decadent shrubs which were categorized as dying. Seedlings and especially young are numerous, yet the population will likely not expand much further due to increasing intraspecific competition. Additional forage is provided by a few scattered mountain big sagebrush, curlleaf mountain mahogany, and rubber rabbitbrush.

The next most abundant shrub consist of broom snakeweed which numbers about 6,412 plants/acre. These are also dwarfed by the harshness of the site and measure, on average, only 3 inches high by 4 inches across. Age class analysis indicate a dynamic reproductive potential. However, they will likely not increase much because of the harshness of the site.

The herbaceous understory is relatively well developed for a black sagebrush site. Five perennial grasses combine to produce 12% cover. Slender wheatgrass, Sandberg bluegrass, and prairie junegrass provide 98% of the total grass cover. Forbs are diverse and abundant. However, most of the common forbs are low value, low growing species which includes stemless goldenweed, desert phlox, and dandelion.

1996 APPARENT TREND ASSESSMENT

Protective ground cover is adequate to prevent most soil erosion on this site. Black sagebrush is abundant with adequate numbers of seedlings and young to maintain the population. Browse trend appears stable. The herbaceous understory is diverse and in good condition for this vegetation type. Some useful forbs are found, but the majority are low value forage species.

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 19

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
G	Agropyron trachycaulum	334	97	6.34
G	Bromus tectorum (a)	3	1	.00
G	Koeleria cristata	64	24	1.12

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
G	<i>Oryzopsis hymenoides</i>	14	6	.25
G	<i>Poa secunda</i>	301	89	4.57
G	<i>Sitanion hystrix</i>	2	1	.00
Total for Grasses		718	218	12.31
F	<i>Achillea millefolium</i>	4	2	.03
F	<i>Agoseris glauca</i>	2	1	.00
F	<i>Antennaria rosea</i>	6	3	.06
F	<i>Arabis</i> spp.	37	16	.08
F	<i>Arenaria fendleri</i>	160	55	.97
F	<i>Aster</i> spp.	24	8	.06
F	<i>Astragalus</i> spp.	117	51	1.52
F	<i>Castilleja linariaefolia</i>	36	19	.17
F	<i>Castilleja</i> spp.	11	5	.02
F	<i>Cirsium</i> spp.	3	2	.01
F	<i>Comandra pallida</i>	2	1	.00
F	<i>Collinsia parviflora</i> (a)	275	77	1.78
F	<i>Crepis intermedia</i>	2	1	.00
F	<i>Cryptantha</i> spp.	21	11	.13
F	<i>Cymopterus</i> spp.	4	1	.00
F	<i>Erigeron pumilus</i>	54	27	.26
F	<i>Haplopappus acaulis</i>	88	35	2.61
F	<i>Lappula occidentalis</i> (a)	30	11	.20
F	<i>Lesquerella</i> spp.	4	1	.00
F	<i>Linum lewisii</i>	55	18	.26
F	<i>Lomatium</i> spp.	5	2	.03
F	<i>Machaeranthera</i> spp	4	1	.00
F	<i>Orthocarpus</i> spp. (a)	7	3	.01
F	<i>Penstemon</i> spp.	2	1	.00
F	<i>Phlox austromontana</i>	238	79	5.08
F	<i>Ranunculus testiculatus</i> (a)	13	4	.16
F	<i>Senecio multilobatus</i>	48	25	.28
F	<i>Taraxacum officinale</i>	92	44	.50
F	<i>Tragopogon dubius</i>	18	7	.06
Total for Forbs		1362	511	14.39

BROWSE TRENDS --

Herd unit 01 , Study no: 19

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia nova	100	14.38
B	Artemisia tridentata vaseyana	1	-
B	Cercocarpus ledifolius	1	-
B	Chrysothamnus nauseosus	24	.82
B	Chrysothamnus viscidiflorus stenophyllus	1	-
B	Eriogonum microthecum	15	.01
B	Gutierrezia sarothrae	98	3.24
B	Mammillaria spp.	4	.01
B	Pinus monophylla	2	-
B	Tetradymia canescens	1	-
Total for Browse		247	18.48

BASIC COVER --

Herd unit 01 , Study no: 19

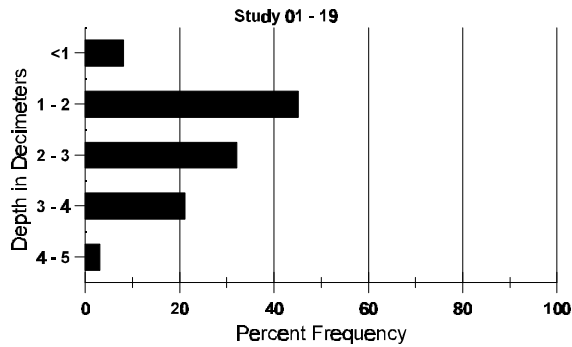
Cover Type	Nested Frequency '96	Average Cover % '96
Vegetation	463	44.50
Rock	316	6.55
Pavement	391	11.31
Litter	483	29.17
Cryptogams	233	2.90
Bare Ground	281	5.23

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 19

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.4	52.6 (14.5)	7.8	26.7	42.0	31.3	5.0	6.0	297.6	.7

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 01 , Study no: 19

Type	Quadrat Frequency '96
Rabbit	2
Deer	13
Cattle	3

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 19

A G E	YR	Form Class (No. of 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	96	19	-	-	-	-	-	-	-	-	19	-	-	-	380		19
Y	96	204	44	-	7	-	-	-	-	-	255	-	-	-	5100		255
M	96	48	934	38	-	-	-	-	-	-	1020	-	-	-	20400	5 15	1020
D	96	8	32	7	5	-	-	-	-	-	41	-	-	11	1040		52
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	380		19
Total Plants/Acre (excluding Dead & Seedlings)												'96	26540	Dec:	4%		
<i>Artemisia tridentata vaseyana</i>																	
Y	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	8 19	0
Total Plants/Acre (excluding Dead & Seedlings)												'96	20	Dec:	-		
<i>Cercocarpus ledifolius</i>																	
Y	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1
Total Plants/Acre (excluding Dead & Seedlings)												'96	20	Dec:	-		
<i>Chrysothamnus nauseosus</i>																	
Y	96	4	3	-	-	-	-	-	-	-	7	-	-	-	140		7
M	96	12	7	-	-	-	-	-	-	-	19	-	-	-	380	17 24	19
D	96	1	-	4	-	-	-	-	-	-	3	-	-	2	100		5
Total Plants/Acre (excluding Dead & Seedlings)												'96	620	Dec:	16%		

A G E	YR	Form Class (No. of 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	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	10	1
Total Plants/Acre (excluding Dead & Seedlings) '96 20 Dec: -																		
<i>Eriogonum microthecum</i>																		
Y	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
M	96	11	5	-	1	-	-	-	-	-	17	-	-	-	340	6	10	17
Total Plants/Acre (excluding Dead & Seedlings) '96 500 Dec: -																		
<i>Gutierrezia sarothrae</i>																		
S	96	57	-	-	1	-	-	-	-	-	58	-	-	-	1160			58
Y	96	258	-	-	19	-	-	-	-	-	277	-	-	-	5540			277
M	96	675	-	-	3	-	-	-	-	-	678	-	-	-	13560	3	4	678
D	96	21	-	-	-	-	-	-	-	-	16	-	-	5	420			21
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	340			17
Total Plants/Acre (excluding Dead & Seedlings) '96 19520 Dec: 2%																		
<i>Mammillaria spp.</i>																		
M	96	1	-	-	3	-	-	-	-	-	4	-	-	-	80	1	2	4
Total Plants/Acre (excluding Dead & Seedlings) '96 80 Dec: -																		
<i>Pinus monophylla</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Total Plants/Acre (excluding Dead & Seedlings) '96 40 Dec: -																		
<i>Tetradymia canescens</i>																		
M	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	11	17	1
Total Plants/Acre (excluding Dead & Seedlings) '96 20 Dec: -																		

TREND STUDY 1-20-96

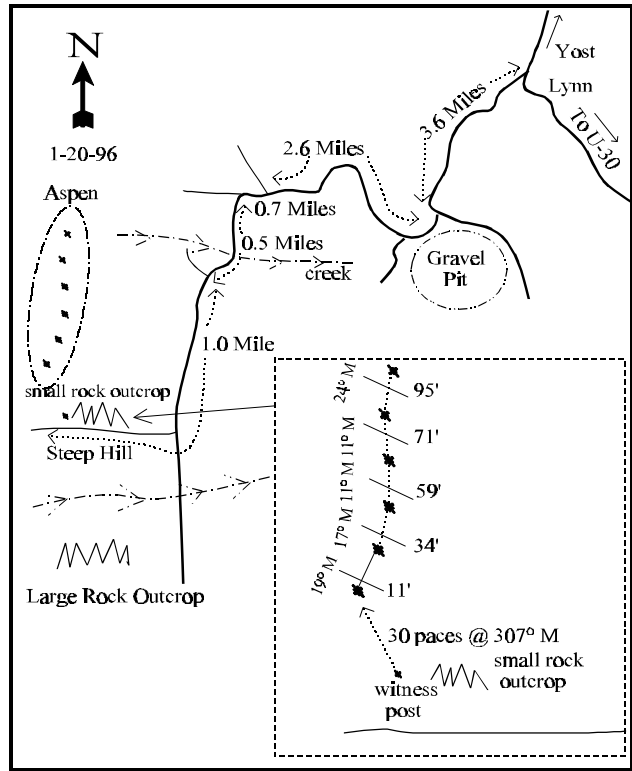
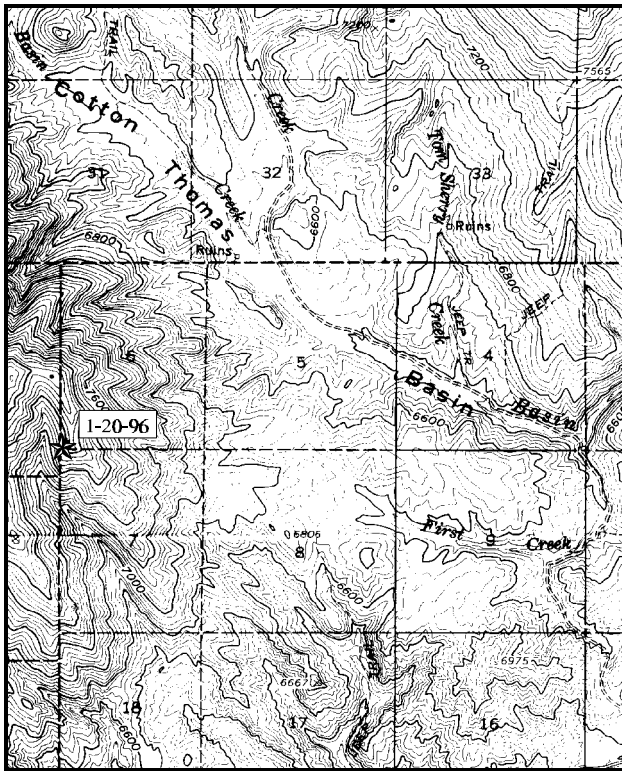
Study site name: Cotton Thomas. Range type: Aspen.

Compass bearing: frequency baseline 19 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From Lynn, travel north approximately 1/4 a mile and take a left. Continue 3.6 miles and take a left just before the gravel pit. Continue 2.6 miles to a fork in the road, stay left and proceed 0.7 miles to another fork. Stay left again and proceed 0.5 miles (you will cross a creek and come to a fork). Stay left at the fork and proceed 1 mile going up a steep hill to the right to the witness post on the right side of the road. From the witness post walk 30 paces at 307° magnetic. The baseline doglegs down through the aspen. The 100-foot baseline runs 19° M., the 200-foot baseline runs 17° M., the 300-foot baseline runs 11° M., the 400-foot baseline runs 11° M., and the 500-hundred foot baseline runs 24° M.



Map Name: Cotton Thomas Basin '15

Diagrammatic Sketch

Township 13N, Range 17W, Section 6, UTM: 2-64-733E 46-39-651N

DISCUSSION

Trend Study No. 1-20

The Cotton Thomas site is new and occurs on private land, placed in one of the few aspen clones in the Grouse Creek Mountains. The area lies west of the town of Lynn near the Cotton Thomas Basin. Aspen is a critical vegetation type for deer summer range. This site contains many dead and decadent trees. Most of the vigorous trees are of the younger age class. The majority of the aspen in the vicinity appear to be stunted in growth and possibly declining, most likely this is a marginal site for aspen with prolonged drought since 1985. This aspen clone is in the bottom of a drainage that runs south to north. Aspect is to the north with a slope of 5% and elevation of about 7,000 feet. Cattle graze this area in the summer, but since this is private land, no numbers or season of use is known. Water and a salt lick is less than a mile away.

The soil is relatively deep, dark colored and probably deeper than the estimated effective rooting depth of 37 inches (see methods). Surface rock cover is scarce (<1%) and nearly absent in the profile. Vegetation and litter cover are abundant leaving little bare soil exposed (5%). Erosion is not a problem.

The browse component is not a critical part of deer summer range, but many are useful for providing some forage for wildlife and cattle. These include, mountain big sagebrush, serviceberry, aspen, wax current, woods rose, and snowberry. Most browse appears not to be utilized. Mountain big sagebrush is found around the fringes of the aspen clone along with a few scattered serviceberry. Most of the other shrubs occur within the aspen canopy. Aspen provides the most browse forage. Many young and mature trees are still available for browsing. Point quarter data estimates a density of 4,486 plants/acre. Average diameter is just under 1 inch. Larger mature trees account for only 5% of the population. Population estimates using shrub density strip data estimates a density of 3,240 plants/acre, 81% of which are young trees. Overhead canopy cover is about 36%. Utilization on available trees is light and percent decadency low at 2%. The number of dead trees is approximately 300 per acre.

The herbaceous understory is diverse and very abundant. Thirteen grasses and one sedge were encountered. The most abundant species includes Kentucky bluegrass, sheep fescue, and bog bluegrass. The dominance of Kentucky bluegrass provides evidence of past heavy livestock grazing on this area as it increases with heavy livestock use.

The forb composition is diverse with 41 species inventoried. Dominant species include arrowleaf balsamroot, violet, dandelion, sweetroot, alpinebog swertia, and a milkvetch. Few forbs appeared to have been utilized at the time of reading, June 12, but livestock will likely graze later this summer.

1996 APPARENT TREND ASSESSMENT

Protective ground cover is abundant and well dispersed. Erosion is not a problem except on disturbed areas and cattle trails. The browse component is diverse and basically shows little use. Aspen is the key browse species. The stand is dense and mostly young with large mature trees comprising only about 5% of the population. The low percent rate of decadency and small number of dead trees would suggest that this stand is in good vigor. There are a number of other useful browse species present, but they all appear to show little use. Trend for browse appears stable for these species and improving for aspen. The herbaceous understory is diverse but the grass component is dominated by the increaser species, Kentucky bluegrass, which increases in response to heavy grazing. There was no sign of grazing yet this season, but livestock may graze here later in the summer. Forbs are represented by many common to the aspen type. Few appear to

have been utilized.

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 20

T Y P e	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
G	<i>Agropyron trachycaulum</i>	66	23	.61
G	<i>Bromus anomalus</i>	32	9	.19
G	<i>Bromus inermis</i>	4	1	.03
G	<i>Carex spp.</i>	40	17	.55
G	<i>Elymus cinereus</i>	36	13	1.20
G	<i>Festuca ovina</i>	96	27	2.83
G	<i>Koeleria cristata</i>	2	1	.03
G	<i>Poa spp.</i>	14	4	.47
G	<i>Poa leptocoma</i>	102	30	1.58
G	<i>Poa pratensis</i>	92	22	4.89
G	<i>Poa secunda</i>	3	1	.00
G	<i>Stipa columbiana</i>	9	3	.06
G	<i>Stipa lettermani</i>	5	1	.00
Total for Grasses		501	152	12.48
F	<i>Achillea millefolium</i>	12	7	.08
F	<i>Agoseris glauca</i>	52	24	.20
F	<i>Antennaria rosea</i>	10	3	.39
F	<i>Arabis drummondi</i>	14	6	.03
F	<i>Artemisia ludoviciana</i>	3	1	.03
F	<i>Astragalus convallarius</i>	20	7	.27
F	<i>Aster spp.</i>	43	19	.88
F	<i>Astragalus spp.</i>	69	20	1.00
F	<i>Balsamorhiza sagittata</i>	61	22	4.44
F	<i>Borago officinalis</i>	18	5	.07
F	<i>Castilleja spp.</i>	3	1	.00
F	<i>Cirsium spp.</i>	11	4	.19
F	<i>Collomia spp. (a)</i>	2	1	.00
F	<i>Comandra pallida</i>	8	5	.07
F	<i>Collinsia parviflora (a)</i>	96	26	.60
F	<i>Crepis acuminata</i>	16	6	.10
F	<i>Cryptantha spp.</i>	3	1	.00
F	<i>Delphinium bicolor</i>	17	6	.05
F	<i>Descurainia pinnata</i>	14	5	.10
F	<i>Descurainia spp. (a)</i>	14	6	.10
F	<i>Galium spp.</i>	130	40	.60

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
F	<i>Geranium richardsonii</i>	43	18	.60
F	<i>Hackelia patens</i>	1	1	.00
F	<i>Helianthus</i> spp.	37	13	.48
F	<i>Hydrophyllum capitatum</i>	22	11	.56
F	Labiatae	20	8	.43
F	<i>Lupinus argenteus</i>	8	4	.07
F	<i>Mertensia oblongifolia</i>	51	27	.51
F	<i>Osmorhiza occidentalis</i>	77	24	1.84
F	<i>Penstemon</i> spp.	5	3	.01
F	<i>Phlox longifolia</i>	16	5	.02
F	<i>Polygonum douglasii</i> (a)	5	2	.01
F	<i>Senecio serra</i>	37	19	1.12
F	<i>Smilacina stellata</i>	8	3	.33
F	<i>Stellaria jamesiana</i>	83	32	.40
F	<i>Swertia perennis</i>	42	20	1.58
F	<i>Taraxacum officinale</i>	142	51	1.92
F	<i>Thalictrum fendleri</i>	100	37	5.16
F	Unknown forb-annual	7	4	.19
F	<i>Veronica biloba</i> (a)	53	16	1.24
F	<i>Viguiera</i> spp.	2	1	.03
F	<i>Viola</i> spp.	260	76	3.89
Total for Forbs		1635	590	29.71

BROWSE TRENDS --

Herd unit 01 , Study no: 20

Type	Species	Strip Frequency '96	Average Cover % '96
B	<i>Amelanchier alnifolia</i>	2	.16
B	<i>Artemisia tridentata</i> <i>vaseyana</i>	32	2.90
B	<i>Chrysothamnus viscidiflorus</i> <i>stenophyllus</i>	51	3.66
B	<i>Eriogonum heracleoides</i>	3	.06
B	<i>Mahonia repens</i>	10	.64
B	<i>Populus tremuloides</i>	66	10.64
B	<i>Ribes cereum cereum</i>	10	.21
B	<i>Symphoricarpos oreophilus</i>	96	17.82

Type	Species	Strip Frequency '96	Average Cover % '96
Total for Browse		270	36.11

BASIC COVER --

Herd unit 01 , Study no: 20

Cover Type	Nested Frequency '96	Average Cover % '96
Vegetation	481	64.94
Rock	89	.53
Pavement	132	.88
Litter	491	64.61
Bare Ground	177	4.94

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 20

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
36.6	45.8	19.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A

PELLET GROUP FREQUENCY --

Herd unit 01 , Study no: 20

Type	Quadrat Frequency '96
Rabbit	1
Deer	1
Cattle	3

BROWSE CHARACTERISTICS --

Herd unit 01 , Study no: 20

A G E	YR	Form Class (No. of 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	96	-	-	-	5	-	-	-	-	-	5	-	-	-	100		5
Total Plants/Acre (excluding Dead & Seedlings)												'96	100	Dec:	-		

A G E	YR	Form Class (No. of 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	96	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2	
Y	96	12	-	-	7	-	-	-	-	-	19	-	-	-	380		19	
M	96	33	-	-	12	-	-	-	-	-	44	-	1	-	900	24 31	45	
D	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
Total Plants/Acre (excluding Dead & Seedlings)												'96	1320	Dec:	3%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	96	17	-	-	1	-	-	-	-	-	18	-	-	-	360		18	
M	96	62	-	-	47	-	-	-	-	-	109	-	-	-	2180	17 23	109	
D	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'96	2560	Dec:	1%			
<i>Eriogonum heracleoides</i>																		
M	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120	8 11	6	
Total Plants/Acre (excluding Dead & Seedlings)												'96	120	Dec:	-			
<i>Mahonia repens</i>																		
Y	96	-	-	-	4	-	-	-	-	-	4	-	-	-	80		4	
M	96	7	-	-	46	-	-	-	-	-	53	-	-	-	1060	6 7	53	
Total Plants/Acre (excluding Dead & Seedlings)												'96	1140	Dec:	-			
<i>Populus tremuloides</i>																		
S	96	13	1	-	4	-	-	-	-	-	18	-	-	-	360		18	
Y	96	117	-	-	14	-	-	-	-	-	131	-	-	-	2620		131	
M	96	19	-	-	-	-	-	1	7	-	26	-	-	1	540	- -	27	
D	96	1	-	-	-	-	-	-	3	-	3	-	-	1	80		4	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	300		15	
Total Plants/Acre (excluding Dead & Seedlings)												'96	3240	Dec:	2%			
<i>Ribes cereum cereum</i>																		
Y	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	160	36 114	8	
Total Plants/Acre (excluding Dead & Seedlings)												'96	220	Dec:	-			
<i>Rosa woodsii</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'96	0	Dec:	-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Symphoricarpos oreophilus																		
S	96	40	-	-	10	-	-	3	-	-	53	-	-	-	1060		53	
Y	96	44	2	-	36	-	-	-	-	-	82	-	-	-	1640		82	
M	96	257	-	-	59	-	-	-	-	-	316	-	-	-	6320	27	45	316
D	96	2	-	-	-	-	-	-	-	-	1	-	-	1	40		2	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'96	8000	Dec:	1%			

TREND STUDY 1-21-96

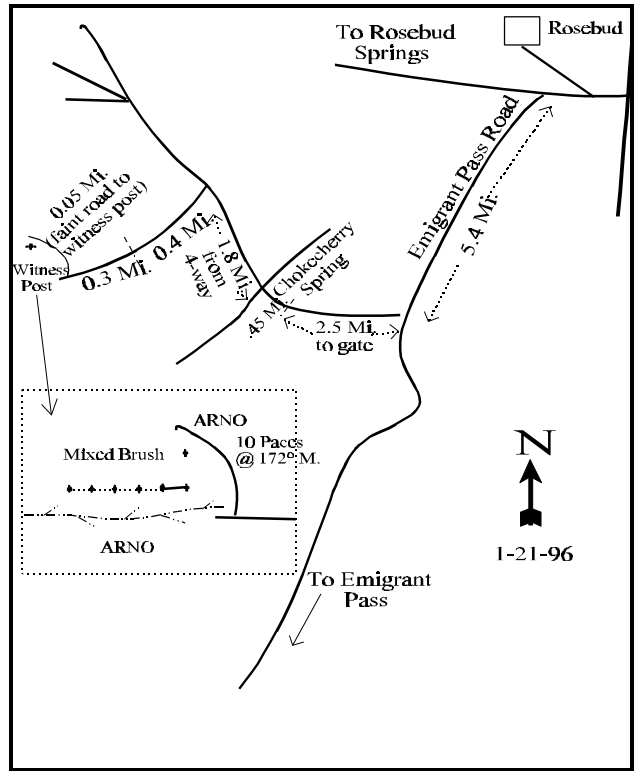
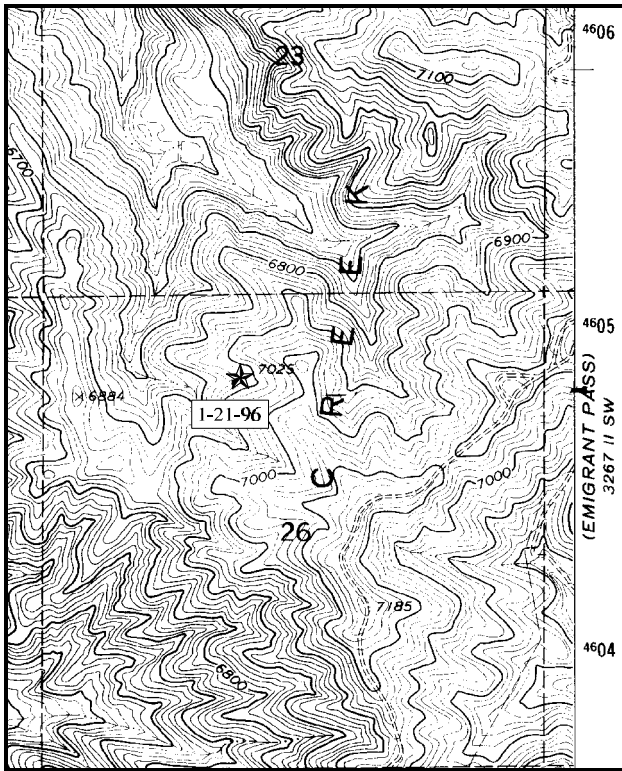
Study site name: Keq Spring. Range type: Mixed mountain brush.

Compass bearing: frequency baseline 241 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From the Rosebud Spring, Emigrant Pass Road intersection, travel up the Emigrant Pass Road for 5.4 miles. Turn right and travel 2.5 miles to a gate. Continue for 0.45 miles to a four way intersection. Continue straight through the intersection and drive 1.8 miles. Take a left and go 0.4 miles to another fence. From the fence, travel 0.3 miles and take a right at a faint road. Drive 0.05 to a witness post on the left hand side of the road. From the witness post, walk 10 paces at a bearing of 172 degrees magnetic. The baseline runs 241 degrees magnetic.



Map Name: Rocky Pass Peak

Diagrammatic Sketch

Township 10N Range 17W, Section 26, UTM: 2-69-750E 46-04-845N

DISCUSSION

Trend Study No. 1-21

The new study samples critical summer range above Keg Spring near the summit of the Grouse Creek Mountains. The vegetative type is mixed mountain brush. The site is on the south facing side of a long ridge which runs west. Slope is 13% to 17% and elevation is approximately 6,950 feet. There is no water nearby except from springs found further down the canyon at Keg and Willow Spring. Deer utilize this area most of the year except when snow forces them to lower elevations.

The soil is moderately shallow on the top of the ridge top, but noticeably deeper down slope where the base line occurs where the effective rooting depth is estimated at >21 inches (see methods). Protective cover from vegetation and litter are abundant and well dispersed leaving little bare soil exposed (<3%). Erosion is not currently a problem.

The dominant browse species include basin big sagebrush, mountain big sagebrush, and snowberry. Basin big sagebrush, intermixed with the mountain big sagebrush, has a density of 1,560 plants/acre. Mature plants are large and vigorous measuring nearly 3 feet in height with a crown of just over 3½ feet. Utilization is mostly light yet percent decadency is moderately high at 25%. Dead plants number an estimated 600 plants/acre, about 28% of the population. This past die-off would not be related to heavy use for it does not occur on basin big sagebrush. As has occurred in many other areas of the state, most likely the deeper rooted basin big sagebrush was affected by the prolonged drought and/or winter injury.

Mountain big sagebrush has a density of approximately 2,500 plants/acre, 70% of which are classified as mature. Utilization is generally light with moderate use noticed on some plants. Percent decadency is fairly low at 23%. The number of dead plants were estimated at 280/acre, or about 10% of the population.

Snowberry is the most abundant shrub on the site with a density of 3,840 plants/acre, which also provides the most browse cover (37%) of all browse species. Many of the plants were infested with insects which reduced the vigor for 41% of the population. All plants appear not to be utilized.

The herbaceous understory is diverse and abundant. However, the most abundant and dominant grass is cheatgrass, which accounts for 46% of the grass cover. Common perennial species include bluebunch wheatgrass, great basin wildrye, and Sandberg bluegrass. The forb component contains several useful species including, arrowleaf balsamroot, Indian paintbrush, northern sweetvetch, silvery lupine, and bluebell.

1996 APPARENT TREND ASSESSMENT

Abundant protective vegetation and litter cover provide excellent soil protection on this site. Percent bare ground is estimated at less than 3% with no serious erosion occurring. The key browse species is mountain big sagebrush followed by basin big sagebrush. Sagebrush shows only light to moderate utilization. It is in good vigor and has adequate seedlings and young to maintain their populations. Trend appears stable. The herbaceous understory is diverse and abundant. The grass component, however, is dominated by annual cheatgrass which contributes 46% of the grass cover.

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 21

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
G	<i>Agropyron dasystachyum</i>	10	3	.06
G	<i>Agropyron spicatum</i>	119	41	3.86
G	<i>Agropyron trachycaulum</i>	4	2	.03
G	<i>Bromus tectorum</i> (a)	225	51	9.33
G	<i>Elymus cinereus</i>	80	27	4.72
G	<i>Koeleria cristata</i>	10	3	.04
G	<i>Melica bulbosa</i>	2	1	.03
G	<i>Poa secunda</i>	67	23	1.14
G	<i>Sitanion hystrix</i>	1	1	.03
G	<i>Stipa columbiana</i>	13	9	.82
Total for Grasses		531	161	20.11
F	<i>Agoseris glauca</i>	48	22	.13
F	<i>Agastache urticifolia</i>	13	4	.59
F	<i>Allium</i> spp.	15	8	.04
F	<i>Astragalus beckwithii</i>	42	14	.49
F	<i>Aster</i> spp.	1	1	.00
F	<i>Balsamorhiza sagittata</i>	18	7	1.11
F	<i>Borago officinalis</i>	55	22	.86
F	<i>Castilleja linariaefolia</i>	2	1	.00
F	<i>Collomia linearis</i> (a)	88	33	.51
F	<i>Collinsia parviflora</i> (a)	284	76	2.66
F	<i>Crepis acuminata</i>	77	30	1.77
F	<i>Cryptantha</i> spp.	12	4	.04
F	<i>Delphinium bicolor</i>	11	6	.05
F	<i>Descurainia pinnata</i>	16	4	.02
F	<i>Galium aparine</i> (a)	40	12	.16
F	<i>Hackelia patens</i>	35	17	.43
F	<i>Hedysarum boreale</i>	10	5	.31
F	<i>Lappula occidentalis</i> (a)	7	3	.01
F	<i>Lithospermum ruderales</i>	27	12	1.00
F	<i>Lomatium triternatum</i>	7	4	.02
F	<i>Lupinus argenteus</i>	54	30	2.08
F	<i>Mertensia oblongifolia</i>	2	2	.03
F	<i>Microsteris gracilis</i> (a)	7	4	.02
F	<i>Navarretia intertexta</i> (a)	36	14	.14
F	<i>Phlox longifolia</i>	55	21	.20
F	<i>Polygonum douglasii</i> (a)	62	22	.16

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
F	Veronica biloba (a)	21	6	.08
F	Viola adunca	38	18	.09
Total for Forbs		1083	402	13.08

BROWSE TRENDS --

Herd unit 01 , Study no: 21

Type	Species	Strip Frequency '96	Average Cover % '96
B	Amelanchier utahensis	2	.18
B	Artemisia tridentata tridentata	32	3.15
B	Artemisia tridentata vaseyana	46	7.64
B	Chrysothamnus nauseosus consimilis	28	1.54
B	Chrysothamnus viscidiflorus stenophyllus	55	5.84
B	Eriogonum microthecum	1	.15
B	Juniperus osteosperma	1	-
B	Symphoricarpos oreophilus	63	10.71
Total for Browse		228	29.23

BASIC COVER --

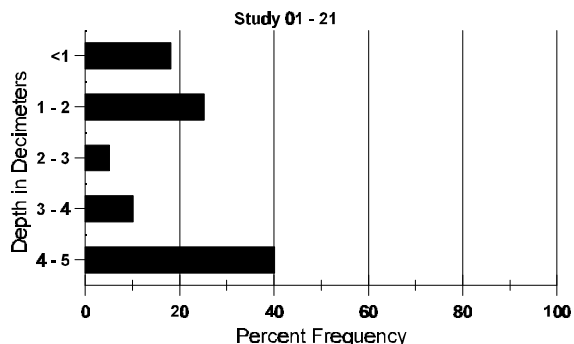
Herd unit 01 , Study no: 21

Cover Type	Nested Frequency '96	Average Cover % '96
Vegetation	475	59.40
Rock	120	1.69
Pavement	129	3.55
Litter	496	68.39
Cryptogams	13	.05
Bare Ground	129	2.63

SOIL ANALYSIS DATA --
 Herd Unit 01, Study no: 21

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
21.8	49.5 (19.4)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 01 , Study no: 21

Type	Quadrat Frequency '96
Rabbit	2
Deer	15

BROWSE CHARACTERISTICS --
 Herd unit 01 , Study no: 21

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Amelanchier utahensis																		
M	96	1	1	-	-	-	-	-	-	-	2	-	-	-	40	33	42	2
Total Plants/Acre (excluding Dead & Seedlings)												'96	40	Dec:	-			
Artemisia tridentata tridentata																		
Y	96	15	-	-	3	-	-	-	-	-	18	-	-	-	360			18
M	96	31	5	-	4	-	-	-	-	-	40	-	-	-	800	35	43	40
D	96	12	8	-	-	-	-	-	-	-	19	-	-	1	400			20
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	600			30
Total Plants/Acre (excluding Dead & Seedlings)												'96	1560	Dec:	26%			

A G E	YR	Form Class (No. of 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	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	96	8	1	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	96	69	17	-	1	-	-	-	-	-	87	-	-	-	1740	23 28	87	
D	96	23	5	-	1	-	-	-	-	-	20	-	1	8	580		29	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	280		14	
Total Plants/Acre (excluding Dead & Seedlings)												'96	2500	Dec:	23%			
<i>Chrysothamnus nauseosus consimilis</i>																		
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	96	42	-	-	6	-	-	-	-	-	48	-	-	-	960	29 34	48	
D	96	4	-	-	-	-	-	-	-	-	3	1	-	-	80		4	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
Total Plants/Acre (excluding Dead & Seedlings)												'96	1080	Dec:	7%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	96	5	-	-	2	-	-	-	-	-	7	-	-	-	140		7	
M	96	114	-	-	15	-	-	-	-	-	128	-	1	-	2580	15 20	129	
D	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'96	2740	Dec:	1%			
<i>Eriogonum microthecum</i>																		
M	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	8 12	3	
Total Plants/Acre (excluding Dead & Seedlings)												'96	60	Dec:	-			
<i>Juniperus osteosperma</i>																		
Y	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'96	20	Dec:	-			
<i>Purshia tridentata</i>																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	28 57	0	
Total Plants/Acre (excluding Dead & Seedlings)												'96	0	Dec:	-			
<i>Symphoricarpos oreophilus</i>																		
S	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	96	35	-	-	26	-	-	-	-	-	46	-	8	7	1220		61	
M	96	90	-	-	13	-	-	-	-	-	59	7	37	-	2060	23 42	103	
D	96	27	-	-	1	-	-	-	-	-	1	-	6	21	560		28	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'96	3840	Dec:	15%			

TREND STUDY 1-22-96

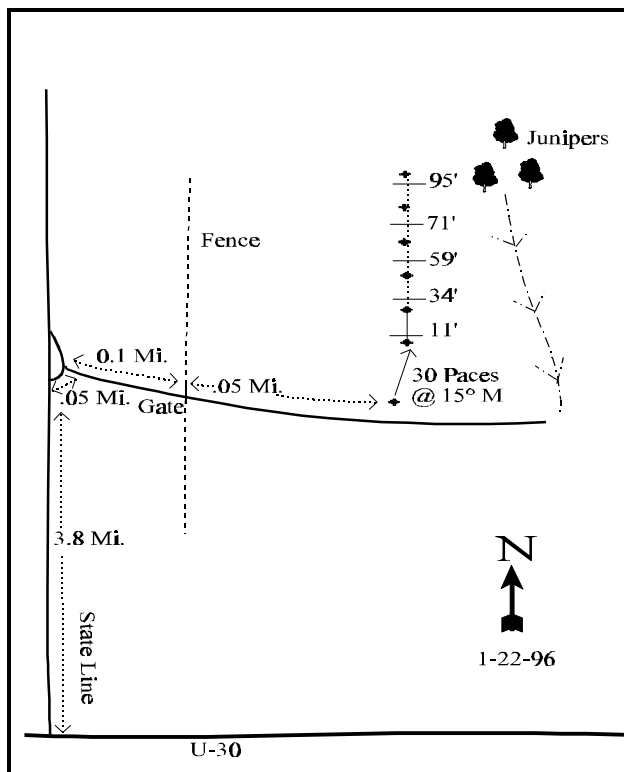
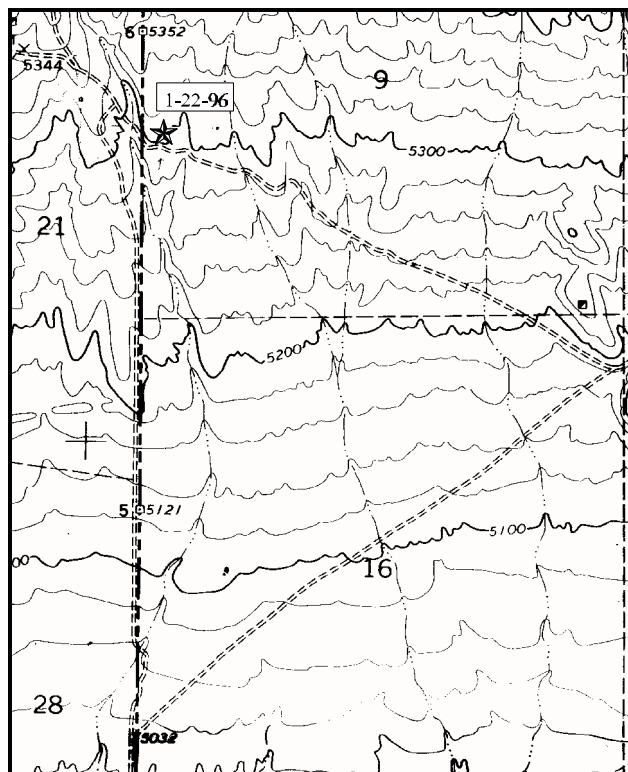
Study site name: Dake Pass. Range type: Black sagebrush.

Compass bearing: frequency baseline 0 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From U-30 at the Utah/Nevada State Line, near mile marker 0, travel 3.8 miles to an intersection. Take a right at the intersection and travel 0.15 to a gate. From the gate drive 0.05 miles to a witness post on the left hand side of the road. From the witness post walk 30 paces at 15 degrees magnetic to the 0-foot baseline stake. The baseline runs 0 degrees magnetic.



Map Name: Jackson Spring

Diagrammatic Sketch

Township 8N, Range 19W, Section 9, UTM: 7-47-685E 45-90-200N

DISCUSSION

Trend Study No. 1-22

The new Dake Pass site samples a salt desert shrub community just west of the Nevada State line. The site is characterized by gentle low ridges dominated by black sagebrush and shallow drainage depressions with deeper soils and a good association of grasses. Site aspect is to the south with a gentle 3% to 5% slope and an elevation of about 5,280 feet. This area is utilized by deer and elk as winter range. It is also reportedly an important sage grouse strutting area. Deer and elk pellets were encountered but more appeared to be outside of the sampled area. No grouse were seen and no scat was encountered on the site. Some coyote droppings were found along with sign of past livestock activity. This area is within the U & I allotment. It is grazed by 914 cattle from November 1 to March 31.

The soil is moderately shallow with an effective rooting depth of 10 inches, light colored, with considerable surface rock and pavement cover. Soil texture is a sandy clay loam. There are large open areas between individual shrubs, but little bare soil is exposed (4%) due to the abundance of pavement cover. The soil profile is rocky throughout, yet no hardpan was noted. Aside from the gradual movement of soil from the low ridges, there is no accelerated erosion occurring.

Black sagebrush dominates the site, but there are several associated and useful species including; bud sagebrush, shadscale, winterfat, Nevada ephedra, and spiny hopsage. All provide additional forage for wintering big game. Black sagebrush has an estimated density of 7,580 plants/acre. Utilization is moderate with 21% of the population displaying heavy use. Percent decadency is moderate at 32%. Vigor is good on all but 21% of the decadent shrubs which were classified as dying. Seedlings are very abundant with 5,660 seedlings/acre estimated. Young plants are also numerous (800 per acre).

Bud sagebrush has an estimated density of 1,080 plants/acre. These plants measure, on average, only 5 inches in height with a 13 inch crown. This may be due to continued heavy use. Currently, 24% of the population displays heavy use. Shadscale is abundant with an estimated density of 4,800 plants/acre. The population appears stable with numerous seedlings and young being inventoried. Utilization is light to moderate. Winterfat, Ephedra, and hopsage occur infrequently. Most of the winter fat and Ephedra are heavily hedged while use of hopsage is mostly light to moderate. Other, less desirable shrubs include narrowleaf low rabbitbrush, and two species of spiny horsebrush.

The herbaceous understory is not particularly abundant, yet is well developed for a salt desert shrub community. Grasses and forbs combine to produce nearly 10% cover. Common grasses consist of Sandberg bluegrass and bottlebrush squirreltail. Forbs are diverse, however most have low forage value. Hoods phlox dominates the forb component by providing 67% of the forb cover.

1996 APPARENT TREND ASSESSMENT

Some inevitable soil movement is occurring on the low ridges, but little bare soil is exposed due to the abundant pavement and rock cover (33%). No active gullies are present and accelerated erosion is not occurring. The key browse is black sagebrush. It appears to have a stable population with a moderate percent decadency of 32%, yet the majority of the plants have good vigor with more than adequate numbers of seedlings and young. The other preferred browse species also appear to have stable populations. The herbaceous understory is fairly well developed for a salt desert shrub community. Forbs are, however, dominated by low value species.

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 22

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
G	<i>Bromus tectorum</i> (a)	27	8	.04
G	<i>Oryzopsis hymenoides</i>	49	18	.64
G	<i>Poa secunda</i>	136	49	2.87
G	<i>Sitanion hystrix</i>	129	55	2.46
Total for Grasses		341	130	6.02
F	<i>Agoseris glauca</i>	3	1	.00
F	<i>Arabis</i> spp.	10	5	.02
F	<i>Astragalus utahensis</i>	12	6	.03
F	<i>Collinsia parviflora</i> (a)	14	4	.02
F	Cruciferae	4	2	.38
F	<i>Cryptantha</i> spp.	33	12	.42
F	<i>Descurainia pinnata</i>	2	1	.00
F	<i>Eriogonum ovalifolium</i>	1	1	.00
F	<i>Erigeron pumilus</i>	2	1	.00
F	<i>Gilia</i> spp. (a)	5	3	.01
F	<i>Halogeton glomeratus</i> (a)	1	1	.00
F	<i>Lappula occidentalis</i> (a)	15	5	.05
F	<i>Melilotus alba</i>	6	2	.03
F	<i>Navarretia intertexta</i> (a)	7	3	.01
F	<i>Phlox hoodii</i>	107	36	2.47
F	<i>Phlox longifolia</i>	27	15	.15
F	<i>Sphaeralcea grossulariaefolia</i>	1	1	.03
F	<i>Townsendia</i> spp.	3	3	.01
Total for Forbs		253	102	3.70

BROWSE TRENDS --

Herd unit 01 , Study no: 22

Type	Species	Strip Frequency '96	Average Cover % '96
B	<i>Artemisia nova</i>	87	14.13
B	<i>Artemisia spinescens</i>	19	.55
B	<i>Atriplex confertifolia</i>	56	4.50
B	<i>Ceratoides lanata</i>	3	.03
B	<i>Chrysothamnus viscidiflorus stenophyllus</i>	35	1.76

Type	Species	Strip Frequency '96	Average Cover % '96
B	Ephedra nevadensis	9	.21
B	Grayia spinosa	10	2.70
B	Kochia americana	17	.75
B	Mammillaria spp.	3	.00
B	Tetradymia nuttallii	4	.30
B	Tetradymia spinosa	1	-
Total for Browse		244	24.95

BASIC COVER --

Herd unit 01 , Study no: 22

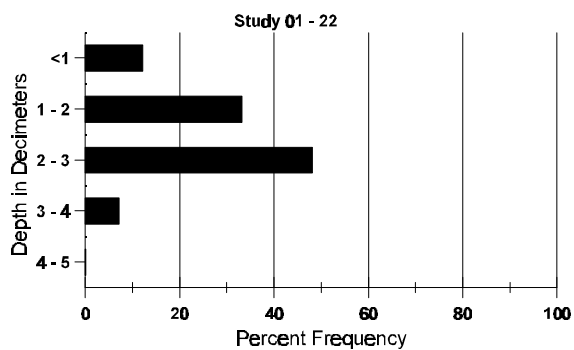
Cover Type	Nested Frequency '96	Average Cover % '96
Vegetation	385	33.97
Rock	278	5.53
Pavement	427	27.12
Litter	479	33.09
Cryptogams	223	2.29
Bare Ground	248	4.20

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 22

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.2	60.8 (10.6)	8.2	42.7	28.0	29.3	1.8	9.3	380.8	.8

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 01 , Study no: 22

Type	Quadrat Frequency '96
Elk	1
Deer	1

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 22

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia nova</i>																		
S	96	276	-	-	7	-	-	-	-	-	283	-	-	-	5660		283	
Y	96	27	13	-	-	-	-	-	-	-	40	-	-	-	800		40	
M	96	46	139	28	2	-	-	-	-	-	215	-	-	-	4300	11	23	215
D	96	15	55	51	2	1	-	-	-	-	98	-	-	26	2480		124	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1720		86	
Total Plants/Acre (excluding Dead & Seedlings)												'96	7580	Dec:	33%			
<i>Artemisia spinescens</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	96	12	-	1	-	-	-	-	-	-	13	-	-	-	260		13	
M	96	17	6	4	-	-	-	-	-	-	26	-	1	-	540	5	13	27
D	96	5	-	6	1	-	2	-	-	-	3	-	1	10	280		14	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'96	1080	Dec:	26%			
<i>Atriplex confertifolia</i>																		
S	96	82	-	-	1	-	-	-	-	-	83	-	-	-	1660		83	
Y	96	61	-	5	4	-	-	-	-	-	70	-	-	-	1400		70	
M	96	113	11	7	11	-	-	-	-	-	140	-	-	2	2840	9	15	142
D	96	17	5	6	-	-	-	-	-	-	23	1	-	4	560		28	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	260		13	
Total Plants/Acre (excluding Dead & Seedlings)												'96	4800	Dec:	12%			
<i>Ceratoides lanata</i>																		
Y	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1	
M	96	-	-	1	1	-	-	-	-	-	1	1	-	-	40	7	12	2
Total Plants/Acre (excluding Dead & Seedlings)												'96	60	Dec:	-			

A G E	YR	Form Class (No. of 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>																		
S	96	12	-	-	8	-	-	-	-	-	20	-	-	-	400		20	
Y	96	-	2	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	96	49	-	-	1	-	-	-	-	-	49	-	1	-	1000	10 16	50	
D	96	2	2	-	-	-	-	-	-	-	4	-	-	-	80		4	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'96	1120	Dec:	7%			
<i>Ephedra nevadensis</i>																		
Y	96	1	-	-	2	-	-	-	-	-	3	-	-	-	60		3	
M	96	2	3	5	-	1	-	-	-	-	11	-	-	-	220	18 29	11	
Total Plants/Acre (excluding Dead & Seedlings)												'96	280	Dec:	-			
<i>Grayia spinosa</i>																		
M	96	8	2	-	-	-	-	-	-	-	7	-	3	-	200	23 34	10	
D	96	2	-	1	-	-	-	-	-	-	2	-	-	1	60		3	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'96	260	Dec:	23%			
<i>Kochia americana</i>																		
S	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	96	55	9	-	-	-	-	-	-	-	64	-	-	-	1280	6 11	64	
D	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'96	1360	Dec:	1%			
<i>Mammillaria spp.</i>																		
M	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	0 2	3	
Total Plants/Acre (excluding Dead & Seedlings)												'96	60	Dec:	-			
<i>Opuntia fragilis</i>																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4 13	0	
Total Plants/Acre (excluding Dead & Seedlings)												'96	0	Dec:	-			
<i>Tetradymia nuttallii</i>																		
M	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	15 19	2	
D	96	2	-	-	-	-	-	-	-	-	1	-	-	1	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'96	80	Dec:	50%			
<i>Tetradymia spinosa</i>																		
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6 11	1	
Total Plants/Acre (excluding Dead & Seedlings)												'96	60	Dec:	-			

TREND STUDY 1-23-96

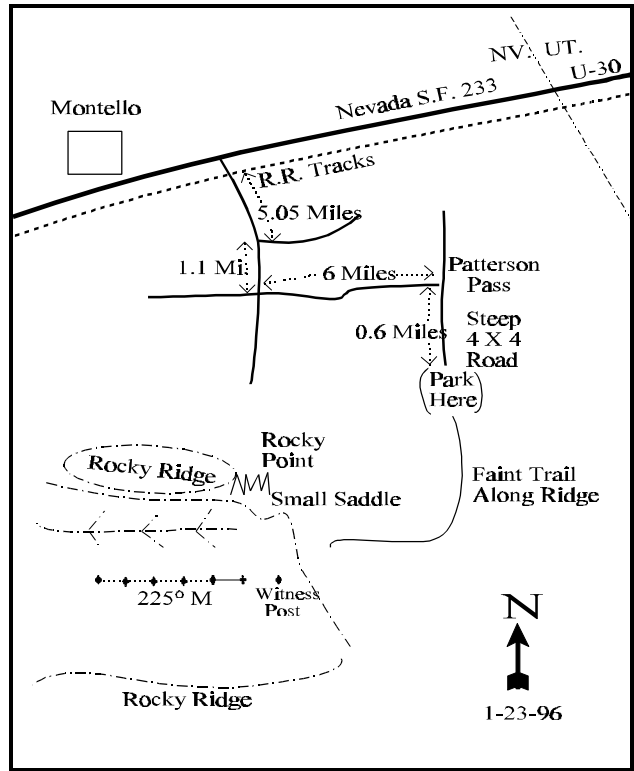
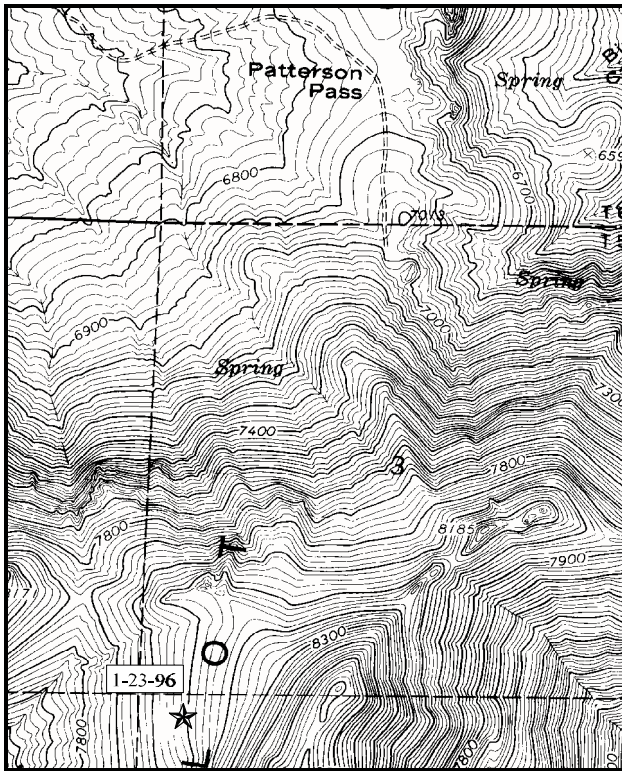
Study site name: Patterson Pass. Range type: Mountain big sagebrush.

Compass bearing: frequency baseline 225 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

Drive 0.5 miles past mile marker 25 on Nevada State Road 233. Turn left and cross tracks and continue straight for 5.05 miles. At this point there will be a road going to the left. Stay right and continue 1.1 miles to a four way intersection. Take a left turn and drive 6 miles to Patterson Pass. Take a right turn and drive 0.6 miles up a steep four wheel drive road. Park here. Walk on a faint trail up the ridge to a witness post in the saddle. The 0-foot baseline stake is just a few paces west of the witness post. The baseline runs 225 degrees magnetic.



Map Name: Patterson Pass

Diagrammatic Sketch

Township 5N Range 19W, Section 10, UTM: 7-51-858E 45-56-500N

DISCUSSION

Trend Study No. 1-23

This is a new site placed within a saddle above and south of Patterson Pass. The area is remote and accessible only by foot. The site has a west aspect with a moderate slope of 15% to 20% and an elevation of about 8,200 feet. This area receives concentrated use by elk as indicated by a pellet group frequency of 58%. Some of the elk pellet groups appear recent, indicating that elk use this area during most of the year then move to lower elevations when the snow gets too deep. Small numbers of deer pellet groups were also encountered. Chuckers were heard on the nearby rocky slopes during study establishment. The area is within the Lucin/Pilot allotment which is grazed by cattle and sheep. Livestock do not appear to utilize the steeper slopes where the transect is located.

The soil is moderately shallow with an estimated effective rooting depth of 10 inches (see methods). It is extremely rocky with numerous large rocks and boulders on the surface and throughout the profile. Rooting depth is limited in some areas where black sagebrush occurs in isolated pockets, but the deeper rooted mountain big sagebrush, which dominates the site, would indicate a noticeably deeper soil. Protective ground cover, in the form of vegetation and litter cover, is abundant and well dispersed. Accelerated erosion is not a problem on the site.

The site is dominated by a stand of moderately large, vigorous mountain big sagebrush. They account for 59% of the browse cover with an estimated population of 5,060 plants/acre. Sixty-eight percent of the population are classified as mature plants. Utilization is light to moderate with 11% of the shrubs displaying heavy hedging. Percent decadency is low at 15%. There are adequate numbers of seedlings and young to maintain the population. Dead plants number only 400 per acre, which is only 7% of the population. On a more flat area, some of the sagebrush exhibit signs of winter injury.

Additional forage is provided by black sagebrush, slenderbush eriogonum, and a few scattered wax current. Black sagebrush occurs in isolated patches where soil depth is obviously limited. The population is in good vigor with light to moderate utilization and low percent decadency.

The increaser, stickyleaf low rabbitbrush, is abundant with an estimated density of 4,100 plants/acre. The majority (78%) of the population consist of mature plants. Most plants appear to not be utilized.

The herbaceous understory is abundant. Nine grasses and 18 forbs combine to produce 29% cover or almost 50% of the total vegetative cover. Grasses are dominated by sheep fescue which provides 70% of the grass cover. Other common grasses include, spike fescue, and Sandberg bluegrass. Several useful forb species are present. These include; silvery lupine, bluebell, lambstongue, and hooker balsamroot. Utilization was noted on the lambstongue and bluebell.

1996 APPARENT TREND ASSESSMENT

Protective ground cover is more than adequate to prevent accelerated erosion from occurring. Vegetation and litter cover are abundant and well dispersed leaving little bare soil(3%). The key browse species, mountain big sagebrush appears to have a stable, vigorous population. Black sagebrush also appears stable. Stickyleaf low rabbitbrush is also abundant but the population is mostly mature, indicating that it is not increasing. The herbaceous understory is abundant and provides good forage for elk and deer. Grasses and forbs will likely not increase significantly unless the shrub canopy cover (30%) is reduced.

HERBACEOUS TRENDS --

Herd unit 01 , Study no: 23

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
G	<i>Agropyron spicatum</i>	43	15	.32
G	<i>Elymus cinereus</i>	5	1	.63
G	<i>Festuca ovina</i>	292	89	12.97
G	<i>Leucopoa kingii</i>	110	32	2.50
G	<i>Poa fendleriana</i>	47	22	.77
G	<i>Poa pratensis</i>	1	1	.03
G	<i>Poa secunda</i>	95	37	1.07
G	<i>Sitanion hystrix</i>	3	1	.00
G	<i>Stipa lettermani</i>	11	6	.08
Total for Grasses		607	204	18.40
F	<i>Agoseris glauca</i>	83	31	.60
F	<i>Astragalus utahensis</i>	1	1	.00
F	<i>Balsamorhiza hookeri</i>	5	3	.01
F	<i>Comandra pallida</i>	7	4	.07
F	<i>Collinsia parviflora (a)</i>	198	62	.86
F	<i>Crepis acuminata</i>	7	4	.02
F	<i>Haplopappus acaulis</i>	2	1	.15
F	<i>Hackelia patens</i>	33	11	.44
F	<i>Lupinus argenteus</i>	150	66	4.57
F	<i>Lygodesmia spinosa</i>	2	1	.03
F	<i>Mertensia oblongifolia</i>	71	32	.77
F	<i>Penstemon spp.</i>	3	1	.00
F	<i>Phlox longifolia</i>	188	68	.81
F	<i>Polygonum douglasii (a)</i>	6	3	.04
F	<i>Potentilla pennsylvanica</i>	50	27	.61
F	<i>Senecio integerrimus</i>	77	34	1.22
F	<i>Sisymbrium altissimum (a)</i>	4	2	.03
F	<i>Taraxacum officinale</i>	31	13	.35
Total for Forbs		918	364	10.63

BROWSE TRENDS --

Herd unit 01 , Study no: 23

Type	Species	Strip Frequency '96	Average Cover % '96
B	<i>Artemisia nova</i>	34	6.58
B	<i>Artemisia tridentata vaseyana</i>	85	17.79

Type	Species	Strip Frequency '96	Average Cover % '96
B	Chrysothamnus viscidiflorus stenophyllus	74	4.60
B	Eriogonum microthecum	38	1.36
B	Mammillaria spp.	3	-
Total for Browse		234	30.35

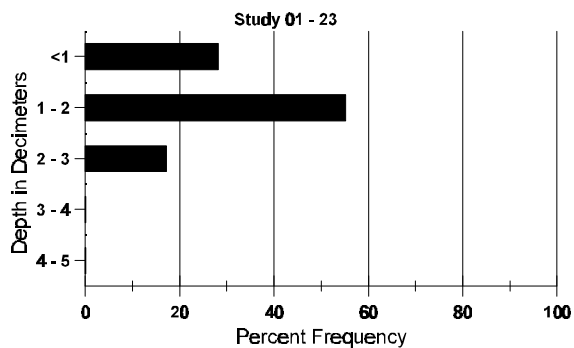
BASIC COVER --
Herd unit 01 , Study no: 23

Cover Type	Nested Frequency '96	Average Cover % '96
Vegetation	443	55.85
Rock	236	12.85
Pavement	94	.60
Litter	486	61.70
Cryptogams	3	.00
Bare Ground	155	3.30

SOIL ANALYSIS DATA --
Herd Unit 01, Study no: 23

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.8	53.0 (8.8)	6.7	40.6	33.4	26.0	5.4	36.2	444.8	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 01 , Study no: 23

Type	Quadrat Frequency '96
Elk	58
Deer	4

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 23

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia nova</i>																		
S	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
Y	96	9	4	-	-	-	-	-	-	-	13	-	-	-	260		13	
M	96	49	33	1	-	-	-	-	-	-	83	-	-	-	1660	11	25	83
D	96	5	4	-	-	-	-	-	-	-	9	-	-	-	180		9	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
Total Plants/Acre (excluding Dead & Seedlings)												'96	2100	Dec:	9%			
<i>Artemisia tridentata vaseyana</i>																		
S	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340		17	
Y	96	40	3	-	-	-	-	-	-	-	43	-	-	-	860		43	
M	96	95	48	26	-	2	-	-	-	-	170	-	1	-	3420	19	33	171
D	96	21	16	2	-	-	-	-	-	-	30	-	1	8	780		39	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	400		20	
Total Plants/Acre (excluding Dead & Seedlings)												'96	5060	Dec:	15%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	96	21	-	-	2	-	-	-	-	-	22	-	1	-	460		23	
M	96	141	-	-	19	-	-	-	-	-	157	-	3	-	3200	11	16	160
D	96	12	8	-	2	-	-	-	-	-	11	-	5	6	440		22	
Total Plants/Acre (excluding Dead & Seedlings)												'96	4100	Dec:	11%			
<i>Eriogonum microthecum</i>																		
Y	96	9	-	-	1	-	-	-	-	-	10	-	-	-	200		10	
M	96	40	8	-	7	-	-	1	-	-	56	-	-	-	1120	6	12	56
Total Plants/Acre (excluding Dead & Seedlings)												'96	1320	Dec:	-			
<i>Mammillaria spp.</i>																		
M	96	1	2	-	1	-	-	-	-	-	4	-	-	-	80	7	6	4
Total Plants/Acre (excluding Dead & Seedlings)												'96	80	Dec:	-			
<i>Ribes cereum cereum</i>																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	3	94	0
Total Plants/Acre (excluding Dead & Seedlings)												'96	0	Dec:	-			

TREND STUDY 1-24-96

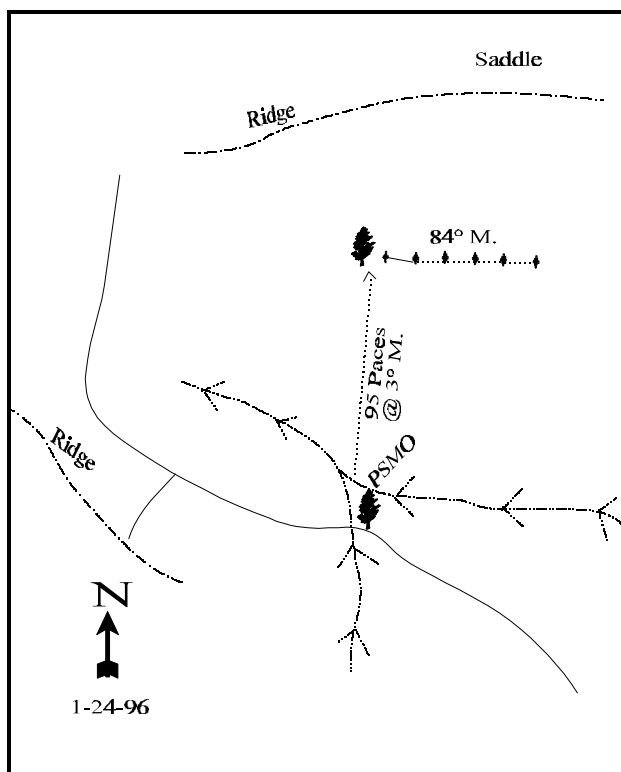
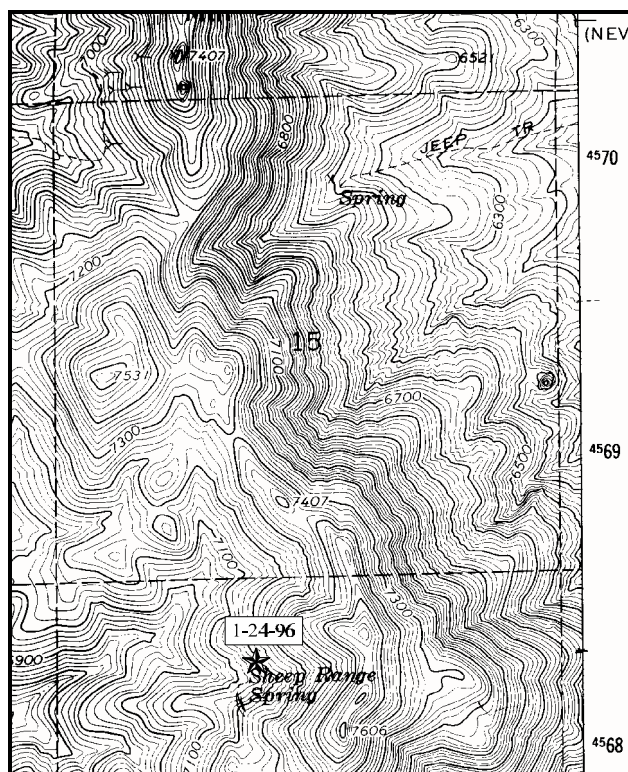
Study site name: Sheep Range Spring. Range type: Mountain big sagebrush.

Compass bearing: frequency baseline 84 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From Grouse Creek Junction, travel south for 5.4 miles to the railroad tracks. Continue straight for 0.6 miles to the TL Bar Beefmaster ranch. Take the left fork and travel 5 miles to a fork in the road. Take a right turn and travel 2.1 miles to a four way intersection. Continue straight (stay right) for 2.7 miles to Government Springs. Take a left at Government Springs and drive 1.0 mile. Take a right and travel down hill for 1.0 mile. Take the left fork and continue for 1.6 miles to an intersection. From the intersection take the left and continue for 1.1 miles where there will be a road going up a steep hill to the right. Stay left and travel 0.1 miles to the witness post on the left hand side of the road. From the witness post walk 95 paces at 3 degrees magnetic to the 0-baseline stake (near a small PSMO). The baseline runs 84 degrees magnetic.



Map Name: Patterson Pass

Diagrammatic Sketch

Township 6N Range 19W, Section 22, UTM: 7-50-312E 45-68-288N

DISCUSSION

Trend Study No. 1-24

This is a new study located north of Sheep Range Spring to monitor preferred habitat used by an increasing elk population in the Pilot Mountains. The study samples a sagebrush-grass range type at an elevation of about 7,260 feet. The site was placed on the south, south-west facing side of a east, west running ridge. Slope on the site is 22% to 28%. Elk pellet groups are abundant with some groups recent and two cow elk were seen in the area during study establishment. Deer pellet groups were also encountered in relatively small numbers. Two large sage grouse were seen near the site. Deer and elk likely utilize this area during the summer as well as normal winters. Cattle grazing occurs in the lower canyons but no cattle were seen in the immediate area and no cattle pats were encountered on the site. This area is within the Lucin/Pilot allotment which is assigned for summer cattle use and spring sheep use. There are many mining claims in the area, but most do not appear active.

The soil is moderately shallow and extremely rocky under the first few inches of soil. There is a noticeable buildup of rock and pavement on the surface with almost a 15% cover value. Effective soil depth is estimated at about 10 inches along the first 300 feet of the baseline, but is noticeably deeper (22 inches) along the last 200 feet. The overall average effective rooting depth is almost 15 inches. Soil texture is a loam which is adequately protected from erosion by abundant vegetation and litter cover.

The site is surrounded by ridges dominated by black sagebrush. The base line was placed on a ridge with deeper soils and more grass and forb cover. The browse component is dominated by mountain big sagebrush and is intermixed with black sagebrush in some of the areas with the shallower soils. Mountain big sagebrush density is estimated at 2,200 plants/acre, 66% of which are classified as mature. Utilization is mostly light with a few heavily hedged individual plants. Vigor is good on most plants and percent decadency is low at 15%. Some of the decadent and dead sagebrush are found in areas with the more shallow soils where black sagebrush is more prevalent. Black sagebrush has an estimated density of 1,020 plants/acre. Utilization is light, vigor good and decadency low at 13%.

The most numerous shrub on the site is the increaser, stickyleaf low rabbitbrush. It has an estimated density of 3,600 plants/acre, 73% of which are mature plants. The average mature plants measures 15 inches in height with a crown of 25 inches. These shrubs appear not to be utilized. The dominant age classes indicate a stable to slightly increasing population. Other shrubs which are found on the site include; rubber rabbitbrush and slenderbush eriogonum.

The herbaceous understory is abundant with grasses combining to produce nearly 17% cover. Cheat grass is common and accounts for 33% of the total grass cover. Common perennial species include; Sandberg bluegrass, bluebunch, and thickspike wheatgrass. Forbs also produce nearly 18% total cover. The dominant perennial species consist of arrowleaf balsamroot, silvery lupine, longleaf phlox, stickseed, and two milkvetch species. Some of the arrowleaf balsamroot was infested with bugs which caused yellow spots on the leaves.

1996 APPARENT TREND ASSESSMENT

Soil conditions are stable with abundant vegetation and litter cover. No accelerated erosion is occurring on the site. Mountain big sagebrush appears to be stable. Utilization is light, vigor good, and percent decadency low. The herbaceous understory is dominated by perennial grasses and forbs. The only negative aspect to the grass composition is the abundance of annual cheatgrass. Any decline in perennial grasses will likely allow an increase in cheatgrass.

Forbs are also abundant with several preferred summer forage species for deer and elk.

HERBACEOUS TRENDS --
Herd unit 01 , Study no: 24

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
G	<i>Agropyron dasystachyum</i>	122	36	2.07
G	<i>Agropyron spicatum</i>	106	37	2.09
G	<i>Bromus tectorum</i> (a)	307	77	5.48
G	<i>Poa fendleriana</i>	1	1	.00
G	<i>Poa secunda</i>	195	52	7.08
G	<i>Stipa lettermani</i>	3	1	.03
Total for Grasses		734	204	16.78
F	<i>Agoseris glauca</i>	50	24	.17
F	<i>Allium</i> spp.	1	1	.00
F	<i>Astragalus beckwithii</i>	27	10	.25
F	<i>Astragalus cibarius</i>	62	32	.46
F	<i>Balsamorhiza hookeri</i>	21	9	.23
F	<i>Balsamorhiza sagittata</i>	130	57	12.23
F	<i>Camelina microcarpa</i> (a)	19	7	.03
F	<i>Collomia linearis</i> (a)	3	2	.01
F	<i>Comandra pallida</i>	18	10	.10
F	<i>Collinsia parviflora</i> (a)	160	64	.62
F	<i>Crepis acuminata</i>	9	5	.05
F	<i>Haplopappus acaulis</i>	2	1	.03
F	<i>Hackelia patens</i>	38	24	.71
F	<i>Hydrophyllum</i> spp.	25	12	.20
F	<i>Lappula occidentalis</i> (a)	6	2	.01
F	<i>Lithospermum ruderales</i>	1	1	.00
F	<i>Lupinus argenteus</i>	33	19	.92
F	<i>Machaeranthera grindelioides</i>	2	1	.03
F	<i>Navarretia intertexta</i> (a)	2	1	.00
F	<i>Phlox longifolia</i>	162	56	.82
F	<i>Polygonum douglasii</i> (a)	3	1	.00
F	<i>Senecio integerrimus</i>	4	2	.03
Total for Forbs		778	341	16.97

BROWSE TRENDS --

Herd unit 01 , Study no: 24

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia nova	24	2.42
B	Artemisia tridentata vaseyana	64	7.43
B	Chrysothamnus nauseosus	1	-
B	Chrysothamnus viscidiflorus stenophyllus	63	6.23
B	Eriogonum microthecum	3	.03
Total for Browse		155	16.13

BASIC COVER --

Herd unit 01 , Study no: 24

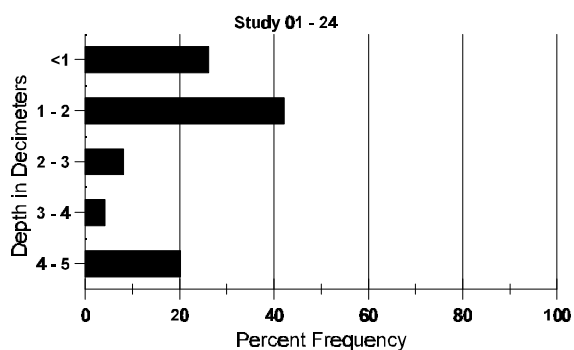
Cover Type	Nested Frequency '96	Average Cover % '96
Vegetation	466	49.35
Rock	245	6.65
Pavement	275	7.63
Litter	495	53.22
Cryptogams	20	.04
Bare Ground	221	6.47

SOIL ANALYSIS DATA --

Herd Unit 01, Study no: 24

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.8	53.6 (13.3)	7.2	40.4	34.1	27.4	2.9	21.1	425.6	.8

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 01 , Study no: 24

Type	Quadrat Frequency '96
Elk	40
Deer	9

BROWSE CHARACTERISTICS --
Herd unit 01 , Study no: 24

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia nova</i>																		
Y	96	3	1	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	96	33	5	-	2	-	-	-	-	-	40	-	-	-	800	10	26	40
D	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
Total Plants/Acre (excluding Dead & Seedlings)												'96	1020	Dec:	14%			
<i>Artemisia tridentata vaseyana</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	96	19	1	-	-	-	-	-	-	-	20	-	-	-	400		20	
M	96	65	8	-	-	-	-	-	-	-	72	-	1	-	1460	20	31	73
D	96	14	2	1	-	-	-	-	-	-	12	-	-	5	340		17	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	840		42	
Total Plants/Acre (excluding Dead & Seedlings)												'96	2200	Dec:	15%			
<i>Chrysothamnus nauseosus</i>																		
Y	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	26	29	0
Total Plants/Acre (excluding Dead & Seedlings)												'96	20	Dec:	-			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	96	31	-	-	4	-	-	-	-	-	33	-	2	-	700		35	
M	96	127	-	-	4	-	-	-	-	-	129	-	2	-	2620	15	25	131
D	96	13	1	-	-	-	-	-	-	-	10	-	3	1	280		14	
Total Plants/Acre (excluding Dead & Seedlings)												'96	3600	Dec:	8%			
<i>Eriogonum microthecum</i>																		
M	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160	3	10	8
D	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'96	180	Dec:	11%			

SUMMARY

DEER HERD UNIT - 1 - BOX ELDER

Twenty-four trend study sites were read on unit 1 in 1996 sampling various vegetation types including; aspen, mountain brush, pinyon-juniper, big sagebrush and black sagebrush. Fourteen sites were established in 1984 and reread in 1990 and 1996. The site at Cedar Hills (#1-15) was established in 1990 and reread in 1996. Nine additional sites were added in 1996 to monitor key habitat not previously covered. Two of the new sites are placed on the Pilot mountain range to monitor important elk habitat.

Study areas monitoring black sagebrush types include; Rosebud Hills (#1-3), South Side Emigrant Pass (#1-7), Kilgore Basin (#1-10), Kimber Ranch (#1-11), Bally Mountain (#1-19) and Dake Pass (#1-22). These sites, with the exception of the higher elevation Bally Mountain, monitor critical winter range for deer. Most of these sites have poor soil conditions due to a lack of herbaceous ground cover. The bare interspaces between shrub crowns are mostly covered with rock and erosion pavement. Trends appear stable at Rosebud hills, Bally Mountain, and Dake Pass but stable to slightly down at South Side Emigrant Pass and Kimber Ranch. Only Kilgore Basin showed an upward soil trend. Herbaceous trends are stable to slightly up for all sites but depleted on all but South Side Emigrant Pass and the higher elevation site at Bally Mountain. Browse trends appear to be stable to improving for all sites with reduced decadency rates and lighter use for most sites compared to 1990 data.

Basin and Wyoming big sagebrush sites are sampled by 8 studies which include; Rosette (#1-2), Kelton (#1-1), Bovine Exclosure (#1-6), Mud Springs Basin (#1-8), Southwest Rosette (#1-9), Red Butte Exclosure (#1-12), Raft River Narrows (#1-13) and Bedke Spring (#1-18). Soil trends appear stable at Raft River Narrows and at Bovine Exclosure. All other sites display improving to slightly improving soil trends. Herbaceous understory trends appear stable at Mud Spring Basin, Rosette and Kelton. An upward trend was noted at Raft River Narrows while the site at South West Rosette showed a slightly upward herbaceous understory trend. Red Butte Exclosure and Bovine Exclosure displayed a down and slightly downward trends respectively. Browse trends were stable to improving on all sites.

Two sites sample pinyon and juniper woodlands. Devils Playground (#1-5) samples a more open woodland which is an important wintering area for deer. The soil is in poor condition but stable with minimal accelerated erosion. The browse trend is up for the key black sagebrush. The herbaceous trend is slightly down. The site at Cedar Hills was established in 1990 to get baseline data for a proposed chaining treatment. By 1996, the site has still not been treated. Juniper and pinyon are dense. The soil trend is up slightly but in poor condition. The browse trend is down and will continue to decline due to the dense tree cover. The herbaceous trend is up with a good amount of native grasses.

Three sites, Chokecherry Springs (#1-4), Patterson Pass (#1-23) and Sheep Range Spring (#1-24) sample higher elevation mountain big sagebrush communities. Chokecherry Springs displays an improving soil and herbaceous trend. The browse trend is down slightly for sagebrush and up for bitterbrush. Patterson Pass and Sheep Range Spring are two new sites placed on the Pilot Range to monitor important elk habitat. These sites are high enough to be utilized during the spring and summer months. Both sites appear to have stable soil and browse trends.

Four sites, Broad Hollow (#1-14), Nut Pine Hills (#1-16), Clark's Basin (#1-17) and Keg Spring (#1-21), sample the limited transitional and summer range on the Raft River and Grouse Creek Mountains. Broad Hollow is an existing site which was established in 1984. Soil and browse trends are up on this site while the

herbaceous trend is stable and dominated by cheatgrass. The other three sites were added in 1996. Soil and browse trends on these sites appear stable.

One new site at Cotton Thomas (#1-20), established in 1996, was placed in an aspen stand. Aspen is limited on the Grouse Creek Mountains. It is important fawning and summer range for deer. Soil and browse trends appear stable. The herbaceous understory is abundant and diverse but dominated by Kentucky bluegrass.

TREND SUMMARY UNIT - 1 - Box Elder

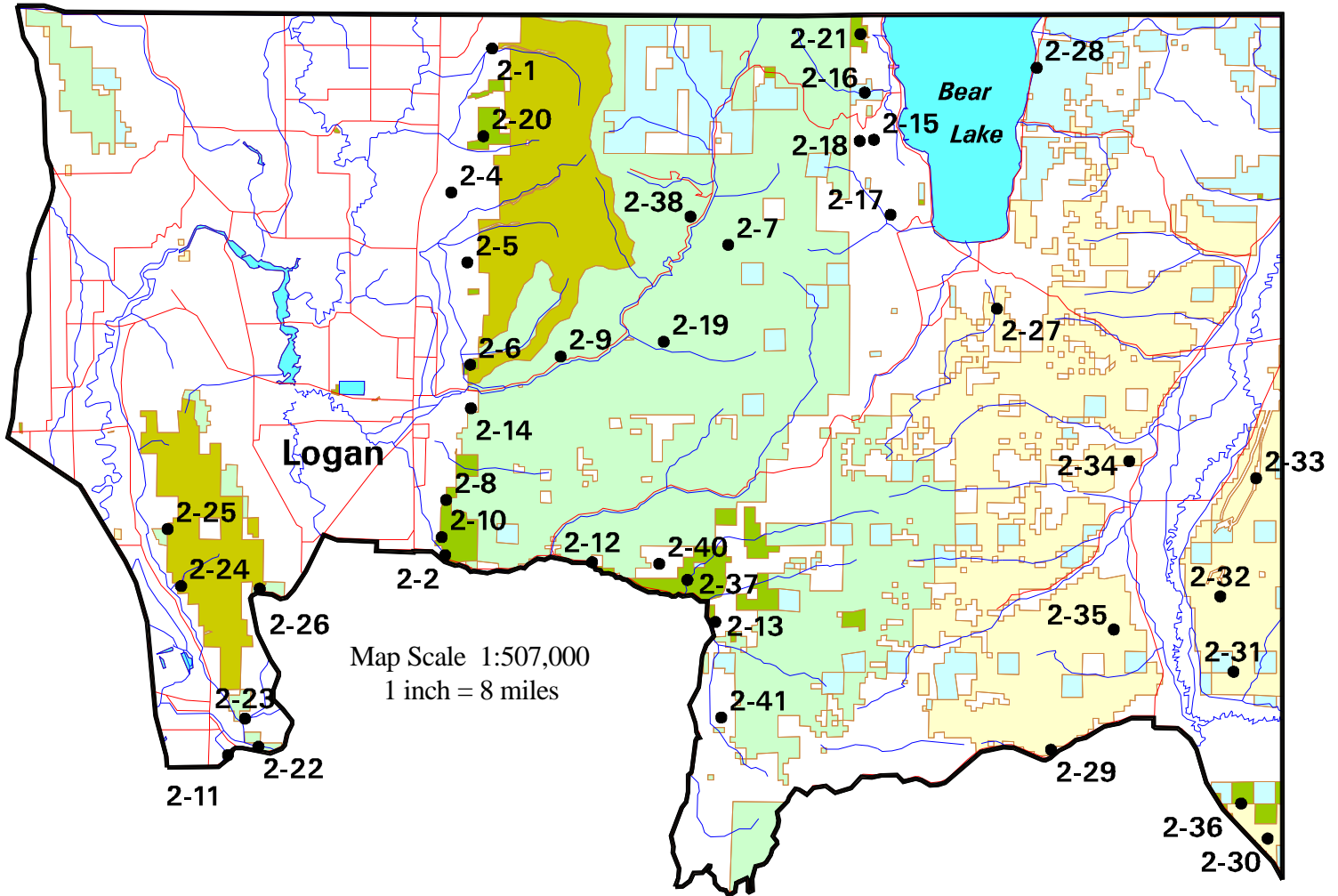
Site	1990			1996		
	Soil	Browse	Grasses & Forbs	Soil	Browse	Grasses & forbs
Black Sagebrush						
1-3 Rosebud Hills	stable	stable	down	stable	up	up slightly
1-7 South Side Emigrant Pass	down	stable	up slightly	down slightly	up slightly	up slightly
1-10 Kilgore Basin	stable	stable	down	up	up	up
1-11 Kimber Ranch	stable	stable	down	down slightly	up	down slightly
1-19 Bally Mountain (new 1996)				appears stable	appears stable	
1-22 Dake Pass (new 1996)				appears stable	appears stable	
Basin/Wyoming Big Sagebrush						
1-1 Kelton	stable	down	down	up slightly	up slightly	stable
1-2 Rosette	down	down	improving	up	up	stable
1-6 Bovine Exclosure	stable	declining	improving	stable	stable	down slightly
1-8 Mud Springs Basin	down	stable	improving	up slightly	stable	stable
1-9 Southwest Rosette	stable	declining	stable	up	up slightly	up slightly
1-12 Red Butte Exclosure	stable	stable	stable	up	up slightly	down
1-13 Raft River Narrows	down	stable	up slightly	stable	up	up
1-18 Bedke Spring (new 1996)				appears stable	appears stable	

Site	1990			1996		
	Soil	Browse	Grasses & Forbs	Soil	Browse	Grasses & forbs
Mountain Big Sagebrush						
1-4 Chokecherry Springs	stable	stable	stable	up	stable	up slightly
1-23 Patterson Pass (new 1996)				appears stable	appears stable	
1-24 Sheep Range Spring (new 1996)				appears stable	appears stable	
Pinyon-Juniper						
1-5 Devils Playground	down	down	improving	stable	up	down slightly
1-15 Cedar Hills (new 1990)				up slightly	down	up
Mountain Brush						
1-14 Broad Hollow	stable	stable	improving	up	up	stable
1-16 Nut Pine Hills (new 1996)				appears stable	appears stable	
1-17 Clark's Basin (new 1996)				appears stable	appears stable	
1-21 Key Spring (new 1996)				appears stable	appears stable	
Aspen						
1-20 Cotton Thomas (new 1996)				appears stable	appears stable	

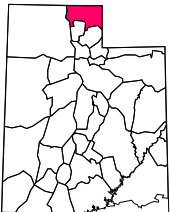
Cache Management Unit

Legend

- Forest Service
- BLM
- State of Utah
- Private Land
- State Wildlife Ref.
- Wilderness Area
- Water Body
- Transect Location
- Road
- Water Course



Unit Location



WILDLIFE MANAGEMENT UNIT 2 - CACHE

Boundary Description

Cache, Rich, Weber and Box Elder counties - Boundary begins at the Utah-Idaho state line and I-15; south on I-15 to US-91; northeast on US-91 to SR-101; east on SR-101 to Hardware Ranch and USFS road 054 (Ant Flat); south on USFS 054 to SR-39; east on SR-16; southeast on SR-16 to the Utah-Wyoming state line; north along this state line to the Utah-Idaho state line; west along this state line to I-15 and beginning point.

The Wellsville Mountains, on the west side of the unit, is subunit 2a - Cache, Wellsville Mountains. Prior to 1993 the area was designated as Deer herd unit #4. A boundary description and subunit 2a follows.

WILDLIFE MANAGEMENT SUBUNIT 2A

Boundary Description

Cache and Box Elder counties - Boundary begins at Interstate 15 and Highway US-89 in Brigham City; north on I-15 to the Utah-Idaho state line; east on this state line to Highway SR-23; south on SR-23 to Highway US 89/91; west on US 89/91 to I-15.

Subunit 2a Description

Deer habitat on subunit 2a is concentrated on the Wellsville Mountains and their northern extension, the Clarkston Mountain. The eastern half of the unit, mostly agricultural land in Cache Valley, is not used much by wintering deer. Most deer cross over to the west side of the mountains where winter range was estimated at 23,906 acres (King and Muir 1971). King and Muir (1971) also stated that the winter range was all in good condition. The acreage and condition of available winter range has undoubtedly declined in the past 25 years. The summer range, due to its inaccessibility and low livestock grazing pressure, is in good condition.

The Wellsville Mountains have remained relatively inaccessible because of the steep topography. Rising abruptly from the valley floor, the ridge of the Wellsville Mountains reaches to over 9,300 feet in elevation. The rise of almost 5,000 feet in just 2½ miles, plus the presence of sheer rocky outcrops, makes for very steep and rugged terrain. The high point on the unit is Box Elder Peak at an elevation of 9,372 feet. Clarkston Mountain is shorter in elevation and not quite as steep. Both mountain ranges are dissected by numerous canyons, although none support year-round flows. All of the intermittent streams eventually drain into the Bear River, some via the Logan and Malad Rivers. The Bear River flows between the two ranges through a rather narrow and now dammed gorge. Towns located in closest proximity to the winter range are Brigham City, Honeyville, Madsen, Deweyville and Collinston and the west side of the Wellsville Mountains, and Plymouth near the Clarkstons. Approximately 58% of the winter range is private land (King and Muir 1971). The Forest Service controls the higher areas of the normal winter range and the State owns two small sections (8%). In severe winters, the acreage of available range is reduced to 9,414 acres, 61% less than is available during a normal winter. Almost all of the severe winter range is under private ownership. A majority of this is used for grazing and agriculture, but more and more is being developed with roads and houses, especially in the extremely critical Coldwater Canyon area. The continuing loss of winter range results in increased depredation problems on adjacent agricultural land. Complaints of deer damage now come from all along the western portion of the unit.

The upper limit for normal winter range is generally the 7,000-foot level. It drops to 6,000 feet in some canyons to exclude the north slopes, and reaches as low as 5,400 feet in box Elder Canyon. The lower limit follows the 4,400-foot contour. In severe winters, the upper limits are usually between 6,000 and 6,500 feet. Most deer which summer on the east side of the Wellsville mountains migrate to winter range on the west side each fall. Coldwater Canyon is the most notable concentration area. There is some migration from the Mantua-Willard herd unit. Most deer that winter on Clarkston Mountain, summer on the Caribou National Forest in Idaho.

Other big game species found on the Wellsville mountains include introduced Rocky Mountain bighorn sheep and a few elk. Neither species are very numerous, but they should be considered in management decisions, especially concerning grazing. Development and the concurrent habitat loss is still the most critical problem facing Wildlife Management Unit 2a.

Unit 2 Description

Overall, Unit 2 can be divided into three main areas which are isolated to some extent from one another. The first part, described above, is the Wellsville subunit. The second is the Cache Valley area with its summer range on the Cache National Forest to the east. Big game summer on the forest and use the winter ranges in the canyons and along the upper benches of the valley. The third area is Rich County, which includes a vast area of private and public range land on the east side of the Cache National Forest, extending to the Wyoming state line. Prior to 1993, these three areas were managed as separate deer herd units. In 1993, these areas were combined into Wildlife Management Unit 2.

The majority of the deer range, along with the largest deer herd, are within the Cache County portion of the unit. Most of this herd summers at higher elevations on the Cache National Forest, west of the Wasatch range summit. The majority of the winter range is also on Forest Service land.

Most winter range in the Cache County portion is located from the base of the mountain to 7,000 feet. However, the south-facing slopes of Blacksmith Fork, Logan, Dry, Providence, and Millville canyons are also important. The lower winter range limits are restricted by the upper limits of the towns and cities of Cove, Richmond, Smithfield, Hyde Park, North Logan, Logan, Providence, Millville, Nibley and Hyrum. These limits to the winter range also include the deer-proof fence above agricultural land between Hyrum and Logan. Between Hyde Park and the Idaho border, the lower third of the winter range is located on private land and is endangered by increased cultivation and subdivision developments. The DWR owns 16,139 acres in Blacksmith Fork Canyon and needs to acquire and manage an additional 13,361 acres in order to maintain the herd at acceptable levels (Mann 1985).

The Rich County portion of the Cache deer herd unit, located on the east face of the Wasatch Range, is topographically similar to the west face. However, the drainages, Swan Creek, Garden City Canyon, Jebo Canyon, Cottonwood canyon, and Temple Canyon are not as deep as those on the west face. Elevation ranges between 5,900 feet at Bear Lake and 9,114 feet on Swan Peak. The southern two thirds of Rich County was part of Unit 5 prior to 1993. This area has now been added to unit 2. Randolph and Woodruff are the principle municipalities located in Rich County. These towns are located on a strip of private land along the Bear River. Much of the lower country is privately owned and is grazed or farmed. The most recent estimates are that 74,560 acres (33%) of the winter range is private land (Jense et al. 1985). A much higher percentage of the severe winter range is private. The BLM owns a majority of the winter range, controlling much of the land in the central part of the unit and the Crawford Mountains to the east.

The upper limits of the winter range begin at about 8,000 feet at the Idaho border and gradually descent to 6,000 feet at Cottonwood Canyon. The lower limits generally follow the 6,000-foot contour. For a more complete description of the winter range limits see King and Muir (1971).

Big Game Trends

The current management objective (1998) is to maintain a target winter herd of 25,000 wintering deer and maintain a buck/doe ration of 15 bucks to 100 does and a fawn/doe ratio of 86 fawns to 100 does. To meet this objective, a projected yearly harvest of about 3,300 bucks will be required. Antlerless deer harvest will be adjusted yearly to meet population objectives.

Due to the severe winter of 1992-93, only 503 bucks were harvested that year. During the 1994 hunt, just over 1,000 bucks were taken. Numbers harvested had increased to 1,724 by 1995. Fawn doe ratios are also well below the management objectives of 86 fawns/100 does. Since 1993, the unit has averaged only 61 fawns per 100 does.

Current management objectives (1998) for elk are to maintain a target population of 2,300 wintering elk with a bull-to-cow ratio 8 bulls to 100 cows. Fifty percent of the bulls are to be 2½ years of age or older. Bull harvests have ranged from a high of 371 bulls in 1991 to a low of 199 in 1993. The five year average from 1991 was 264. The ratio of calves per 100 cows has declined from 52 in 1991-92 to 38 by 1995-96. The average over the past five years is 41 calves per 100 cows. __

Trend Study Description

A total of 29 study sites were established in the unit in 1984 and read again in 1990 and 1996. During the 1990 season, 5 new site were added. All of these were reread in 1996 along with 6 additional new sites. Six study sites occur in subunit 2a, Wellsville Mountains. All of these sites monitor big game winter range. Eight study sites sample winter ranges along the Cache Valley front. Eleven sites monitor winter and summer ranges in the Cache National Forest to the east of the Cache Valley. Five study sites were placed on important winter ranges west of Bear Lake and an additional 10 sites monitor winter ranges in the remainder of Rich County. Site locations, data and descriptions follow.

TREND STUDY 2-1-96

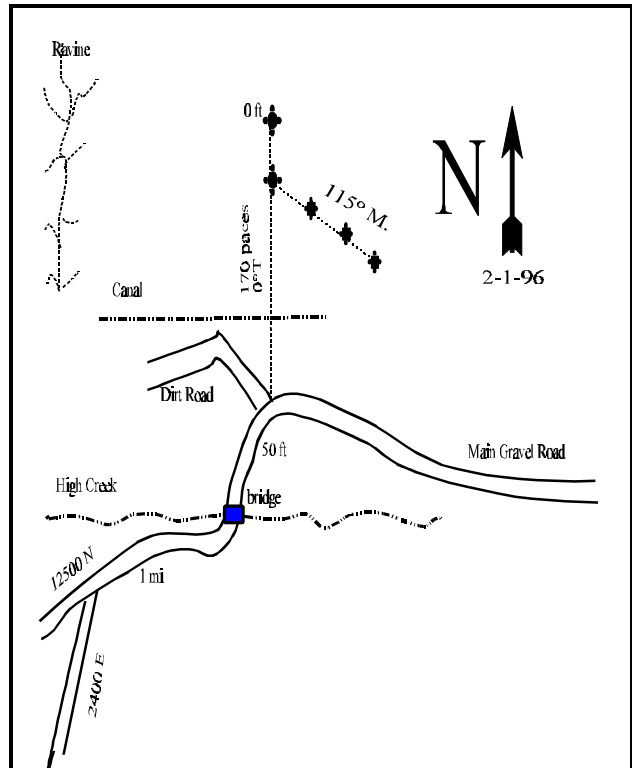
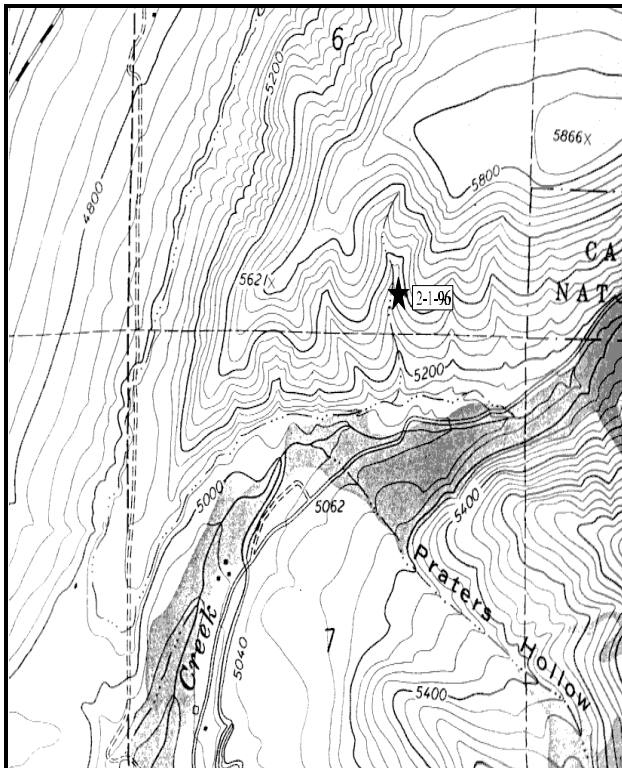
Study site name: High Creek. Range type: Big sagebrush.

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft).

LOCATION DESCRIPTION

From 12500 North and 2400 East in Richmond, proceed northeast for 1.2 miles and cross High Creek. Just beyond this crossing (north) a dirt road heads off to the northeast. From this intersection, walk 170 paces on a bearing of 0 degrees true to the 100-foot stake of the frequency baseline. Walk 100 feet beyond this stake, at 0 degrees true, to the 0-foot stake, marked with browse-tag #7929. The baseline runs at 180 degrees true. The baseline doglegs after 100 feet and runs in a direction of 115 degrees magnetic.



Map Name: Richmond

Diagrammatic Sketch

Township 14N, Range 2E, Section 6, UTM: 4-36-580E 46-47-430N

DISCUSSION

Trend Study No. 2-1

This study, located on the north side of High Creek, samples critical winter range on the northernmost part of the herd unit near the Idaho border. Unlike most of the Cache County "face", where sagebrush and other shrubs have been largely eliminated, this area retains a moderately dense mountain big sagebrush population. The site is on a fairly steep (35% to 40%) south facing slope at 5,380 feet in elevation. The site is about 700 ft above High creek. Deer or elk pellet groups were infrequent in the past and entirely absent in 1996. The hillside on which the study is located contains many open areas dominated by annual or perennial weeds.

Soil is moderately shallow with a clay loam texture. Parent material is limestone. Rocks are common on the surface (20%) and in the profile. They consist of both large limestone cobble and smaller gravel sized rocks. Water infiltration rates should be rapid. Effective rooting depth (see methods) was estimated at only 10 inches in 1996, but the high amount of rock in the profile restricted accurate penetrometer readings. Rooting depth is obviously not overly restrictive since the site contains a moderately dense stand of mountain big sagebrush. The high amount of rock on the surface and upper soil profile does contribute to moderately high soil surface temperatures however. Soil temperature was estimated at nearly 70°F at a depth of about 10 inches. Protective ground cover is abundant, but comes largely weedy plant cover and litter. No active erosion is evident at this time.

Browse composition consists of a fairly dense stand of mountain big sagebrush with a few remnant antelope bitterbrush. The mountain big sagebrush population tends to be clumped or aggregated on this site. Because of this and the relatively small sample size, density was over estimated to some extent at 4,132 plants/acre in 1984. Utilization was extremely heavy that year when 76% of the population displayed heavy use. Density remained somewhat similar in 1990 with an estimated 3,666 plants/acre. A larger proportion of the population (35% vs 19%) were classified as young. This may have been a classification problem between readers. Utilization in 1990 was light, percent decadency increased to 12% with 42% of the mature and decadent shrubs displaying poor vigor. Density declined slightly in 1996, due to a reduction in the amount of young plants in the population. Some of the change is mostly due to the larger, more representative sample used in 1996 which tripled the original sample size. Utilization is light to moderate, percent decadency is moderately low at 18%, and vigor is good on all but a few mature and decadent plants. Seed production is good this year. Some of the decadent shrubs appear to have partial crown death due to some kind of winter injury or some other natural event (prolong drought), not heavy browsing.

Antelope bitterbrush occurs as scattered mature plants. Apart from vegetative reproduction (i.e., layering), relatively few seedling or young bitterbrush can be found and none occurred within the shrub density strips. Although bitterbrush was not encountered on the density plots in 1984 or 1990 it was picked up in the larger sample of 1996. Estimated density is approximately 220 mature plants/acre. Utilization was reported heavy in the past but current use is moderate with good vigor.

The herbaceous understory is abundant but dominated by annual grasses and weedy forbs. Annual grasses make up 89% of the grass cover. Only three perennial grasses, bluebunch wheatgrass, Sandberg bluegrass and bulbous bluegrass, were encountered on the site. The more preferred Sandberg bluegrass and bluebunch wheatgrass combine to produce only 9% of the grass cover. Cheatgrass brome is the most abundant species on the site followed by Japanese brome.

The forb composition is diverse and abundant but dominated by weedy species that typically act as invaders or increasers on disturbed sites. Dominant species, ragweed, willowweed, prickly lettuce, and yellow salsify account for 71% of the forb cover. Most of the remaining species (see data summary) are generally low value increaser forbs.

1984 APPARENT TREND ASSESSMENT

Soil trend is stable to declining at a low condition level. Erosion is apparent but not of large magnitude. Vegetative cover, especially from perennial herbaceous plants, is rather poor. Vegetative trend indicators suggest a thickening stand of mountain big sagebrush, a stable or declining bitterbrush population and a herbaceous composition dominated by biennial and perennial weeds and other poor value species. No evidence of an improving perennial grass or forb cover or composition is apparent.

1990 TREND ASSESSMENT

Although assessed as increasing in 1984, the population of big sagebrush declined by 11% in 1990. However, the proportion of young plants in the population increased from 19% in 1984 to 36%. Sagebrush canopy cover averages 17%. Percent decadency increased to 12%, yet utilization was light. Vigor is poor on 44% of the mature and 36% of the decadent sagebrush. The remnant bitterbrush occurs in small numbers and has been heavily utilized. This shrub is considered a very minor component of the community. Trend for browse is considered stable. The only perennial grass has increased in nested and quadrat frequency but is still a minor component within the weedy understory. There are many forbs, but only 9 out of the 20 had increased nested and quadrat frequency values and 6 out the 9 are weedy increasers. The understory remains dominated by undesirable weedy and annual species.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - declining, still poor condition with the composition still mostly weedy increasers

1996 TREND ASSESSMENT

Protective ground cover is abundant on this site leaving little bare ground unprotected. Trend for soil is up due to an increase in litter cover from 21% to 57% and a decline in percent bare ground from 12% to <1%. The browse trend appears stable. Density remains similar to 1990 estimates with the exception of a decline in the number of young plants. Utilization is mostly light and vigor improved from 1990 observations. Percent decadency increased slightly (12% to 18%). One cause for concern on this site is the apparent lack of seedlings and young combined with the abundant herbaceous understory which is dominated by annual grasses and weedy forbs. These winter annuals and weeds provide considerable competition to seedling sagebrush establishment. These weedy species also bring a high amount of fine fuels to the site, making fire a real hazard, for the sagebrush would be lost to a fire. The herbaceous understory trend is down. The site is still dominated by annuals and weedy forbs. Blue bunch wheatgrass and Sandberg bluegrass increased in nested frequency since 1990, but sum of nested frequency of forbs declined with 10 of the 15 species sampled in 1990 declining significantly.

TREND ASSESSMENT

soil - up

browse - stable

herbaceous understory - down with poor composition

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 1

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	a ⁹	ab ²⁵	b ³¹	5	12	16	2.02
G	Bromus brizaeformis (a)	-	-	85	-	-	31	.77
G	Bromus japonicus (a)	-	-	158	-	-	56	4.85
G	Bromus tectorum (a)	-	-	306	-	-	79	23.27
G	Poa bulbosa	a ⁻	a ³	b ²⁶	-	1	11	.83
G	Poa secunda	a ⁻	a ⁻	b ¹³	-	-	5	.84
Total for Grasses		9	28	619	5	13	198	32.60
F	Agoseris glauca	a ¹⁷	a ¹⁶	b ⁻	10	7	-	-
F	Allium acuminatum	6	-	-	2	-	-	-
F	Alyssum alyssoides (a)	-	-	95	-	-	40	.22
F	Ambrosia artemisifolia	a ²⁸⁴	b ¹⁵	b ¹⁶	92	9	6	.69
F	Artemisia ludoviciana	7	6	4	2	2	1	.15
F	Astragalus spp.	-	4	-	-	2	-	-
F	Calochortus nuttallii	a ²⁴	b ⁻	b ⁻	12	-	-	-
F	Cirsium spp.	-	4	-	-	1	-	-
F	Crepis acuminata	-	5	7	-	2	5	.27
F	Epilobium brachycarpum (a)	a ⁻	b ¹²⁷	b ¹¹⁹	-	54	50	1.78
F	Erodium cicutarium (a)	-	-	30	-	-	12	.35
F	Galium aparine (a)	-	-	6	-	-	3	.18
F	Grindelia squarrosa	-	-	5	-	-	3	.21
F	Hackelia patens	a ²	b ¹²	a ¹	1	5	1	.03
F	Helianthus annuus (a)	a ⁻	b ³⁰	a ⁻	-	17	-	.00
F	Lappula occidentalis (a)	-	-	10	-	-	4	.02
F	Lactuca serriola	a ⁻	b ⁴⁷	b ²⁸	-	23	13	.72
F	Lomatium grayi	ab ²⁷	a ³⁰	b ⁴	10	12	3	.04
F	Lupinus argenteus	2	-	-	1	-	-	-
F	Machaeranthera spp	92	-	-	47	-	-	-
F	Oenothera caespitosa	a ¹⁵	a ¹⁶	b ⁻	8	8	-	.00
F	Phacelia hastata	a ⁷	b ²⁴	a ⁻	3	11	-	-
F	Phlox longifolia	3	-	-	1	-	-	-
F	Polygonum douglasii (a)	-	-	8	-	-	4	.02
F	Tragopogon dubius	a ¹⁶	b ⁵⁸	a ³⁷	7	29	18	.76
F	Veronica biloba (a)	-	-	12	-	-	4	.04
F	Zigadenus paniculatus	1	-	1	1	-	1	.03
Total for Forbs		503	394	383	197	182	168	5.56

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

BROWSE TRENDS --

Herd unit 02 , Study no: 1

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	62	12.29
B	Purshia tridentata	8	1.85
Total for Browse		70	14.14

BASIC COVER --

Herd unit 02 , Study no: 1

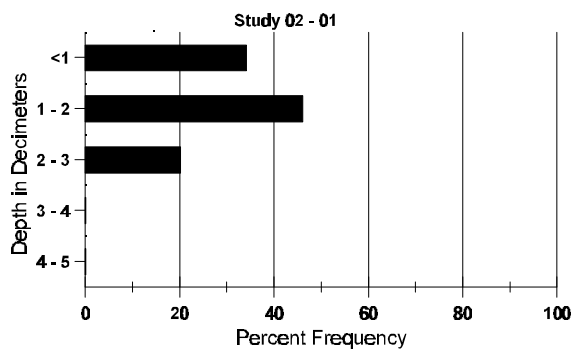
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	387	2.25	6.50	56.92
Rock	237	37.00	49.25	19.50
Pavement	124	21.00	11.50	6.28
Litter	393	30.25	21.00	56.94
Cryptogams	9	1.50	0	.07
Bare Ground	53	8.00	11.75	.72

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 1

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.7	69.6 (10.5)	7.2	42.9	29.1	28.0	2.2	16.3	150.4	.5

Stoniness Index



BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 1

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	84	-	10	14	-	-	-	-	-	-	21	2	1	-	800		24	
	90	36	2	-	1	-	-	-	-	-	39	-	-	-	1300		39	
	96	1	1	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	2	17	76	-	-	-	-	-	-	94	1	-	-	3166	25 30	95	
	90	56	1	-	-	-	-	-	-	-	32	1	24	-	1900	24 36	57	
	96	73	22	-	1	-	-	-	-	-	95	-	1	-	1920	26 38	96	
D	84	-	1	4	-	-	-	-	-	-	4	-	1	-	166		5	
	90	13	1	-	-	-	-	-	-	-	9	-	2	3	466		14	
	96	15	2	5	-	-	-	-	-	-	12	-	3	7	440		22	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	860		43	
Total Plants/Acre (excluding Dead & Seedlings)											'84	4132	Dec:	4%				
											'90	3666		13%				
											'96	2400		18%				
<i>Purshia tridentata</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	96	3	8	-	-	-	-	-	-	-	11	-	-	-	220	31 72	11	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-				
											'90	0		-				
											'96	220		-				

TREND STUDY 2-2-96

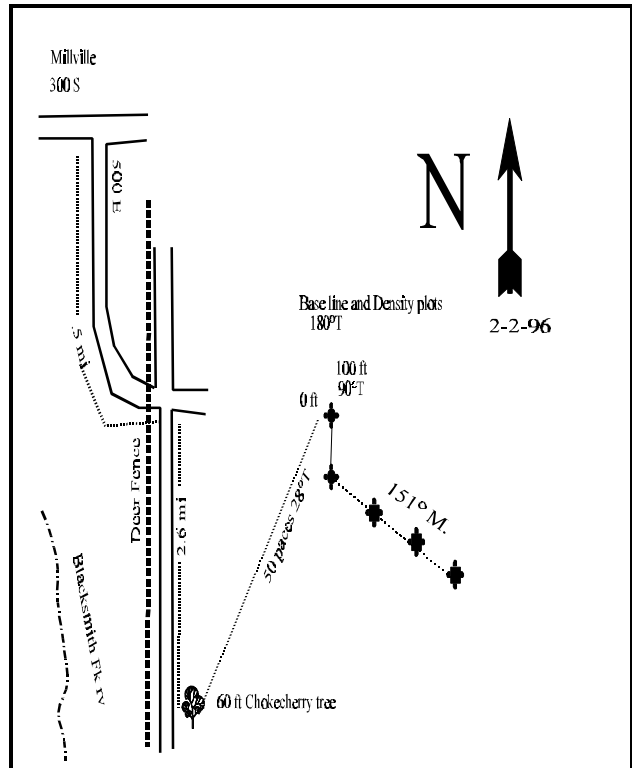
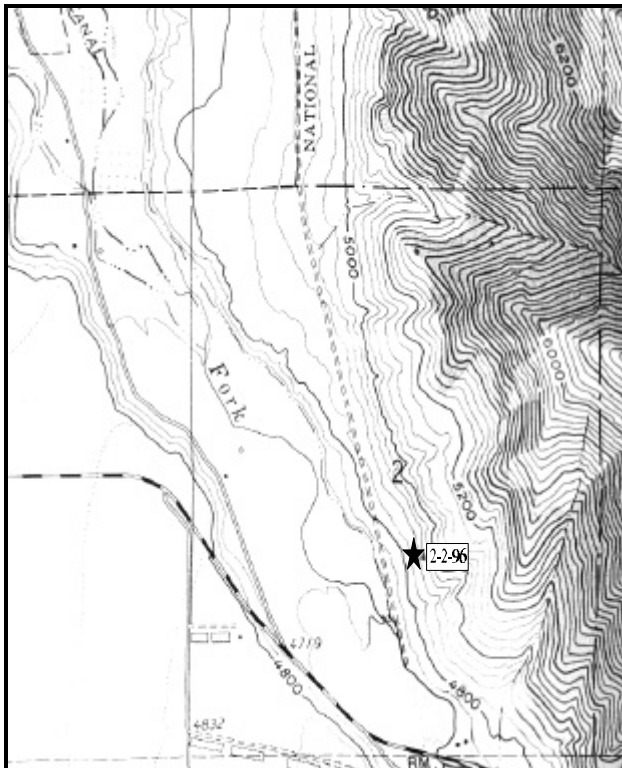
Study site name: Mouth of Blacksmith Fork. Range type: Big sagebrush.

Compass bearing: frequency baseline 159 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Proceed south 0.5 miles from the intersection of 300 South and 500 East in Millville. At the intersection just east of the deer fence, proceed south for 2.6 miles and stop at a witness post. From the witness post, walk 50 paces at 28 degrees true, to the 0-foot stake of the baseline marked by browse tag #90. The baseline runs at a bearing of 159 degrees magnetic. The baseline doglegs after 100 feet and runs 151 degrees magnetic.



Map Name: Logan

Diagrammatic Sketch

Township 10N Range 1E, Section 2, UTM: 4-33-044E 46-09-244N

DISCUSSION

Trend Study No. 2-2

This study is located slightly north of the mouth of Blacksmith Fork Canyon on a moderately steep (30%) west to southwest facing slope. Elevation is approximately 4,880 feet. The transect sits on a narrow bench about 200 feet above a deer fence which runs along the edge of the valley. The area has been heavily utilized by both deer and elk in the past. Currently deer and elk pellet groups occur infrequently. The range type is basin big sagebrush with a remnant stand of perennial grass and an over abundance of annual grasses, annual forbs and perennial weeds. Most of this critical winter range area has been almost totally depleted of browse within the last 30 to 40 years. Most of this depletion has come about from competition for sagebrush seedling establishment with a very thick "carpet" of winter annuals. This is especially difficult with extended periods of drought.

Soil is "Sterling gravelly loam," a category with moderately rapid permeability. Root depth can reach 60 inches, but more often is restricted to the upper 16 inches of the soil profile. The soil is moderately alkaline and calcareous in the upper horizons but becomes strongly so in the subsoil. Erosion potential is medium to high (Erickson and Mortensen, 1974). Soils at the site have a loam texture and a moderately alkaline pH of 7.9. Effective rooting depth (see methods) is estimated at 16 inches. Rocks are common on the surface and throughout the profile. Phosphorus is limiting in the soil with only 7.3 ppm. Soil temperature is also extremely high averaging nearly 76°F at a depth of 17 inches. Currently erosion is not a problem due to the abundant herbaceous (45%) and litter cover (71%). The composition of the herbaceous understory is poor however, with cheatgrass, Japanese brome, and rattle snake brome contributing 66% of the grass cover. The abundance of these grasses leaves the area susceptible to a devastating fire which would eliminate the sagebrush.

Big sagebrush and broom snakeweed are the only browse species remaining on the site. Big sagebrush was identified as mountain big sagebrush (*Artemisia tridentata vaseyana*) during the 1984 and 1990 readings. In 1996, the sagebrush was called basin big sagebrush (var. *tridentata*). Some mountain big sagebrush grows on the nearby slopes, but the majority of the sagebrush along the bench is the more deeply rooted basin big sagebrush. The population was extremely decadent (91%), heavily browsed (100%) and generally in poor vigor during the 1984 reading. Dead and dying plants resulting from heavy browsing and rodent activity were everywhere. In 1990 the population increased slightly to 966 plants/acre. Use was more moderate and percent decadency went down to 31%. Vigor was still poor on 24% of the population. In 1996 a much larger sample size estimated a population of 1,680 plants/acre. Because the population is characteristically clumped and discontinuous in its distribution, the larger and better distributed sample gives a much better estimate of its true density. Utilization was shown to be light, vigor good, and percent decadency has gone down to only 8%. Recruitment is also improved with good numbers of seedlings and young plants (13% and 26% of the population respectively).

Shrubs such as antelope bitterbrush and Utah juniper occur occasionally, but were not sampled even with the much larger sample. Broom snakeweed appears to have a stable population. It contributes <1% of the browse cover.

Herbaceous composition is dominated by annual grasses and biennial and perennial weeds. Among the grasses, annual brome grasses and jointed goatgrass (*Aegilops cylindrica*) are especially prevalent. The annual grasses produce 94% of the grass cover. Less abundant are blue bunch wheatgrass, Sandberg bluegrass, prairie Junegrass, and red three-awn, a warm season increaser.

The forb component consists largely of annual mustards, prickly lettuce, common ragweed, dyers woad, yellow salsify, and autumn willowweed. Ragweed alone makes up 58% of the forb cover. Apart from the small amounts of white sweetclover, and alfalfa, the forb composition is nearly worthless and indicative of very poor range condition.

1984 APPARENT TREND ASSESSMENT

Apparent trend is down. Virtually every indicator suggests a continuing decline in range condition. This is especially evident with respect to vegetative parameters. Soil condition is relatively less depleted but is nonetheless declining. Perhaps the most serious downward trend is the possible loss or serious depletion of the big sagebrush resource.

1990 TREND ASSESSMENT

Basin big sagebrush has shown slight increase in its density (17%) since 1984. Percent decadency has gone from 91% down to 31%, while the young class makes up 31% of the population. This population remains a moderately hedged, low density sagebrush community. Broom snakeweed and low rabbitbrush have both reduced values for nested frequency and quadrat frequency. Undesirable species are prominent and continue to increase. Isatis tinctoria, Dyers woad, increased significantly in its sum of nested frequency value. Other species that have increased in importance include jointed goatgrass (Aegilops) and cheatgrass. Actually, only 6 out of 20 forbs had increased nested and quadrat frequency values and 4 of these were weedy increasers. There is some evidence of soil movement, but ground cover percentages indicate no meaningful changes in the soil condition.

TREND ASSESSMENT

soil - stable, but still poor condition

browse - improving, but sagebrush population still only about 1,000 plants per acre

herbaceous understory - downward, most understory cover is made up of weedy increasing species

1996 TREND ASSESSMENT

Soil trend is up due to an increase in litter cover and a decline in percent bare ground from 13% to <1%. The abundant herbaceous vegetation and its associated litter adequately protect the soil from erosion. Trend for browse is up with an 43% increase in density of basin big sagebrush. This increase is primarily because of a much larger sample size. Utilization is light, vigor good, and percent decadency low at 8%. Much of the dead sagebrush within the population are from the harsh winters of the early 1980's (heavy use and winter injury) and extended drought after that for more than 8 years. Sum of nested frequency for perennial grasses has decreased, while that for forbs have slightly increased. However, forbs only make up 15% of the total herbaceous cover. Trend for the perennial species within the herbaceous understory is down. The composition is extremely poor, with >88% of the herbaceous species cover made up of annual weeds. The grass composition is totally dominated by undesirable species including joint goatgrass, rattlesnake brome, Japanese brome, cheatgrass, annual rye, and bulbous bluegrass. Preferred perennial grasses make up only 4% of the grass cover. The forb composition is also poor and dominated by weedy annual, biannual, and perennial species. Common ragweed is the most abundant species. It accounts for 58% of the forb cover and showed a notable increase in its sum of nested frequency from 1990. Conversely, dyers woad, declined significantly in its sum of nested frequency, while that of white sweetclover increased. With the high amounts of fine fuel (weedy species), a wildfire could remove all of the

critical winter browse (basin big sagebrush) from the site.

TREND ASSESSMENT

soil - up, but mostly dependant on weedy species for protective vegetative and litter cover

browse - up

herbaceous understory - down for perennial species, dominated by annual grasses and weedy forbs

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 2

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Aegilops cylindrica (a)	a3	b81	c148	1	26	54	7.88
G	Agropyron spicatum	a46	b15	ab21	19	7	9	.73
G	Aristida longiseta longiseta	3	-	-	1	-	-	-
G	Bromus brizaeformis (a)	-	-	48	-	-	19	.19
G	Bromus japonicus (a)	-	-	338	-	-	95	16.71
G	Bromus tectorum (a)	-	-	262	-	-	74	8.07
G	Koeleria cristata	5	-	-	4	-	-	-
G	Poa bulbosa	-	-	58	-	-	22	1.49
G	Poa secunda	a12	b34	a14	6	16	7	.03
G	Secale cereale (a)	-	8	114	-	3	44	2.77
Total for Grasses		69	138	1003	31	52	324	37.90
F	Agoseris glauca	1	5	3	1	2	1	.00
F	Allium acuminatum	a22	b-	b-	12	-	-	-
F	Alyssum alyssoides (a)	-	-	47	-	-	18	.21
F	Ambrosia artemisifolia	a261	b94	b114	85	41	49	3.92
F	Artemisia ludoviciana	1	3	-	1	1	-	-
F	Asclepias asperula	a-	b8	b5	-	5	4	.54
F	Astragalus utahensis	a6	a8	b-	4	5	-	-
F	Balsamorhiza sagittata	1	-	-	1	-	-	-
F	Calochortus nuttallii	1	-	3	1	-	2	.01
F	Cirsium spp.	a22	b1	b1	9	1	1	.00
F	Comandra pallida	3	-	-	2	-	-	-
F	Crepis acuminata	5	7	-	3	3	-	-
F	Epilobium brachycarpum (a)	-	-	70	-	-	33	.29
F	Erodium cicutarium (a)	-	-	8	-	-	4	.07
F	Gilia spp. (a)	-	-	3	-	-	1	.00
F	Grindelia squarrosa	-	-	3	-	-	1	.03
F	Isatis tinctoria	a1	b46	c27	1	24	12	.19
F	Lactuca serriola	-	6	2	-	4	1	.00
F	Linum lewisii	1	-	-	1	-	-	-

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	Lithospermum ruderales	a-	b6	a-	-	5	-	.03
F	Lomatium grayi	5	-	-	3	-	-	-
F	Melilotus alba	a9	a1	b28	4	1	11	.30
F	Medicago sativa	15	19	16	6	9	7	.45
F	Petroradia pumila	2	-	-	1	-	-	-
F	Phlox longifolia	-	-	5	-	-	2	.01
F	Tragopogon dubius	a191	b35	b60	86	15	28	.71
Total for Forbs		547	239	395	221	116	175	6.80

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

BROWSE TRENDS --

Herd unit 02 , Study no: 2

T y p e	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata tridentata	50	9.85
B	Gutierrezia sarothrae	7	.03
Total for Browse		57	9.89

BASIC COVER --

Herd unit 02 , Study no: 2

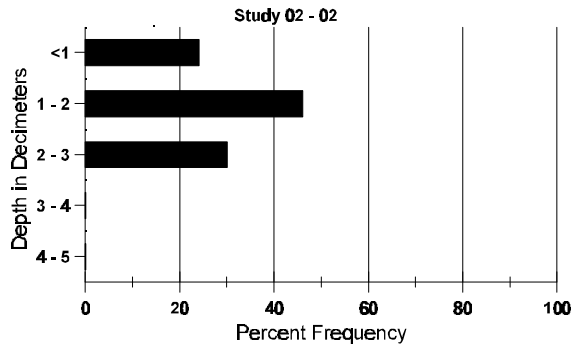
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	398	2.00	11.00	59.50
Rock	195	16.00	20.75	6.88
Pavement	119	14.00	3.50	2.87
Litter	400	58.00	51.75	71.15
Cryptogams	-	1.00	0	0
Bare Ground	62	9.00	13.00	.41

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 2

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.9	75.6 (16.5)	7.9	33.3	40.7	26.0	2.7	7.3	188.8	.8

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 2

Type	Quadrat Frequency '96
Elk	1
Deer	1
Cattle	1

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 2

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Artemisia tridentata tridentata																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	10	-	-	1	-	-	-	-	-	11	-	-	-	220		11	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	8	1	-	-	-	-	-	-	-	9	-	-	-	300		9	
	96	22	-	-	-	-	-	-	-	-	22	-	-	-	440		22	
M	84	-	-	2	-	-	-	-	-	-	2	-	-	-	66	32	40	2
	90	9	1	-	1	-	-	-	-	-	8	-	3	-	366	25	27	11
	96	52	3	-	-	-	-	-	-	-	55	-	-	-	1100	32	52	55
D	84	-	-	22	-	-	-	-	-	-	16	3	3	-	733		22	
	90	3	5	1	-	-	-	-	-	-	5	-	3	1	300		9	
	96	4	2	-	-	-	-	-	-	-	5	-	-	1	140		7	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	520		26	
Total Plants/Acre (excluding Dead & Seedlings)												'84	799	Dec:	92%			
												'90	966		31%			
												'96	1680		8%			

A G E	YR	Form Class (No. of 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	96	14	-	-	-	-	-	-	-	-	14	-	-	-	280			14
M	84	1	1	-	-	-	-	-	-	-	2	-	-	-	66	19	22	2
	90	24	-	-	1	-	-	-	-	-	25	-	-	-	833	18	16	25
	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340	14	19	17
D	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Total Plants/Acre (excluding Dead & Seedlings)												'84	99	Dec:	33%			
												'90	899		0%			
												'96	620		0%			
<i>Opuntia fragilis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	33	6	8	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	33		-			
												'96	0		-			

TREND STUDY 2-4-96

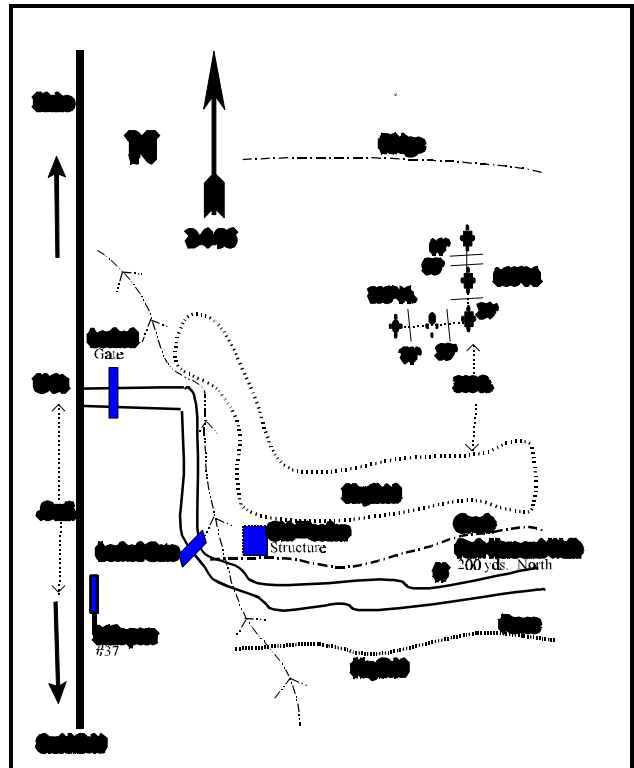
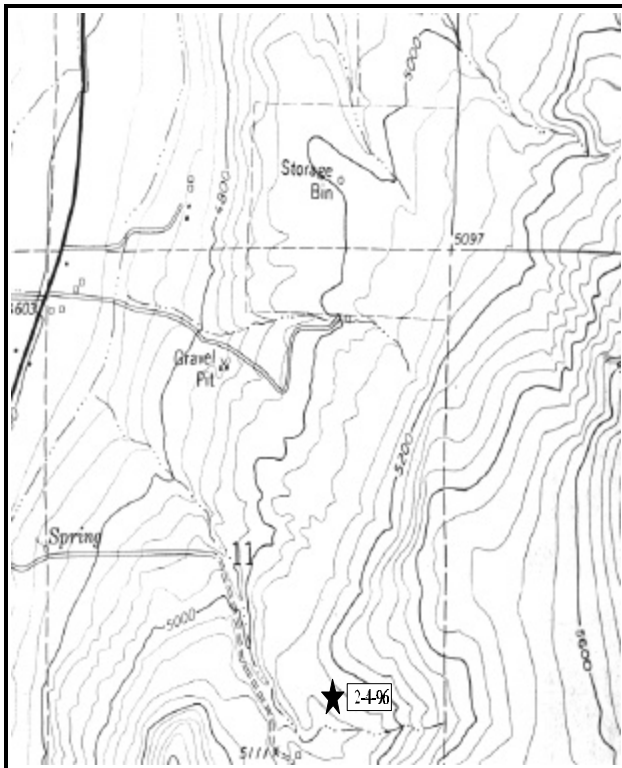
Study site name: Crow Mountain. Range type: Bitterbrush.

Compass bearing: frequency baseline 160 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Proceed north on U-91 through Smithfield to mile marker 37. Travel 0.8 miles north of the mile marker and turn east (right). At the fork, veer left (right fork goes to residence) and proceed through the gate. From the gate travel 0.4 miles passing through two gates. Stop at the third gate noting an old wooden structure on the left. From the gate walk approximately 275 paces at a bearing of 13 degrees true to the 0-foot stake of the baseline. The baseline runs at a bearing of 160 degrees magnetic. The 0-foot stake is marked by browse tag #7927. The baseline doglegs after 200 feet and runs in a direction of 256 degrees magnetic. You will need to call the land owner (Curtis Dent) in Richmond to get the key for the locked gates.



Map Name: Richmond

Diagrammatic Sketch

Township 13N Range 1E, Section 11, UTM: 4-33-501E 46-36-583N

DISCUSSION

Trend Study No. 2-4

This study, one of several that sample critical winter range along the Cache County "face", is located northeast of Crow Mountain between Smithfield and Richmond. Like much of the critical winter range north of Smithfield, the study area is nearly surrounded by cultivated hay-meadows and pastures. The study site is within a dispersed stand of bitterbrush on a 35% south slope at approximately 5,140 feet in elevation. Utilization of the browse was observed as heavy in 1984 after the heavy winters of 1982-84. Utilization was light in 1996, with only a few deer and elk pellet groups found on the site. The area has been grazed by cattle in the past, but no grazing has occurred during the past five years (1991-1996).

Soil is "Leathan Silt Loam, a classification that has only moderate water permeability and a high erosion potential. Leathan soil is quite deep with an A horizon up to 12" in depth, depending upon erosion. Chemically, the soil is strongly calcareous but only mildly alkaline in reaction (Erickson and Mortensen, 1974). Soils at the study site are deep with an effective rooting depth (see methods) estimated at 20 inches in 1996. Texture is a clay loam with a moderately alkaline pH of 7.8. Organic matter is relatively high at 4.5% but phosphorus could be a limiting factor at only 7 ppm. Vegetative and litter cover from herbaceous plants provide adequate soil protection. Apart from a few places where calcium carbonate has accumulated on the surface, cover is continuous and there is little evidence of active soil erosion.

Because of an almost complete loss of mountain big sagebrush, browse composition and overall density has been seriously depleted. Current composition consists of a sparse stand of mostly older age class antelope bitterbrush and a number of smaller increaser shrubs, like broom snakeweed, woods rose, and narrowleaf low rabbitbrush. Big sagebrush is nearly absent within the immediate area except on or near drainage channels. Antelope bitterbrush was heavily browsed in 1984, but protected somewhat by a semi-erect, layering growth habit. Use was light to moderate in 1990 and 1996. Vigor is generally good, however relatively little sexual reproduction is apparent. The major decline in population density in 1996 is more a reflection of the increased sample size used that year, and not a major drop in density. Evidence of this is found in the relatively small number of dead plants sampled (140 plants/acre). The increaser species receive little use and appear to be increasing in density, especially woods rose, and broom snakeweed. Snakeweed increased from 66 to 2,440 plants/acre between 1990 and 1996. Some of this increase is obviously due to the larger sample used in 1996 which effectively tripled the previous area sample. The age class structure of snakeweed indicates a stable population due to the lack of seedlings and young plants.

The principal forage component is a vigorous stand of perennial grasses and forbs. The perennial grass composition was dominated by Kentucky bluegrass with smaller amounts of bluebunch wheatgrass in 1984. Currently, Bluebunch wheatgrass is the most dominant perennial grass. Kentucky bluegrass had a sum of nested frequency of 310 in 1984, declining to 178 in 1990, and only 25 in 1996. Annual brome grasses currently dominate the site by providing 81% of the grass cover. Annual grasses and forbs were not previously included so no comparisons can be made with past years. Photo point comparisons suggest that these annual grasses were also numerous in 1990.

Forbs are very diverse and abundant, containing several useful species which includes; yellow salsify, arrowleaf balsamroot, western yarrow, blue flax, and low penstemon. Unfortunately, weedy forbs are also abundant and contain some invasive species. Curly cup gumweed, thistle, and dyers woad are abundant.

Gumweed has increased in sum of nested frequency, while thistle has remained fairly constant since 1990. Dyers woad increased significantly in nested frequency. These three forbs combine to produce 32% of the forb cover. The abundant understory cover of annual grasses and weedy forbs provides significant competition to shrub seedling establishment.

1984 APPARENT TREND ASSESSMENT

Soil is protected by an adequate vegetative cover of grass and forbs. Trend appears stable. However, the same factors that produce a stable soil trend also appear to be inhibiting reproduction of the more desirable shrub species. From a big game winter forage point of view, trend is down because of a lack of browse and the fact that only the undesirable shrubs are increasing.

1990 TREND ASSESSMENT

Bitterbrush is the key browse species on this privately-owned winter range. There is limited browse in this agricultural area. The large old plants have been heavily utilized in the past, but currently support light to moderate hedging. Bitterbrush canopy cover was estimated at 9%. Density plots appeared to show the bitterbrush population increasing by 15%, while percent decadency also increased from 20% to 29%. On this slope, there is heavy competition from an understory of a sod-forming grass, rhizomatous forbs, and numerous annuals. There are 27 forbs with 17 of them increasing in nested and quadrat frequency values. Three of the 4 grasses also have increasing nested and quadrat frequency values. It should be noted that the competitive sod-forming Kentucky bluegrass has greatly decreased in nested and quadrat frequency values while the more desired bluebunch wheatgrass has increased.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - improving

1996 TREND ASSESSMENT

The soil trend is up due to an increase in litter cover and a decline in bare ground from 36% to 8%. The abundant vegetation and litter cover adequately protect the soil from erosion. Trend for the key browse species, antelope bitterbrush, is up slightly. Estimated density declined since 1990 from 2,266 plants/acre to 860. However, due to the lack of significant numbers of dead plants, this decline is mostly due to the much larger sample size utilized. The new sample better estimates shrub densities which often have aggregated and/or discontinuous populations which characterizes this bitterbrush population. Utilization is currently light to moderate with no heavy use reported. Percent decadency declined from 29% to 11%, with most plants displaying good vigor. Broom snakeweed also showed an increase in population, apparently a result of the increased sample. Snakeweed and wood's rose appear to have stable populations with their current age distributions. The herbaceous understory is abundant but dominated by annual brome grasses which combine to cover nearly one third of the ground surface. Kentucky bluegrass has continued to decline significantly leaving bluebunch wheatgrass as the only abundant perennial grass. Sum of nested frequency for perennial grasses declined by 57%. Forbs are abundant and contain some important species. However, nearly all perennial forb species sampled in 1990 declined in nested frequency by 1996. The only species that increased include; curly cup gumweed, dyers woad, pacific aster, tapertip hawksbeard, prickly lettuce, and low penstemon. Gumweed and dyers woad are abundant and account for 25% of the forb cover. Overall, sum of nested frequency for forbs declined by 30%. This, combined with the decline in sum of nested frequency for

perennial grasses, indicates a downward trend for the herbaceous understory.

TREND ASSESSMENT

soil - up slightly

browse - up slightly

herbaceous understory - down, dominated by weedy species

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 4

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	a7	b98	b89	3	32	30	6.23
G	Bromus brizaeformis (a)	-	-	84	-	-	36	.84
G	Bromus japonicus (a)	-	-	351	-	-	95	22.86
G	Bromus tectorum (a)	-	-	74	-	-	25	3.95
G	Festuca ovina	-	1	-	-	1	-	-
G	Poa fendleriana	-	1	5	-	1	3	.01
G	Poa pratensis	a310	b178	c25	98	66	11	.28
Total for Grasses		317	278	628	101	100	200	34.18
F	Achillea millefolium	15	13	11	9	6	6	.28
F	Alyssum alyssoides (a)	-	-	46	-	-	17	.16
F	Artemisia ludoviciana	-	-	1	-	-	1	.00
F	Aster chilensis	a4	a40	b14	2	15	5	.10
F	Astragalus convallarius	a-	b21	a7	-	9	3	.04
F	Aster spp.	A-	a-	b8	-	-	5	.27
F	Astragalus spp.	-	5	-	-	3	-	-
F	Balsamorhiza sagittata	a126	a132	b95	58	65	47	8.32
F	Calochortus nuttallii	-	5	-	-	2	-	-
F	Cirsium spp.	a78	b37	b33	37	17	17	1.40
F	Comandra pallida	a21	b49	a14	9	25	8	.04
F	Crepis acuminata	-	1	7	-	1	4	.12
F	Epilobium brachycarpum (a)	-	-	10	-	-	5	.05
F	Eriogonum cernuum (a)	-	-	1	-	-	1	.03
F	Galium aparine (a)	-	-	16	-	-	6	.03
F	Grindelia squarrosa	a11	ab12	b32	5	8	13	2.51
F	Hackelia patens	a1	b23	a-	1	14	-	-
F	Helianthus annuus (a)	-	-	7	-	-	5	.07
F	Helianthella uniflora	a-	b12	a3	-	6	1	.38
F	Ipomopsis aggregata	-	2	-	-	2	-	-
F	Isatis tinctoria	a-	a6	b96	-	2	45	2.20
F	Lactuca serriola	a7	ab16	b27	5	7	13	.38
F	Linum lewisii	a38	b67	ab62	17	29	24	1.06

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	Lithospermum ruderale	a50	b12	b5	24	6	4	.19
F	Medicago sativa	-	1	-	-	1	-	-
F	Oenothera spp.	-	4	-	-	1	-	-
F	Penstemon humilis	a-	b16	c49	-	8	18	.82
F	Petradoria pumila	-	3	-	-	1	-	-
F	Phlox longifolia	a-	b127	c25	-	54	12	.16
F	Senecio spp.	a11	b-	b-	6	-	-	-
F	Taraxacum officinale	-	7	-	-	3	-	-
F	Tragopogon dubius	a176	b122	c27	76	56	13	.24
F	Veronica biloba (a)	-	-	6	-	-	3	.01
F	Viola spp.	a-	b22	a1	-	15	1	.00
Total for Forbs		538	755	603	249	356	277	18.94

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

BROWSE TRENDS --

Herd unit 02 , Study no: 4

Type	Species	Strip Frequency '96	Average Cover % '96
B	Chrysothamnus viscidiflorus stenophyllus	2	.38
B	Gutierrezia sarothrae	43	3.32
B	Purshia tridentata	32	5.66
B	Rosa woodsii	29	.72
Total for Browse		106	10.10

BASIC COVER --

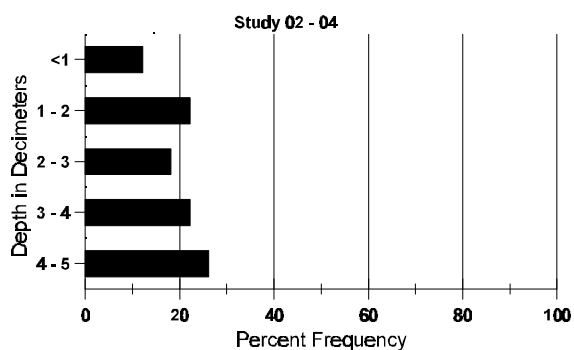
Herd unit 02 , Study no: 4

Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	389	3.00	15.00	56.76
Rock	61	3.50	3.50	.71
Pavement	100	2.25	3.50	.48
Litter	398	70.00	41.75	58.16
Cryptogams	2	0	0	.00
Bare Ground	216	21.25	36.25	8.03

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 4

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
20.0	64.2 (18.1)	7.8	31.7	29.0	39.3	4.5	7.0	230.4	.7

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 4

Type	Quadrat Frequency '96
Rabbit	1
Elk	1

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 4

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Amelanchier alnifolia</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	98	56	0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			

A G E	YR	Form Class (No. of 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	19	25	2
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	40		-			
<i>Gutierrezia sarothrae</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	16	18	1
	96	118	-	-	1	-	-	-	-	-	119	-	-	-	2380	12	18	119
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	66		-			
												'96	2440		-			
<i>Purshia tridentata</i>																		
Y	84	3	2	-	-	-	-	-	-	-	5	-	-	-	333			5
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
M	84	-	-	18	-	-	-	-	-	-	18	-	-	-	1200	21	41	18
	90	16	2	-	6	-	-	-	-	-	24	-	-	-	1600	22	34	24
	96	12	19	-	-	1	-	-	-	-	30	2	-	-	640	25	49	32
D	84	-	-	6	-	-	-	-	-	-	6	-	-	-	400			6
	90	4	6	-	-	-	-	-	-	-	9	-	-	1	666			10
	96	1	4	-	-	-	-	-	-	-	2	-	1	2	100			5
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	140			7
Total Plants/Acre (excluding Dead & Seedlings)												'84	1933	Dec:	21%			
												'90	2266		29%			
												'96	860		12%			

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Rosa woodsii																		
S	84	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	90	6	-	-	11	-	-	-	-	-	17	-	-	-	1133		17	
	96	31	-	-	-	-	-	-	-	-	28	-	3	-	620		31	
M	84	18	-	-	-	-	-	-	-	-	18	-	-	-	1200	15	5	18
	90	3	-	-	1	-	-	-	-	-	4	-	-	-	266	12	8	4
	96	36	-	-	-	-	-	-	-	-	33	-	3	-	720	43	45	36
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	-	-	-	-	-	-	2	-	3	-	100		5	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	1533	Dec:	0%			
												'90	1399		0%			
												'96	1440		7%			

TREND STUDY 2-5-96

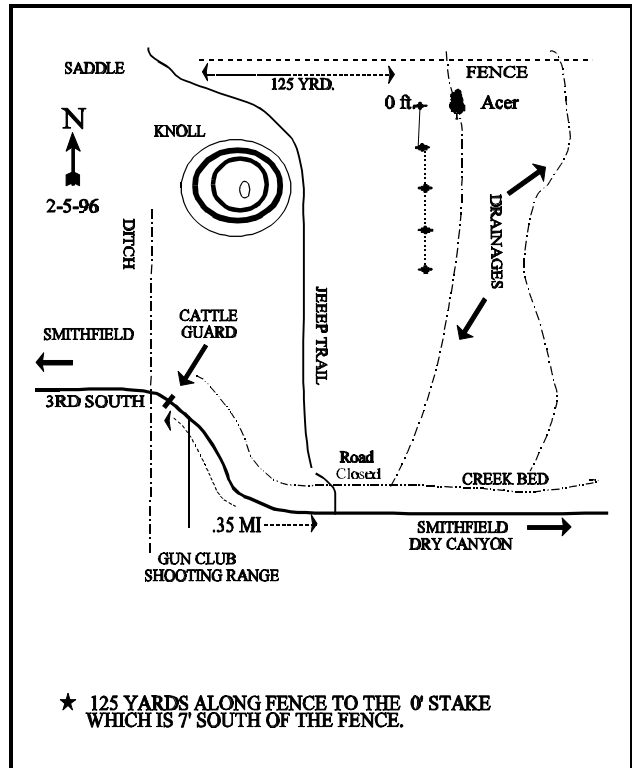
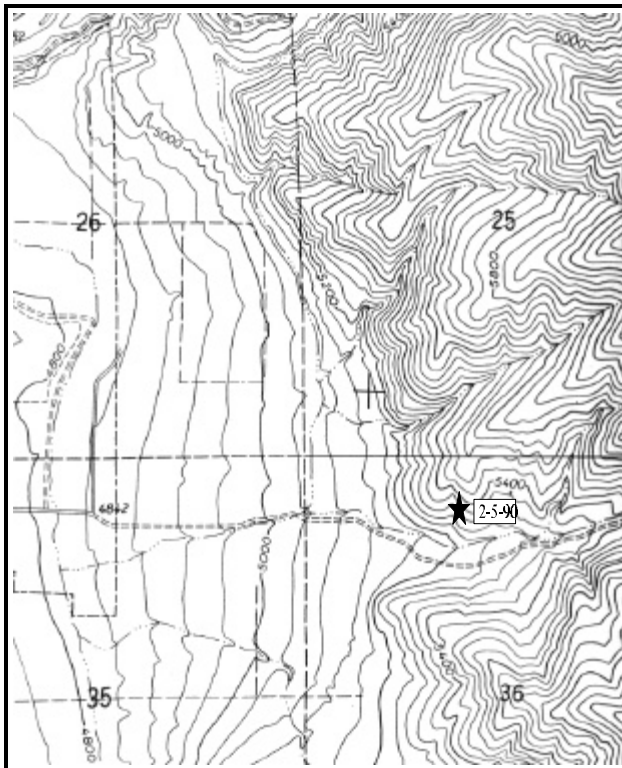
Study site name: Smithfield Dry Canyon. Range type: Perennial grass.

Compass bearing: frequency baseline 151 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

In Smithfield turn east (right) onto 3rd South and proceed up Smithfield Dry Canyon. The road eventually turns to gravel. Begin to note mileage at the cattle guard (old and filled in with dirt) outside of the canyon mouth. Proceed 0.35 miles up the canyon from the cattle guard to a point where a faint road takes off to the left, crosses the creekbed, and runs up the slope to the north. Four-wheel drive is advisable from this point. Proceed across creek and up the slope to the fence. Walk east along the fence approximately 125 yards and look for the 0-foot stake of the frequency baseline seven feet south of the fence. If one comes to a juniper by a drainage, backtrack 55 feet to the 0-foot stake. A red browse tag is wired to the 0-foot stake; #7952. The baseline runs at 151 degrees true.



Map Name: Smithfield

Diagrammatic Sketch

Township 13N Range 1E, Section 36, UTM: 4-34-721E 46-31-306N

DISCUSSION

Trend Study No. 2-4

This study, one of several that sample critical winter range along the Cache County "face", is located northeast of Crow Mountain between Smithfield and Richmond. Like much of the critical winter range north of Smithfield, the study area is nearly surrounded by cultivated hay-meadows and pastures. The study site is within a dispersed stand of bitterbrush on a 35% south slope at approximately 5,140 feet in elevation. Utilization of the browse was observed as heavy in 1984 after the heavy winters of 1982-84. Utilization was light in 1996, with only a few deer and elk pellet groups found on the site. The area has been grazed by cattle in the past, but no grazing has occurred during the past five years (1991-1996).

Soil is "Leathan Silt Loam, a classification that has only moderate water permeability and a high erosion potential. Leathan soil is quite deep with an A horizon up to 12" in depth, depending upon erosion. Chemically, the soil is strongly calcareous but only mildly alkaline in reaction (Erickson and Mortensen, 1974). Soils at the study site are deep with an effective rooting depth (see methods) estimated at 20 inches in 1996. Texture is a clay loam with a moderately alkaline pH of 7.8. Organic matter is relatively high at 4.5% but phosphorus could be a limiting factor at only 7 ppm. Vegetative and litter cover from herbaceous plants provide adequate soil protection. Apart from a few places where calcium carbonate has accumulated on the surface, cover is continuous and there is little evidence of active soil erosion.

Because of an almost complete loss of mountain big sagebrush, browse composition and overall density has been seriously depleted. Current composition consists of a sparse stand of mostly older age class antelope bitterbrush and a number of smaller increaser shrubs, like broom snakeweed, woods rose, and narrowleaf low rabbitbrush. Big sagebrush is nearly absent within the immediate area except on or near drainage channels. Antelope bitterbrush was heavily browsed in 1984, but protected somewhat by a semi-erect, layering growth habit. Use was light to moderate in 1990 and 1996. Vigor is generally good, however relatively little sexual reproduction is apparent. The major decline in population density in 1996 is more a reflection of the increased sample size used that year, and not a major drop in density. Evidence of this is found in the relatively small number of dead plants sampled (140 plants/acre). The increaser species receive little use and appear to be increasing in density, especially woods rose, and broom snakeweed. Snakeweed increased from 66 to 2,440 plants/acre between 1990 and 1996. Some of this increase is obviously due to the larger sample used in 1996 which effectively tripled the previous area sample. The age class structure of snakeweed indicates a stable population due to the lack of seedlings and young plants.

The principal forage component is a vigorous stand of perennial grasses and forbs. The perennial grass composition was dominated by Kentucky bluegrass with smaller amounts of bluebunch wheatgrass in 1984. Currently, Bluebunch wheatgrass is the most dominant perennial grass. Kentucky bluegrass had a sum of nested frequency of 310 in 1984, declining to 178 in 1990, and only 25 in 1996. Annual brome grasses currently dominate the site by providing 81% of the grass cover. Annual grasses and forbs were not previously included so no comparisons can be made with past years. Photo point comparisons suggest that these annual grasses were also numerous in 1990.

Forbs are very diverse and abundant, containing several useful species which includes; yellow salsify, arrowleaf balsamroot, western yarrow, blue flax, and low penstemon. Unfortunately, weedy forbs are also abundant and contain some invasive species. Curly cup gumweed, thistle, and dyers woad are abundant.

Gumweed has increased in sum of nested frequency, while thistle has remained fairly constant since 1990. Dyers woad increased significantly in nested frequency. These three forbs combine to produce 32% of the forb cover. The abundant understory cover of annual grasses and weedy forbs provides significant competition to shrub seedling establishment.

1984 APPARENT TREND ASSESSMENT

Soil is protected by an adequate vegetative cover of grass and forbs. Trend appears stable. However, the same factors that produce a stable soil trend also appear to be inhibiting reproduction of the more desirable shrub species. From a big game winter forage point of view, trend is down because of a lack of browse and the fact that only the undesirable shrubs are increasing.

1990 TREND ASSESSMENT

Bitterbrush is the key browse species on this privately-owned winter range. There is limited browse in this agricultural area. The large old plants have been heavily utilized in the past, but currently support light to moderate hedging. Bitterbrush canopy cover was estimated at 9%. Density plots appeared to show the bitterbrush population increasing by 15%, while percent decadency also increased from 20% to 29%. On this slope, there is heavy competition from an understory of a sod-forming grass, rhizomatous forbs, and numerous annuals. There are 27 forbs with 17 of them increasing in nested and quadrat frequency values. Three of the 4 grasses also have increasing nested and quadrat frequency values. It should be noted that the competitive sod-forming Kentucky bluegrass has greatly decreased in nested and quadrat frequency values while the more desired bluebunch wheatgrass has increased.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - improving

1996 TREND ASSESSMENT

The soil trend is up due to an increase in litter cover and a decline in bare ground from 36% to 8%. The abundant vegetation and litter cover adequately protect the soil from erosion. Trend for the key browse species, antelope bitterbrush, is up slightly. Estimated density declined since 1990 from 2,266 plants/acre to 860. However, due to the lack of significant numbers of dead plants, this decline is mostly due to the much larger sample size utilized. The new sample better estimates shrub densities which often have aggregated and/or discontinuous populations which characterizes this bitterbrush population. Utilization is currently light to moderate with no heavy use reported. Percent decadency declined from 29% to 11%, with most plants displaying good vigor. Broom snakeweed also showed an increase in population, apparently a result of the increased sample. Snakeweed and wood's rose appear to have stable populations with their current age distributions. The herbaceous understory is abundant but dominated by annual brome grasses which combine to cover nearly one third of the ground surface. Kentucky bluegrass has continued to decline significantly leaving bluebunch wheatgrass as the only abundant perennial grass. Sum of nested frequency for perennial grasses declined by 57%. Forbs are abundant and contain some important species. However, nearly all perennial forb species sampled in 1990 declined in nested frequency by 1996. The only species that increased include; curly cup gumweed, dyers woad, pacific aster, tapertip hawksbeard, prickly lettuce, and low penstemon. Gumweed and dyers woad are abundant and account for 25% of the forb cover. Overall, sum of nested frequency for forbs declined by 30%. This, combined with the decline in sum of nested frequency for

perennial grasses, indicates a downward trend for the herbaceous understory.

TREND ASSESSMENT

soil - up slightly

browse - up slightly

herbaceous understory - down, dominated by weedy species

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 5

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	44	57	33	16	18	13	1.29
G	Bromus brizaeformis (a)	-	-	6	-	-	2	.06
G	Bromus japonicus (a)	-	-	343	-	-	96	20.67
G	Bromus tectorum (a)	-	-	124	-	-	37	6.49
G	Poa bulbosa	_a 131	_b 340	_c 73	48	96	28	1.50
G	Poa pratensis	_a 309	_b 51	_c -	97	22	-	-
G	Poa secunda	-	9	-	-	4	-	-
Total for Grasses		484	457	579	161	140	176	30.02
F	Achillea millefolium	5	7	-	2	3	-	-
F	Ambrosia psilostachya	_a -	_a -	_b 29	-	-	12	1.41
F	Artemisia ludoviciana	7	9	3	3	4	2	.16
F	Aster chilensis	_a 42	_b 109	_a 31	18	36	12	.53
F	Astragalus convallarius	-	4	4	-	1	1	.03
F	Balsamorhiza sagittata	_a 50	_a 48	_b 14	23	22	10	1.82
F	Calochortus nuttallii	3	4	-	1	3	-	-
F	Comandra pallida	3	8	6	1	4	2	.06
F	Cynoglossum officinale	-	2	-	-	1	-	-
F	Epilobium brachycarpum (a)	-	-	39	-	-	22	.51
F	Galium aparine (a)	-	-	5	-	-	2	.18
F	Grindelia squarrosa	_a 36	_a 28	_b 187	15	15	67	10.64
F	Hackelia patens	8	10	3	5	5	1	.03
F	Helianthus annuus (a)	15	33	18	7	18	9	.12
F	Helianthella uniflora	-	-	2	-	-	1	.00
F	Lappula occidentalis (a)	-	-	3	-	-	1	.00
F	Lactuca serriola	_a -	_b 99	_c 225	-	44	82	5.57
F	Lithospermum ruderales	8	11	12	4	6	7	.39
F	Navarretia intertexta (a)	-	-	6	-	-	4	.04
F	Phacelia spp.	7	-	-	3	-	-	-
F	Phlox longifolia	_a 1	_b 88	_a 5	1	37	2	.03
F	Polygonum douglasii (a)	-	-	7	-	-	4	.02
F	Sisymbrium altissimum (a)	-	-	46	-	-	22	1.87

Type	Species	Nestled Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	Solidago spp.	1	-	-	1	-	-	-
F	Tragopogon dubius	_a -	_b 130	_c 65	-	59	28	1.22
F	Viola spp.	_a -	_b 16	_c -	-	11	-	-
F	Zigadenus paniculatus	2	-	-	1	-	-	-
Total for Forbs		188	606	710	85	269	291	24.71

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

BROWSE TRENDS --

Herd unit 02 , Study no: 5

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	2	.78
B	Purshia tridentata	14	3.07
Total for Browse		16	3.85

BASIC COVER --

Herd unit 02 , Study no: 5

Cover Type	Nestled Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	386	4.25	34.25	58.24
Rock	38	2.50	.25	.16
Pavement	17	.25	.25	.07
Litter	400	62.00	38.75	77.62
Cryptogams	-	0	0	0
Bare Ground	154	31.00	26.50	3.83

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 5

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
27.5	71.6 (18.1)	7.1	24.3	28.4	47.4	3.3	17.0	284.8	.4

PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 5

Type	Quadrat Frequency '96
Rabbit	1

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 5

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	1	1	-	-	-	-	-	-	2	-	-	-	66	25	17	2
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	24	17	1
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	37	60	2
D	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	1	-	-	1	-	-	-	-	-	1	-	-	1	66		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	99	Dec:	33%			
												'90	132		50%			
												'96	40		0%			
<i>Gutierrezia sarothrae</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	13	28	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Purshia tridentata</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	2	14	-	-	-	-	-	-	16	-	-	-	533	23	21	16
	90	8	1	-	-	-	-	-	-	-	9	-	-	-	300	21	28	9
	96	-	8	4	-	-	-	-	-	-	12	-	-	-	240	25	59	12
D	84	-	-	12	-	-	-	-	-	-	12	-	-	-	400		12	
	90	9	4	-	1	-	-	-	-	-	13	-	-	1	466		14	
	96	-	1	1	-	-	-	-	-	-	2	-	-	-	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
Total Plants/Acre (excluding Dead & Seedlings)												'84	933	Dec:	43%			
												'90	799		58%			
												'96	300		13%			

TREND STUDY 2-6-96

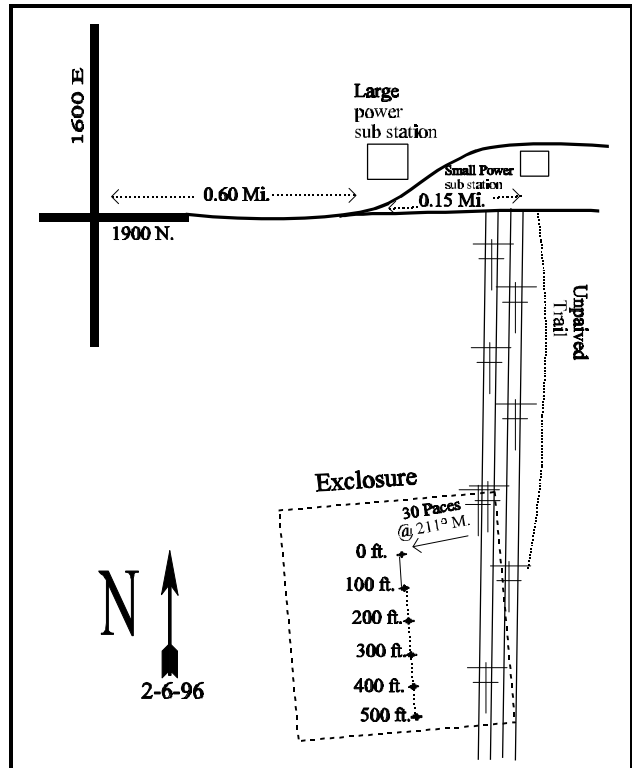
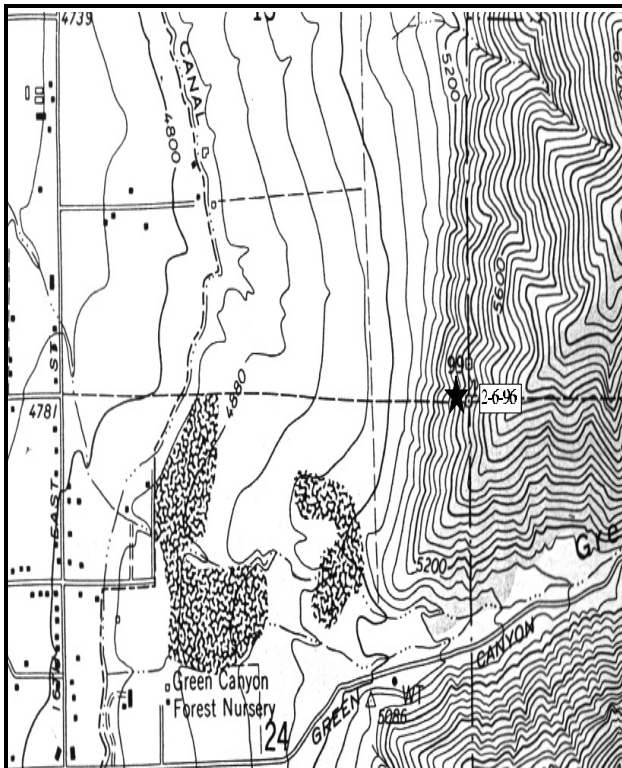
Study site name: Green Canyon Exclosure. Range type: Bitterbrush.

Compass bearing: frequency baseline 182 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

In Logan at the corner of 1600 E. and 1900 N. travel east down 1900 N. for 0.6 miles to where a road veers off to the north. Stay right and proceed 0.15 miles to an unpaved trail on the right hand side of the road. Walk south down the trail until you hit the exclosure. From the power pole at the corner of the exclosure, walk 30 paces at 211 degrees magnetic to the 0-foot stake. The baseline runs parallel to the second set of power lines at 182 degrees magnetic.



Map Name: Smithfield

Diagrammatic Sketch

Township 12N, Range 1E, Section 24, UTM: 4-34-934E 46-23-596N

DISCUSSION

Trend Study No. 2-6 (new location)

The original Green Canyon site was not read in 1996. It was deleted at the request of DWR biologist and a new Green Canyon site was established in an old 40 acre livestock exclosure just south of the canyon. Slope on the site varies from 20% to 25%. Aspect is west and elevation is 5,180 feet. Deer and elk pellet groups were encountered in small numbers along with a few cattle pats. The exclosure fence is obviously compromised somewhere. Humans also impact the site as there is a hiking and running trail running through the site. There are also grain fields and a subdivision to the west.

Soil is a loam in texture and moderately deep with some rock on the surface and in the profile. Effective rooting depth (see methods) is estimated at 14 inches. The soil is moderately alkaline with a pH of 7.8. Phosphorous could be a limiting factor at only 6.6 ppm. Average soil temperature is lower (64°F at 18 inches) than other sites along the Cache valley front. This is likely due to the lack of rock on the surface or in the surface profile. Protective ground cover from herbaceous vegetation and litter is abundant and well dispersed, effectively limiting erosion.

Browse on the site consist of aggregated clumps of mountain big sagebrush with a few scattered bitterbrush. Sagebrush has a density of 840 plants/acre, 67% classified as young. Utilization is light, vigor good and there are no decadent individuals. Age class analysis indicates an expanding population. Bitterbrush occur infrequently. Mature plants are vigorous and average over 3 feet in height with a crown diameter of over 7 feet. Utilization is light to moderate and no plants were classified as decadent.

The herbaceous understory is abundant with grasses and forbs combining to produce 52% cover. Grass composition is poor with rye and bulbous bluegrass accounting for 95% of the grass cover. Annual brome grasses which dominate the understory vegetation of many sites in this herd unit are not abundant. Forbs are abundant, however they consist mostly of weedy species including thistle, morning glory, willowweed, curlycup gumweed, sunflower, prickly lettuce, yellow salsify, and mule's ear. Useful forbs including arrowleaf balsamroot, yellow sweetclover, and alfalfa account for 20% of the forb cover.

1996 APPARENT TREND ASSESSMENT

Protective ground cover is abundant with little bare ground exposed (4%). Erosion is not a problem on this site. Browse is in short supply but the relatively small populations mountain big sagebrush and bitterbrush appear vigorous and healthy. Mountain big sagebrush shows a high proportion of young plants (67%) and appears to have an expanding population. Utilization of sagebrush and bitterbrush is mostly light. The herbaceous understory composition is poor, but not dominated by annual brome grasses like many other winter range sites in this unit. However, winter rye and bulbous bluegrass dominate the site by providing 74% of the understory cover. Native perennial grasses are represented by an occasional bluebunch wheatgrass. A few useful forb species are found on the site, yet the majority are weedy annuals and biennials.

DISCUSSION

Trend Study No. 2-6

*** The original site was deleted and a new one installed south of Green canyon in 1996.

This study is located just north of Green Canyon, on a steep west facing slope that is considered important to wintering deer along the central portion of the Cache Valley "face." Because deer and elk have been largely excluded from the more gentle portions of their historic range by agricultural development, urbanization and game-proof fencing, these areas have been impacted to an considerable degree. Utilization of the remaining browse is extremely intense and occurs nearly every winter irrespective of it's severity. The study site is on a steep (75%) west facing slope occupied by a sparse stand of Utah juniper with scattered antelope bitterbrush in the interspaces. Mountain big sagebrush has been almost eliminated. Grass and forb cover is moderately dense and possibly increasing.

Soil is of the same classification as that on the Smithfield Dry Canyon site. However, because of a much steeper slope, the "Richmond Very Stony Loam" is more shallow at this location and is certainly more eroded. Ground cover is relatively good but the steep slope and rocky character of the soil has allowed noticeable sheet and gully erosion to occur.

Browse forage comes almost entirely from two species. Most important is antelope bitterbrush followed by Utah juniper. Bitterbrush constitutes a sparse (~300 plants/acre) stand dominated by mature and decadent plants that are experiencing very high utilization nearly every winter. Utah juniper persists as scattered large trees, but provides little available browse because of "highlining." No significant reproduction of either species was observed. Mountain big sagebrush is essentially absent from the steep slope, yet occurs in small numbers near its base. Three winter-killed deer carcasses were observed near the base of the slope. The primary vegetative component on this site is perennial grass. Five species were encountered, of which; bluebunch wheatgrass, western wheatgrass and Sandberg bluegrass are most prevalent.

A small number of forbs provide a secondary source of forage. Important perennials or biennials include oneflower helianthella, arrowleaf balsamroot, gray lomatium, tarragon and yellow salsify. Annual forbs and grasses are common but not abundant enough to constitute a fire hazard. Species include prickly lettuce, pale allysum, storksbill, autumn willowweed, shepherds purse, narrowleaf collomia, and three species of annual brome grass.

1984 APPARENT TREND ASSESSMENT

Soil trend is down but the rate of erosion is slower than might otherwise be expected because of a moderately good grass cover. Vegetative trend is declining because of a continuing loss of browse plants and the concurrent increase of perennial grass. (Trend for old site location.)

1990 TREND ASSESSMENT

There is a continued decline (9% drop) of browse on this steep slope leads to a downward trend for browse. The sparse stand of bitterbrush is heavily browsed and junipers on the site are severely highlined. Perennial grasses, as a group, are increasing, while the forbs are mostly increasing. The problem here is that most of the forbs are weedy increasers. There is an abundance of annuals, especially bromes and mustards. For the steep, 70% slope, there is minimal sign of erosion. (Trend for old site location.)

TREND ASSESSMENT

soil - stable

browse - slightly downward with very low shrub densities

herbaceous understory - slight upward trend, improved densities for many beneficial perennial species

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 6

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
G	Agropyron cristatum	3	1	.03
G	Agropyron spicatum	4	1	.21
G	Bromus brizaeformis (a)	98	32	.63
G	Bromus japonicus (a)	48	16	.20
G	Bromus tectorum (a)	65	17	.91
G	Koeleria cristata	3	2	.09
G	Poa bulbosa	320	78	13.11
G	Secale cereale (a)	375	90	25.55
Total for Grasses		916	237	40.75
F	Achillea millefolium	-	-	.03
F	Alyssum alyssoides (a)	4	3	.04
F	Aster spp.	4	1	.00
F	Balsamorhiza sagittata	21	9	1.41
F	Cirsium spp.	14	7	.37
F	Convolvulus arvensis	16	5	.75
F	Epilobium brachycarpum (a)	121	47	2.46
F	Euphorbia spp.	18	8	.28
F	Gilia spp. (a)	1	1	.00
F	Grindelia squarrosa	131	48	3.22
F	Helianthus annuus (a)	13	7	.11
F	Helianthella uniflora	1	1	.03
F	Lactuca serriola	2	1	.00
F	Lithospermum ruderales	6	2	.30
F	Melilotus officinalis	8	4	.21
F	Medicago sativa	12	4	.68
F	Phacelia spp.	3	1	.00
F	Tragopogon dubius	21	9	.40
F	Unknown forb-perennial	13	4	.59
F	Wyethia amplexicaulis	9	3	.36
Total for Forbs		418	165	11.29

BROWSE TRENDS --

Herd unit 02 , Study no: 6

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	22	1.83
B	Gutierrezia sarothrae	12	.33
B	Purshia tridentata	3	.21
B	Rhus glabra cismontana	0	.03
Total for Browse		37	2.41

BASIC COVER --

Herd unit 02 , Study no: 6

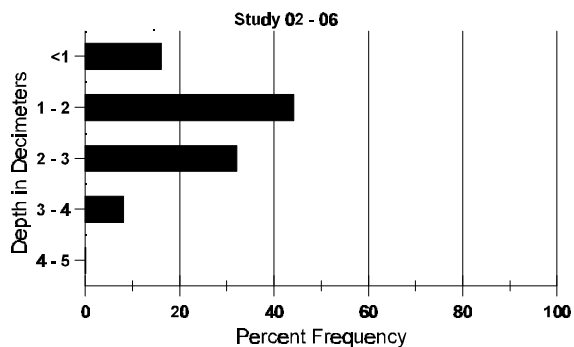
Cover Type	Nested Frequency '96	Average Cover % '96
Vegetation	488	57.42
Rock	88	.52
Pavement	167	2.07
Litter	498	69.95
Cryptogams	20	.25
Bare Ground	135	4.41

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 6

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.8	64.2 (17.5)	7.8	45.3	32.7	22.0	2.7	6.6	156.8	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 6

Type	Quadrat Frequency '96
Elk	1
Deer	3
Cattle	2

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 6

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
S	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	96	28	-	-	-	-	-	-	-	-	28	-	-	-	560		28	
M	96	13	1	-	-	-	-	-	-	-	13	-	-	1	280	29	46	14
Total Plants/Acre (excluding Dead & Seedlings)												'96	840	Dec:		-		
<i>Gutierrezia sarothrae</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	96	23	-	-	-	-	-	-	-	-	23	-	-	-	460		23	
M	96	28	-	-	-	-	-	-	-	-	28	-	-	-	560	14	19	28
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'96	1020	Dec:		-		
<i>Purshia tridentata</i>																		
M	96	2	2	-	-	-	-	-	-	-	4	-	-	-	80	39	90	4
Total Plants/Acre (excluding Dead & Seedlings)												'96	80	Dec:		-		

TREND STUDY 2-7-96

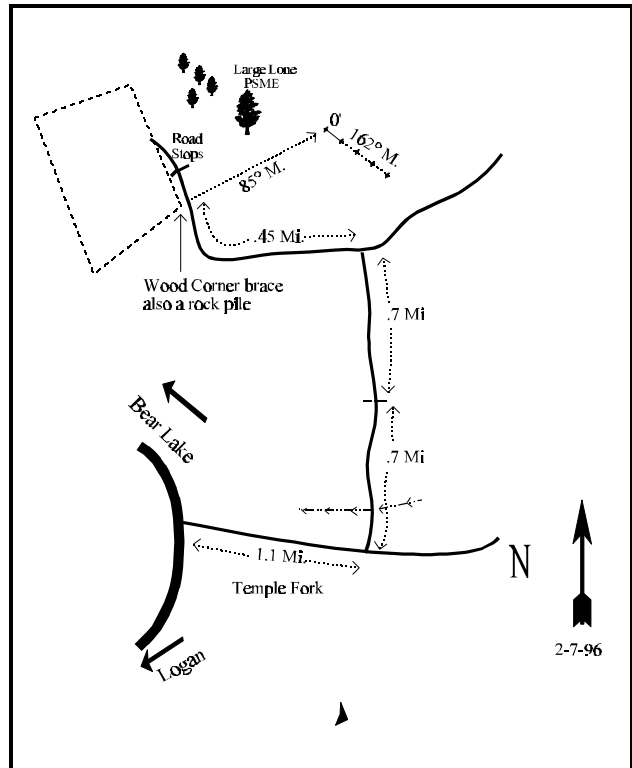
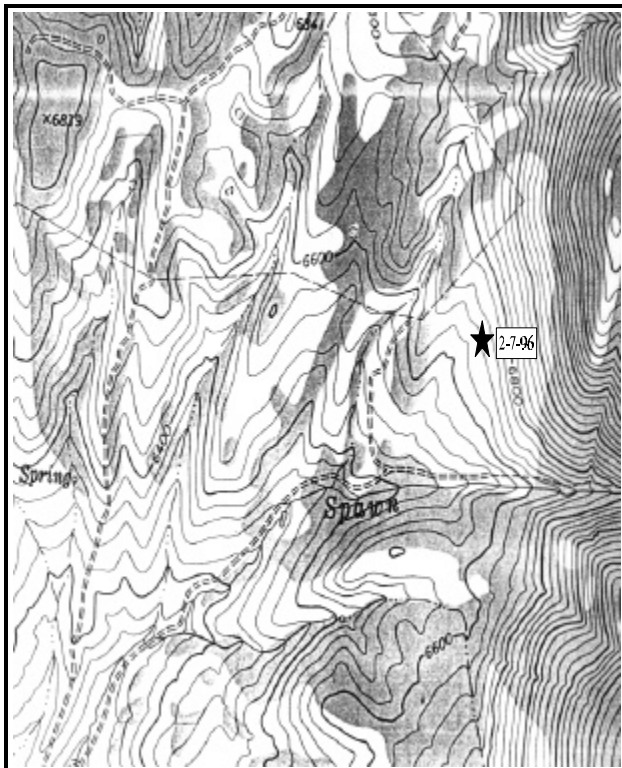
Study site name: Spawn Creek. Range type: Mixed mountain brush.

Compass bearing: frequency baseline 146 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Proceed up Logan Canyon to the Temple Fork cut-off and turn right. Note mileage here and travel 1.1 miles up Temple Fork to a point where the road splits and fords the creek to the left. Ford the creek and proceed straight ahead 0.7 miles to where the road closes. From the road closure, walk up the road for 0.7 miles to a sharp left-hand fork. Turn left and walk 0.45 miles to the lip of a hill; note that road begins to run immediately to the right of a fence at the bottom of this short slope. At the lip of the slope note a large, lone mountain mahogany on right side with a green stake imbedded two feet away. Take a bearing of 85 degrees magnetic from the stake to the 0-foot baseline stake, which is about 30 paces past a large, lone Douglas fir. 0-foot stake is marked with browse tag #7930. Baseline runs at 162 degrees magnetic.



Map Name: Temple Peak

Diagrammatic Sketch

Township 13N, Range 3E, Section 30, UTM COOR: 4-54-374E 46-32-638N

DISCUSSION

Trend Study No. 2-7

This study is a high elevation (6,760 feet) site used primarily as elk winter range. Located in Spawn Creek drainage, the area appears to be a good quality spring-fall range and/or fawning habitat for deer. The study site is a densely vegetated mixed mountain brush type on a moderately steep, west-southwest facing slope. Other plant communities in the immediate vicinity include conifer, aspen, curlleaf mountain mahogany, mountain big sagebrush-grass, and riparian zones containing wet and dry meadows and numerous beaver ponds. The site is on USFS land and is grazed by cattle. A few deer and elk pellet groups were encountered but use of this area by wildlife appears light.

Soil is a moderately deep loam with nearly equal amounts of sand, silt and clay. Percent organic matter is high (6.8%) and pH is neutral at 7.2. Surface litter and vegetative cover are dense, continuous and interrupted only by an occasional livestock or wildlife trail. There is no apparent erosion.

Browse is the principal vegetative component and consists of several co-dominant species. These include mountain snowberry, mountain big sagebrush, black chokecherry, antelope bitterbrush, Saskatoon serviceberry, and snowbrush ceanothus. Less abundant shrubs include stickyleaf low rabbitbrush, Rocky Mountain maple, curlleaf mountain mahogany, Rocky Mountain juniper, Oregon hollygrape, and woods rose. Composition is highly diverse and appears essentially stable. Most browse species display little to no use except serviceberry, mountain big sagebrush, bitterbrush, and occasionally a snowberry which showed some moderate to heavy use. Use of these shrubs has declined since 1984 when much heavier use was reported. Although cattle graze the area in the summer, their impact appears negligible.

Grass composition is also diverse and includes several desirable species. Grass species in their approximate order of abundance are: bluebunch wheatgrass, mountain brome, Kentucky bluegrass, subalpine needlegrass, and oniongrass. Utilization is light on all species, however, some current use from cattle was apparent during past readings. The grass component is vigorous and is uniformly distributed over the entire study site.

Forb composition is especially diverse and includes many good quality species which show light levels of current grazing use. The forb component also has good vigor and shows little sign of composition al change.

1984 APPARENT TREND ASSESSMENT

Both soil and vegetative trend appear highly stable. Soil erosion is nearly nonexistent due to an almost complete cover of litter and vegetation of varying height. Vegetative diversity is exceptional and unlikely to change in the future, unless the intensity of animal use increases significantly.

1990 TREND ASSESSMENT

The herbaceous understory is a key component on this high elevation winter and/or transition range. Meaningful increases were noted in several species with regard to sum of nested frequency and quadrat frequency values for grasses and forbs. Most of the grasses and forbs have increased with all plants exhibiting good vigor. Snowberry, Saskatoon serviceberry, snowbrush ceanothus, and big sagebrush are the most abundant and valuable of the browse species. Sagebrush canopy cover averaged about 9%. The most palatable browse plants; bitterbrush, serviceberry and *Ceanothus*, have been moderately hedged. Overall trends for the browse species are unchanged. Soil erosion is negligible.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - slight upward trend, from an already excellent composition with very good vigor

1996 TREND ASSESSMENT

Trend for soil continues to be stable with abundant vegetation and litter cover. Percent litter cover did decline slightly since 1990 but percent bare ground also declined. Trend for browse appears stable for key species. Density of sagebrush declined from 1,399 to 760 plants/acre since 1990, probably more from the much larger sampling design and some losses to continued drought. It appears that the number of mature sagebrush remained similar while the number of decadent plants declined. Other key browse species display stable population densities with most showing less heavy use compared to 1990. Trend for the herbaceous understory is slightly up for perennial grasses and also slightly up for perennial forbs. Overall trend appears slightly up.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - slightly up for grasses and slightly up for perennial forbs, slightly up overall

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 7

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	a ₆₅	a ₃₂	b ₂₀₆	24	15	69	10.06
G	Agropyron trachycaulum	a ₄₄	b ₁₀₅	a ₃₄	21	41	11	.58
G	Bromus marginatus	a ₉₆	b ₁₆₆	a ₁₀₅	41	67	40	2.17
G	Carex spp.	-	3	-	-	1	-	-
G	Melica bulbosa	4	10	2	2	6	1	.03
G	Poa pratensis	7	14	16	4	5	8	.71
G	Stipa columbiana	18	7	16	11	4	5	.14
G	Stipa lettermani	-	10	3	-	5	1	.00
Total for Grasses		234	347	382	103	144	135	13.71
F	Achillea millefolium	ab ₃₅	a ₂₉	b ₄₉	15	11	22	.33
F	Agastache urticifolia	8	1	5	5	1	3	.33
F	Arabis spp.	a ₋	b ₂₅	c ₇	-	11	4	.02
F	Aster chilensis	ab ₁₇	a ₃₇	b ₉	9	16	5	.36
F	Astragalus convallarius	a ₁	b ₆	a ₋	1	3	-	-
F	Balsamorhiza hookeri	-	3	-	-	2	-	-
F	Balsamorhiza sagittata	25	21	19	14	13	8	2.45
F	Calochortus nuttallii	1	2	-	1	1	-	-
F	Chenopodium fremontii	-	-	3	-	-	1	.00

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	Cirsium spp.	5	2	1	2	1	1	.03
F	Collomia linearis (a)	_a 3	_a -	_b 13	1	-	6	.03
F	Comandra pallida	29	41	36	12	20	16	.59
F	Collinsia parviflora (a)	-	-	56	-	-	23	.14
F	Crepis acuminata	35	64	38	24	30	18	.53
F	Cruciferae	-	3	-	-	1	-	-
F	Descurainia spp. (a)	-	1	-	-	1	-	-
F	Eriogonum umbellatum	12	26	20	5	14	11	1.24
F	Hackelia patens	6	7	-	3	4	-	.03
F	Helianthella uniflora	_a -	_a -	_b 34	-	-	14	2.07
F	Lappula occidentalis (a)	-	-	9	-	-	3	.04
F	Linum lewisii	-	1	5	-	1	2	.18
F	Lithospermum ruderale	3	-	4	2	-	2	.16
F	Lupinus sericeus	_a 63	_b 39	_b 42	29	19	20	2.01
F	Machaeranthera canescens	_a 5	_b 24	_b 25	2	11	11	.76
F	Mentha spp.	-	6	-	-	3	-	-
F	Microsteris gracilis (a)	-	-	19	-	-	7	.03
F	Penstemon cyananthus	4	-	-	3	-	-	-
F	Penstemon humilis	2	6	5	2	4	3	.04
F	Penstemon spp.	_a -	_b 9	_b 8	-	5	4	.19
F	Polygonum douglasii (a)	-	-	10	-	-	4	.02
F	Senecio integerrimus	_a 19	_b 35	_c -	10	20	-	-
F	Taraxacum officinale	-	4	-	-	2	-	-
F	Tragopogon dubius	-	4	6	-	3	2	.01
F	Unknown forb-perennial	-	3	8	-	1	3	.01
F	Veronica biloba (a)	-	-	158	-	-	52	1.72
F	Viola spp.	_a -	_b 58	_a -	-	32	-	-
F	Wyethia amplexicaulis	_a 46	_b 8	_b -	20	4	-	.00
Total for Forbs		319	465	589	160	234	245	13.40

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

BROWSE TRENDS --

Herd unit 02 , Study no: 7

Type	Species	Strip Frequency '96	Average Cover % '96
B	Acer grandidentatum	1	.15
B	Amelanchier alnifolia	8	.36
B	Artemisia tridentata vaseyana	35	4.51
B	Ceanothus velutinus	12	2.63
B	Chrysothamnus viscidiflorus viscidiflorus	8	.89
B	Eriogonum heracleoides	27	1.23
B	Eriogonum microthecum	2	.15
B	Mahonia repens	82	5.70
B	Prunus virginiana	27	1.82
B	Purshia tridentata	9	1.16
B	Symphoricarpos oreophilus	76	15.50
Total for Browse		287	34.15

BASIC COVER --

Herd unit 02 , Study no: 7

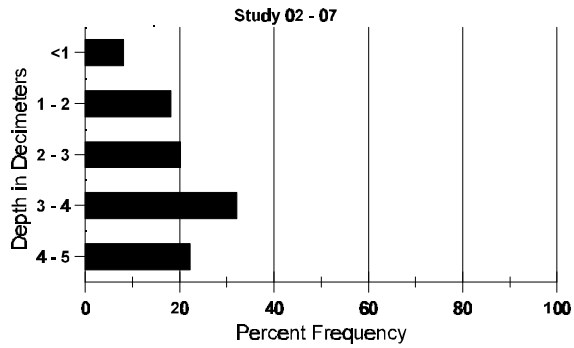
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	352	.50	6.50	57.27
Rock	186	3.50	3.50	3.09
Pavement	137	3.75	1.25	1.32
Litter	397	84.00	76.25	66.00
Cryptogams	2	0	0	.03
Bare Ground	151	8.25	12.50	4.26

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 7

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
19.2	56.0 (17.6)	7.2	36.6	31.1	32.4	6.8	21.6	326.4	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 7

Type	Quadrat Frequency '96
Elk	10
Deer	3
Cattle	2

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 7

A G E	YR	Form Class (No. of 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>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
<i>Amelanchier alnifolia</i>																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	66			1
	96	3	-	-	-	-	-	-	-	-	-	3	-	-	60			3
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	1	-	1	-	-	-	1	-	-	2	-	-	1	200	39	18	3
	96	5	-	2	-	-	-	-	-	-	4	3	-	-	140	37	54	7
D	84	-	-	1	-	-	-	-	-	-	-	-	1	-	66			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'84	132	Dec:	50%			
												'90	266		0%			
												'96	200		0%			

A G E	YR	Form Class (No. of 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	1	-	-	-	-	-	2	1	-	-	200		3	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	2	1	-	-	-	-	-	-	2	1	-	-	200		3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	-	1	9	-	-	-	-	-	-	6	-	4	-	666	29 23	10	
	90	9	1	-	1	-	-	-	-	-	8	2	1	-	733	31 33	11	
	96	21	7	-	2	-	-	-	-	-	28	-	2	-	600	28 38	30	
D	84	-	4	19	-	-	-	-	-	-	11	3	9	-	1533		23	
	90	9	-	1	-	-	-	-	-	-	8	-	-	2	666		10	
	96	4	1	-	-	-	-	-	-	-	3	-	-	2	100		5	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	220		11	
Total Plants/Acre (excluding Dead & Seedlings)												'84	2399	Dec:	64%			
												'90	1399		48%			
												'96	760		13%			
<i>Ceanothus velutinus</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	18	2	-	-	-	-	-	-	-	15	5	-	-	400	22 36	20	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	420		-			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	1	-	-	1	-	-	-	66	24 41	1	
	96	14	-	-	1	-	-	-	-	-	15	-	-	-	300	17 19	15	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	66		0%			
												'96	320		6%			
<i>Eriogonum heracleoides</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	54	-	-	3	-	-	-	-	-	57	-	-	-	1140	8 17	57	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	1140		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Eriogonum microthecum</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80	10	26	4
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	80		-			
<i>Mahonia repens</i>																		
Y	84	308	-	-	-	-	-	-	-	-	308	-	-	-	20533			308
	90	22	-	-	16	-	-	2	-	-	33	7	-	-	2666			40
	96	123	-	-	70	-	-	-	-	-	193	-	-	-	3860			193
M	84	168	-	-	-	-	-	-	-	-	168	-	-	-	11200	6	5	168
	90	53	-	-	26	-	-	15	-	-	66	28	-	-	6266	4	3	94
	96	728	-	-	180	-	-	-	-	-	908	-	-	-	18160	5	6	908
Total Plants/Acre (excluding Dead & Seedlings)												'84	31733	Dec:	-			
												'90	8932		-			
												'96	22020		-			
<i>Prunus virginiana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	5	-	-	4	-	-	-	-	-	9	-	-	-	180			9
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	9	-	-	13	-	-	6	-	-	13	15	-	-	1866			28
	96	59	-	-	10	-	-	-	-	-	69	-	-	-	1380			69
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	18	4	-	-	-	-	-	-	-	22	-	-	-	440	33	28	22
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	1866		-			
												'96	1820		-			
<i>Purshia tridentata</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	6	2	-	-	-	-	-	-	7	-	-	1	160	19	45	8
D	84	-	-	1	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	1	-	1	-	-	-	-	-	2	-	-	-	133			2
	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	100%			
												'90	133		100%			
												'96	180		11%			

A G E	YR	Form Class (No. of 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	9	-	-	-	-	-	11	-	-	-	220		11	
Y	84	-	2	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	11	1	-	4	-	-	3	-	-	16	3	-	-	1266		19	
	96	12	-	-	6	-	-	-	-	-	17	1	-	-	360		18	
M	84	9	8	-	-	-	-	-	-	-	17	-	-	-	1133	30 42	17	
	90	11	3	-	5	3	-	4	-	-	22	4	-	-	1733	32 37	26	
	96	128	1	1	3	-	-	-	-	-	132	-	-	1	2660	30 53	133	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	4	4	-	1	-	-	-	-	-	4	-	-	5	180		9	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	1266	Dec:	0%			
												'90	3065		2%			
												'96	3200		6%			

TREND STUDY 2-8-96

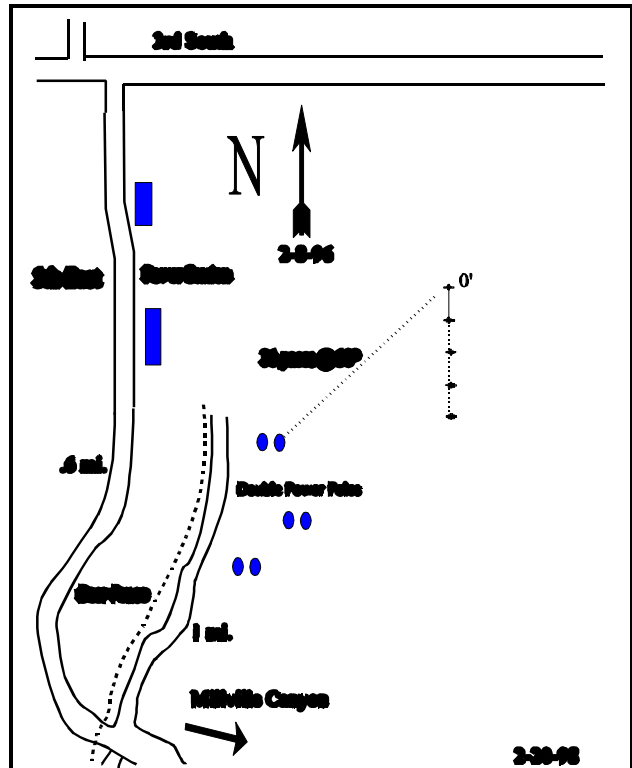
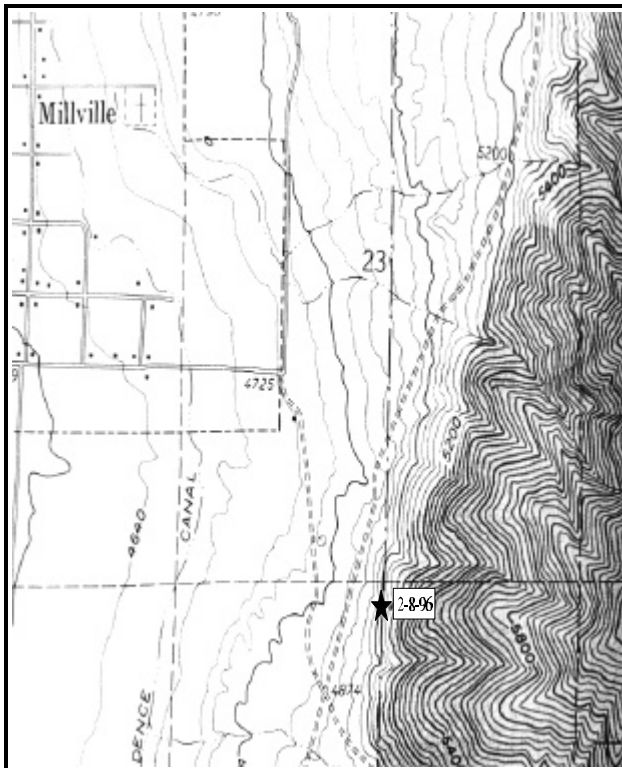
Study site name: Millville Canyon. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 165 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11, 59 & 95ft), line 2 (34 & 71ft).

LOCATION DESCRIPTION

From 500 East and 300 South in Millville travel south 0.6 miles. At the intersection just beyond the deer fence turn left (north). Proceed 0.10 miles and stop just opposite the northernmost pair of power poles just east of the road. From the easternmost pole walk 136 paces at 50 degrees magnetic to 0-foot baseline stake, marked by browse tag #7986. Baseline runs at 165 degrees magnetic.



Map Name: Logan

Diagrammatic Sketch

Township 11N, Range 1E, Section 26, UTM COOR: 4-33-117E 46-13-406N

DISCUSSION

Trend Study No. 2-8

This study site lies on the steep west facing slope of the Cache "face" near Millville Canyon. The area contains an important stand of mountain big sagebrush without the general association of bitterbrush and a somewhat scattered population of Utah juniper. This site is immediately north of Millville Canyon at an elevation of 5,180 feet and is quite steep (75%) with a rocky and eroded soil surface. Animal use was extremely heavy in 1984. Additionally, eight deer and one elk were found near the site, as a result of the harsh winter of 1983-84. Currently no elk and few deer pellet groups were found on the site. Use is light to moderate.

Soil is a "Richmond Very Stony Loam," similar to that described and reported in studies #5 and #6. Soil at the site is fairly deep (16.5 inches), but rocky with poor structure and high erosion potential. It has a loam texture and a relatively low percent organic matter content (1.56%). Both phosphorus and potassium could be limiting at 5.6 and 3.2 ppm respectively. Average soil temperature is also quite high (75°F), due to the abundant rock on the surface and in the profile. Steep slope and poor cover resulting from intense animal use and trampling effects have caused accelerated soil erosion in the past, but current conditions are more stable.

Browse composition is dominated by one of the few remaining stands of mountain big sagebrush on this portion of the Cache Valley "face." Estimated density in 1984 was approximately 732 plants/acre, which constitutes a moderately sparse stand that appeared to be slowly declining. The population was dominated by heavily browsed decadent plants in poor vigor. Little reproduction was evident. During the 1990 reading, the sagebrush population was split into mountain big sagebrush and a hybrid form, a cross between black sagebrush and mountain big sagebrush. Estimated density of the hybrid sagebrush was about 400 plants/acre in 1990. The population was moderately hedged, mostly decadent (83%), yet it displayed good vigor. Mountain big sagebrush numbered only approximately 132 plants/acre with light to moderate use. Percent decadency was 50%. Density of the big sagebrush/black sagebrush hybrid increased to 740 plants/acre by 1996. Decadency declined to 54% with moderate use. Mountain big sagebrush currently numbers 360 plants/acre with light use and good vigor. Because the community structure is basically discontinuous and clumped, the newer sampling design greatly increases the sample size and insures better distribution of the sampling units, thereby the more recent population estimates are more fundamentally correct than the older design.

Herbaceous composition is poor. Unlike the Green Canyon site, annual grasses including cheatgrass, Japanese brome, and rattlesnake brome are abundant here. These three species account for 67% of the grass cover. Preferred perennials include bluebunch wheatgrass and Sandberg bluegrass. Also encountered in 1996 were winter rye and jointed goatgrass.

Forb composition consists chiefly of annual and perennial weeds. The only forbs of value are arrowleaf balsamroot, yellow salsify, gray Lomatium, and perhaps thistle. Dyers woad was found on the site in 1990 and has increased significantly since then.

1984 APPARENT TREND ASSESSMENT

This site is in perhaps the poorest condition of any that we observed on the herd unit. Soil and vegetative trend are definitely declining and in view of the slope steepness combined with the presence of the big game fence, there is probably little or no corrective action feasible.

1990 TREND ASSESSMENT

Sagebrush appears to continue to decline. New growth on the shrubs is very vigorous and there is good seed production, but no seedling or young plants were found. Sagebrush canopy cover is 5%. There was an increase in perennial grass nested and quadrat frequency values. This is largely due to increases in Sandberg bluegrass and bluebunch wheatgrass. The soil remains loose and easily disturbed, with a high potential for erosion, but the condition appears to have stabilized since 1984.

TREND ASSESSMENT

soil - stable, fair condition

browse - continued down

herbaceous understory - down for forbs (weedy composition) and slightly upward for grasses with continued increases for bluebunch wheatgrass and Sandberg bluegrass

1996 TREND ASSESSMENT

Soil trend is improved slightly due to an increase in litter cover and a decline in percent bare ground from 7% to 3%. Trend for browse is up for mountain big sagebrush due to increased density, lighter utilization, good vigor, a declining percent decadency, and improved recruitment. Trend for the more preferred hybrid is stable. Due to the lack of young plants, the increased density would be mostly the result of the larger sample size used in 1996. Percent decadency declined, but a majority are still decadent (54%) and use is slightly heavier. Overall, trend for browse is slightly up. The composition of the herbaceous understory is poor and dominated by annual grasses and weedy forbs. Sum of nested frequency for perennial grasses declined while frequency of perennial forbs increased. Sum of nested frequency for bluebunch wheatgrass and Sandberg bluegrass declined significantly since 1990. The increase in forb frequency is due primarily to a significant increase in dyers woad which changed from a quadrat frequency of 11% to 55%. It is currently the most numerous forb on the site. Trend is considered slightly down.

TREND ASSESSMENT

soil - slightly improved

browse - up slightly

herbaceous understory - slightly down, poor composition dominated by annual grasses and weedy forbs

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 8

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Aegilops cylindrica (a)	-	-	7	-	-	2	.03
G	Agropyron spicatum	_a 49	_b 88	_{ab} 72	24	36	26	3.52
G	Bromus brizaeformis (a)	-	-	293	-	-	96	4.97
G	Bromus japonicus (a)	-	-	81	-	-	27	.96
G	Bromus tectorum (a)	-	-	305	-	-	87	10.07
G	Poa bulbosa	_a -	_b 15	_c 40	-	6	13	1.07
G	Poa secunda	_{ab} 170	_a 202	_b 136	67	78	52	2.47

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	<i>Secale cereale</i> (a)	-	-	75	-	-	29	.89
Total for Grasses		219	305	1009	91	120	332	24.02
F	<i>Alyssum alyssoides</i> (a)	-	-	52	-	-	23	.11
F	<i>Artemisia ludoviciana</i>	3	7	6	1	3	3	.33
F	<i>Balsamorhiza sagittata</i>	-	2	1	-	1	1	.09
F	<i>Cirsium</i> spp.	-	8	8	-	4	6	.87
F	<i>Comandra pallida</i>	1	4	1	1	2	1	.00
F	<i>Epilobium brachycarpum</i> (a)	-	-	17	-	-	9	.04
F	<i>Holosteum umbellatum</i> (a)	-	-	7	-	-	3	.01
F	<i>Ipomopsis aggregata</i>	3	7	14	1	6	6	.03
F	<i>Isatis tinctoria</i>	_a -	_b 23	_c 119	-	11	55	1.80
F	<i>Lactuca serriola</i>	-	-	7	-	-	2	.01
F	<i>Lomatium grayi</i>	3	-	-	1	-	-	-
F	<i>Melilotus alba</i>	-	-	8	-	-	3	.33
F	<i>Phlox longifolia</i>	-	-	1	-	-	1	.00
F	<i>Ranunculus testiculatus</i> (a)	-	-	1	-	-	1	.00
F	<i>Tragopogon dubius</i>	_a 34	_a 23	_b 94	18	12	45	1.72
Total for Forbs		44	74	336	22	39	159	5.38

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

BROWSE TRENDS --

Herd unit 02 , Study no: 8

T y p e	Species	Strip Frequency '96	Average Cover % '96
B	<i>Artemisia tridentata-nova hybrid</i>	29	2.69
B	<i>Artemisia tridentata vaseyana</i>	16	2.25
B	<i>Gutierrezia sarothrae</i>	38	.56
B	<i>Rhus glabra cismontana</i>	10	.24
Total for Browse		93	5.74

BASIC COVER --

Herd unit 02 , Study no: 8

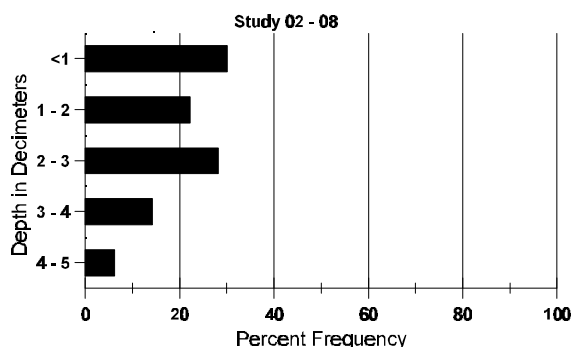
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	381	3.75	4.00	41.35
Rock	318	22.25	20.50	24.38
Pavement	234	17.50	35.25	5.16
Litter	394	39.00	32.00	38.56
Cryptogams	112	3.50	1.00	1.79
Bare Ground	110	14.00	7.25	2.76

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 8

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
16.5	74.7 (17.4)	8.0	50.6	31.4	18.0	1.6	5.6	3.2	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 8

Type	Quadrat Frequency '96
Rabbit	3
Deer	6

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 8

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata-nova hybrid</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66	24	29	1
	96	11	6	-	-	-	-	-	-	-	17	-	-	-	340	20	39	17
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	2	3	-	-	-	-	-	-	-	5	-	-	-	333			5
	96	6	12	1	1	-	-	-	-	-	19	-	1	-	400			20
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	440			22
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	399		83%			
												'96	740		54%			
<i>Artemisia tridentata vaseyana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	84	-	-	1	-	-	-	-	-	-	1	-	-	-	66	14	17	1
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	24	25	1
	96	10	2	-	-	-	-	-	-	-	12	-	-	-	240	31	45	12
D	84	-	-	10	-	-	-	-	-	-	3	-	5	2	666			10
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	280			14
Total Plants/Acre (excluding Dead & Seedlings)												'84	732	Dec:	91%			
												'90	132		50%			
												'96	360		6%			
<i>Gutierrezia sarothrae</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	40			2
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	19	-	-	-	-	-	-	-	-	19	-	-	-	380			19
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266	12	18	4
	96	66	-	-	-	-	-	-	-	-	66	-	-	-	1320	12	15	66
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	266		-			
												'96	1700		-			

A G E	YR	Form Class (No. of 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	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	133		-			
												'96	0		-			
Rhus glabra cismontana																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	13	-	-	-	-	-	-	-	-	13	-	-	260		13		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	1	5	-	-	-	-	-	-	-	6	-	-	120	14	16	6	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	-	-	-	-	-	-	-	-	-	-	-	20		1		
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	380		-			

TREND STUDY 2-9-96

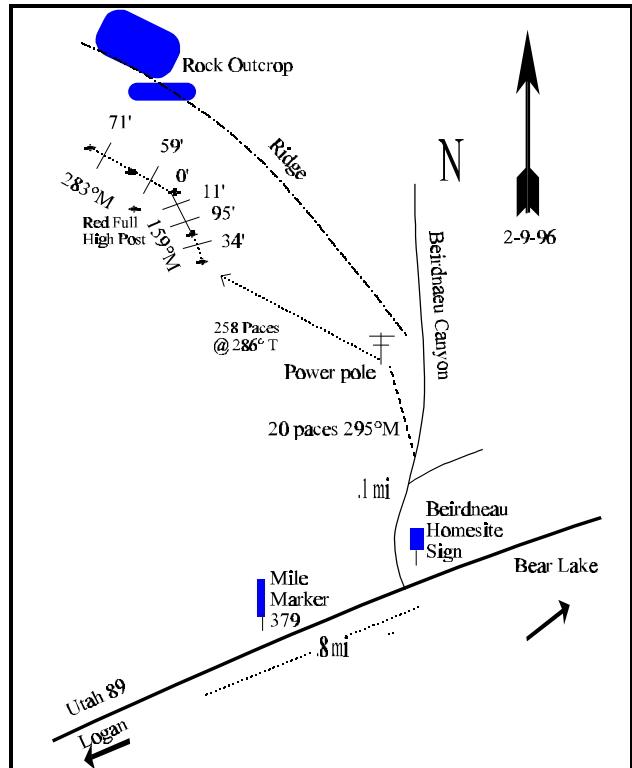
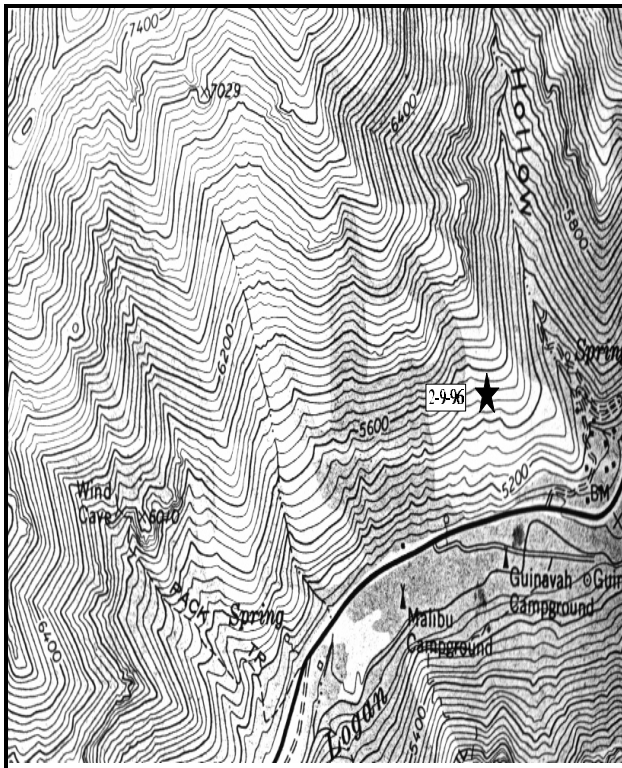
Study site name: Beirdnaeu. Range type: Mixed mountain brush.

Compass bearing: frequency baseline 159 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Proceed up Logan Canyon to mile marker 379 and begin to note mileage. Continue 0.80 miles to the Forest Service sign "Beirdnaeu Summer Home Sites." Turn left here and proceed 0.10 miles to a fork and stop. Walk to the power pole on the left at a bearing of 295 degrees magnetic and about 20 paces. Take a bearing of 286 degrees true from the pole and walk 285 paces to the 0-foot stake of the baseline marked by browse tab #7928. Baseline runs at 159 degrees magnetic. The second stake is placed 50 feet down the slope at the same bearing. The third and fourth stake are placed 100 feet apart above the 0-foot baseline stake at a bearing of 283 degrees magnetic.



Map Name: Mt. Elmer

Diagrammatic Sketch

Township 12N, Range 2E, Section 23, UTM: 4-41-743E 46-24-207N

DISCUSSION

Trend Study No. 2-9

This study is on a steep (55%) south facing slope at 5,560 feet elevation. It is located slightly north of the Beirdneau summer home site in Logan Canyon. The area is considered a normal deer winter range that possesses a good mix of mountain big sagebrush and antelope bitterbrush, interspersed with juniper trees. Like many of the sites in this unit, wildlife use was heavy in 1984, but is currently light.

The soil is moderately deep (14"), yet rather rocky and well-drained soil. It appears that some of the soil has been colluvially deposited and/or weathered-in-place from limestone parent material. Texture is a clay loam which is moderately alkaline with a pH of 7.9. Phosphorous could be a limiting factor with only 8.7 ppm. Vegetation and litter cover appear adequate to control runoff from all but the highest intensity summer storms.

Browse composition consists of a mixture of bitterbrush and mountain big sagebrush with an understory of smaller shrubs. Most notable is broom snakeweed. Both of the dominant browse species tend to be large shrubs, especially bitterbrush which in some instances reaches a height of six or seven feet. Both species demonstrated moderate to heavy levels of hedging and moderately high levels of decadence in 1984. A confounding factor, reported in 1984, in assessing age structure was a fairly recent die off of bitterbrush and sagebrush that affected 10% to 20% of the total population. Although some of the deaths are obviously the result of rodent activity during the winters of 1983-85, a complete explanation of the die off is not possible. Disease or insect infestation is a possibility as is gopher activity beneath the ground surface. Seventeen percent of the population displayed poor vigor in 1984 increasing to 18% by 1990. Decadency rates were also high at 66% and 54% respectively. The browse stand on this area is at best, thought barely stable in 1984. Age and form class analysis both suggested declining populations. During the 1996 reading, the sample size was greatly increased. Estimated density of mountain big sagebrush declined to 360 plants/acre. Dead plants, first counted in 1996, numbered nearly as many as live ones (300 plants/acre). Much of the decline in density is due to the larger sample. However, the large proportion of dead plants in the population indicates a sagebrush decline. This is most likely the result of prolonged drought along with winter injury, which has been common for the sagebrush populations of Utah. No seedlings and few young plants were encountered in 1996. Bitterbrush density is currently 380 plants/acre. Utilization is moderate and percent decadency has declined from 77% in 1990 to 0% in 1996. Vigor has also improved.

Grasses and forbs are irregularly distributed, but provide good cover. Composition is poor, because of the predominance of weedy annuals. Cheatgrass and Japanese brome alone, account for 82% of the grass cover. Bluebunch wheatgrass is the only moderately abundant perennial grass with a quadrat frequency of 44%. The forb component has fair diversity and quality. The most common forb is yellow salsify followed by gray Lomatium and yellow sweetclover. Most forbs showed some evidence of use in 1984. Annual and biennial weeds are common and include a species of particular note, dyers woad, which has increased significantly since 1990.

1984 APPARENT TREND ASSESSMENT

Both soil and vegetative trend are marginally stable at this time. Careful monitoring, however, will be necessary to detect changes in the sagebrush and bitterbrush populations as well as accompanying changes in the occurrence of increaser species. Soil trend is marginally stable on a soil that is potentially

very erodible.

1990 TREND ASSESSMENT

The most preferred browse, bitterbrush, has increased in density while sagebrush has declined slightly. Both sagebrush and bitterbrush tend to have a moderately hedged growth form. Canopy cover from bitterbrush was 6%, while sagebrush averaged only 1% cover. Cheatgrass and Japanese brome are the most prevalent grass species. Bluebunch wheatgrass is still quite common but it did have decreased values for sum of nested frequency and quadrat frequency. There is a fair diversity of perennial forbs, but many are weedy increasers.

TREND ASSESSMENT

soil - stable but fair condition

browse - stable to slightly increasing

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

1996 TREND ASSESSMENT

Soil trend is stable. Protective ground cover is abundant and more than adequate to protect the soil from erosion. The sagebrush and bitterbrush die off which started in the early 1980's appears to have stabilized. Mountain big sagebrush is lightly utilized with improved vigor and a declining decadency rate. Bitterbrush is moderately utilized with good vigor and no decadent plants sampled. No seedlings or young have been sampled during any reading. Trend for browse is considered stable with the decline in density counterbalanced by the lighter use and improved vigor. Some of the lower population estimates can also be attributed to the much larger sample now being taken which gives better estimates for populations that are discontinuous and/or clumped. The herbaceous understory is dominated by annual grasses and weedy forbs which adversely effect shrub recruitment. Sum of nested frequency for perennial grasses increased since 1990, but this increase comes largely from the appearance of bulbous bluegrass. Bluebunch wheatgrass increased slightly in its sum of nested frequency. Sum of nested frequency for forbs declined slightly overall. Sum of nested frequency for dyers woad increased significantly since 1990. Trend for the herbaceous understory is considered stable but in poor condition because it is dominated by weedy species.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable but dominated by annuals and weedy species

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 9

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agoseris glauca	-	-	1	-	-	1	.00
G	Agropyron spicatum	125	105	108	50	41	44	2.99
G	Agropyron trachycaulum	-	-	7	-	-	2	.06
G	Bromus brizaeformis (a)	-	-	2	-	-	1	.00
G	Bromus japonicus (a)	-	-	343	-	-	98	17.68

Type	Species	Nestled Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Bromus tectorum (a)	-	-	204	-	-	60	8.41
G	Poa bulbosa	a-	a-	b83	-	-	32	2.65
G	Poa pratensis	4	10	-	1	3	-	-
G	Poa secunda	a-	b10	ab3	-	5	3	.04
Total for Grasses		129	125	751	51	49	241	31.85
F	Achillea millefolium	a14	b-	b-	5	-	-	-
F	Agoseris glauca	a14	a26	b-	8	13	-	-
F	Allium acuminatum	a45	a29	b6	24	16	2	.04
F	Alyssum alyssoides (a)	-	-	137	-	-	49	.39
F	Artemisia ludoviciana	4	3	10	2	1	5	.26
F	Aster chilensis	a49	a40	b2	17	16	1	.00
F	Astragalus spp.	a-	b13	a-	-	6	-	-
F	Astragalus utahensis	1	3	2	1	1	1	.00
F	Balsamorhiza sagittata	5	5	3	2	3	2	.53
F	Chaenactis douglasii	-	1	-	-	1	-	-
F	Cirsium spp.	2	5	5	1	3	3	.33
F	Comandra pallida	8	-	2	3	-	1	.03
F	Cymopterus spp.	-	-	-	-	-	-	.03
F	Cynoglossum officinale	a5	b27	a2	2	15	1	.00
F	Epilobium brachycarpum (a)	-	-	46	-	-	21	.22
F	Galium aparine (a)	-	-	36	-	-	13	.40
F	Gilia aggregata	-	4	-	-	3	-	-
F	Hackelia patens	1	10	-	1	5	-	-
F	Holosteum umbellatum (a)	-	-	5	-	-	2	.01
F	Isatis tinctoria	a-	b23	c65	-	10	31	1.33
F	Lactuca serriola	a-	b67	c28	-	38	13	.15
F	Linum lewisii	20	22	29	9	12	14	.37
F	Lithospermum ruderales	10	8	9	5	4	4	.54
F	Lomatium grayi	97	118	107	37	45	41	2.96
F	Melilotus officinalis	a2	a15	b100	2	7	41	5.01
F	Penstemon humilis	a2	b10	a1	2	5	1	.03
F	Phlox hoodii	a-	b13	a-	-	5	-	-
F	Tragopogon dubius	159	163	156	68	70	68	2.96
F	Unknown forb-perennial	-	-	1	-	-	1	.06
F	Veronica biloba (a)	-	-	31	-	-	13	.11
Total for Forbs		438	605	783	189	279	328	15.85

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

BROWSE TRENDS --

Herd unit 02 , Study no: 9

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	14	2.04
B	Chrysothamnus viscidiflorus stenophyllus	4	.30
B	Gutierrezia sarothrae	10	.43
B	Juniperus scopulorum	1	.85
B	Purshia tridentata	17	9.03
B	Symphoricarpos oreophilus	10	1.38
Total for Browse		56	14.05

BASIC COVER --

Herd unit 02 , Study no: 9

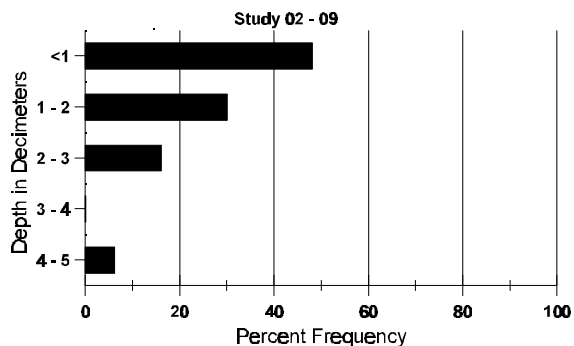
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	394	1.25	14.50	54.68
Rock	219	20.25	9.00	12.78
Pavement	184	19.50	31.00	5.56
Litter	400	48.00	39.00	48.74
Cryptogams	14	.25	0	.20
Bare Ground	127	10.75	6.50	6.39

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 9

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.8	64.6 (15.8)	7.9	26.7	38.0	35.3	3.2	8.7	211.2	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 9

Type	Quadrat Frequency '96
Deer	1

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 9

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
Y	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	5	-	-	-	-	-	-	5	-	-	-	333	22	27	5
	90	5	-	-	-	-	-	-	-	5	-	-	-	333	24	32	5	
	96	7	2	-	-	-	-	-	-	9	-	-	-	180	23	40	9	
D	84	-	-	12	-	-	-	-	-	9	-	3	-	800		12		
	90	5	1	-	-	-	-	-	-	4	-	1	1	400		6		
	96	2	4	-	2	-	-	-	-	7	-	-	1	160		8		
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	-	-	-	-	-	-	-	-	-	-	-	300		15		
Total Plants/Acre (excluding Dead & Seedlings)												'84	1199	Dec:	67%			
												'90	733		55%			
												'96	360		44%			
<i>Chrysothamnus nauseosus albicaulis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0	45	61	0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	1	-	-	-	-	-	-	-	1	-	-	-	66		1		
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	2	-	-	-	-	-	-	-	2	-	-	-	133		2		
	96	1	-	-	-	-	-	-	-	1	-	-	-	20		1		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	1	-	-	-	-	-	-	-	1	-	-	-	66	25	30	1	
	96	3	-	-	1	-	-	-	-	4	-	-	-	80	28	41	4	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	199		-			
												'96	100		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Gutierrezia sarothrae</i>																		
Y	84	7	-	-	-	-	-	-	-	-	7	-	-	-	466		7	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	21	-	-	-	-	-	-	-	-	21	-	-	-	1400	15	19	21
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	9	14	1
	96	20	-	-	-	-	-	-	-	-	20	-	-	-	400	14	17	20
Total Plants/Acre (excluding Dead & Seedlings)												'84	1866	Dec:	-			
												'90	66		-			
												'96	400		-			
<i>Juniperus osteosperma</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
<i>Phlox hoodii</i>																		
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66	3	5	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Purshia tridentata</i>																		
M	84	-	-	2	-	-	-	-	-	-	2	-	-	-	133	45	53	2
	90	3	4	-	-	-	-	-	-	-	7	-	-	-	466	63	92	7
	96	4	12	1	-	2	-	-	-	-	19	-	-	-	380	52	88	19
D	84	-	-	7	-	-	-	-	-	-	7	-	-	-	466			7
	90	2	1	-	-	-	-	-	-	-	2	-	-	1	200			3
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5
Total Plants/Acre (excluding Dead & Seedlings)												'84	599	Dec:	78%			
												'90	666		30%			
												'96	380		0%			

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Symphoricarpos oreophilus																		
Y	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	90	2	-	-	-	-	-	3	-	-	5	-	-	-	333		5	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	-	2	-	-	-	-	-	-	-	2	-	-	-	133	32	31	2
	90	2	-	-	1	-	-	3	-	-	6	-	-	-	400	16	28	6
	96	3	1	-	4	-	-	-	-	-	6	-	2	-	160	24	51	8
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	333	Dec:	0%			
												'90	733		0%			
												'96	240		8%			

TREND STUDY 2-10-96

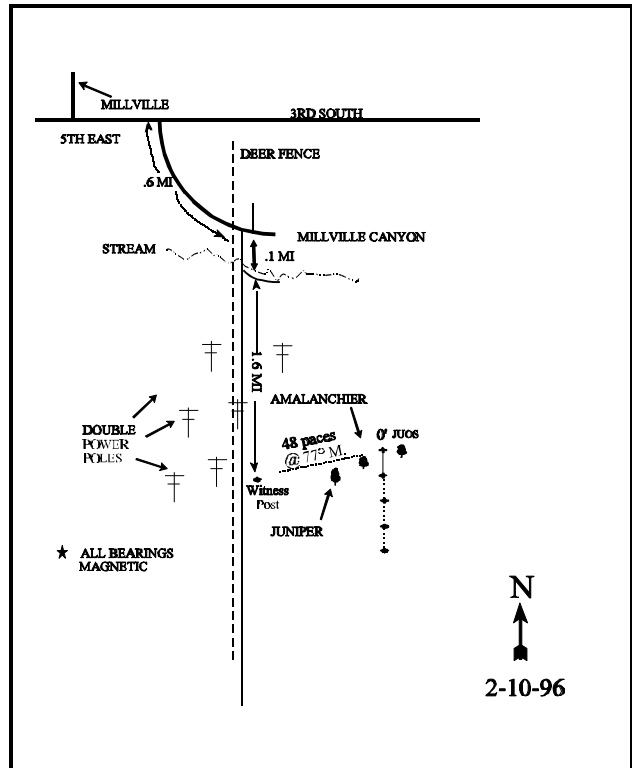
Study site name: Broad Hollow Flat. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 163 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From 500 East and 200 South in Millville turn right (south) and proceed 0.6 miles; just beyond the deer fence turn right (south). Travel 0.10 miles (passing a small stream) and bear right at the fork. Follow the deer fence for 1.6 miles and stop at the witness post on the left. Note that the power poles cross the road and there are two sets on the right side of the road. The witness post is directly opposite the second two poles on the right side of the road. Proceed from the witness post 48 paces at 77 degrees magnetic to the 0-foot stake of the baseline marked by browse tag #7931. The baseline runs on a bearing of 163 degrees magnetic.



Map Name: Logan

Diagrammatic Sketch

Township 11N, Range 1E, Section 35, UTM COOR: 4-32-781E 46-10-596N

DISCUSSION

Trend Study No. 2-9

This study is on a steep (55%) south facing slope at 5,560 feet elevation. It is located slightly north of the Beirdneau summer home site in Logan Canyon. The area is considered a normal deer winter range that possesses a good mix of mountain big sagebrush and antelope bitterbrush, interspersed with juniper trees. Like many of the sites in this unit, wildlife use was heavy in 1984, but is currently light.

The soil is moderately deep (14"), yet rather rocky and well-drained. It appears that some of the soil has been colluvially deposited and/or weathered-in-place from limestone parent material. Texture is a clay loam which is moderately alkaline with a pH of 7.9. Phosphorous could be a limiting factor with only 8.7 ppm. Vegetation and litter cover appear adequate to control runoff from all but the highest intensity summer storms.

Browse composition consists of a mixture of bitterbrush and mountain big sagebrush with an understory of smaller shrubs. Most notable is broom snakeweed. Both of the dominant browse species tend to be large shrubs, especially bitterbrush which in some instances reaches a height of six or seven feet. Both species demonstrated moderate to heavy levels of hedging and moderately high levels of decadence in 1984. A confounding factor, reported in 1984, in assessing age structure was a fairly recent die off of bitterbrush and sagebrush that affected 10% to 20% of the total population. Although some of the deaths are obviously the result of rodent activity during the winters of 1983-85, a complete explanation of the die off is not possible. Disease or insect infestation is a possibility as is gopher activity beneath the ground surface. Seventeen percent of the population displayed poor vigor in 1984 increasing to 18% by 1990. Decadency rates were also high at 66% and 54% respectively. The browse stand on this area is at best, thought barely stable in 1984. Age and form class analysis both suggested declining populations. During the 1996 reading, the sample size was greatly increased. Estimated density of mountain big sagebrush declined to 360 plants/acre. Dead plants, first counted in 1996, numbered nearly as many as live ones (300 plants/acre). Much of the decline in density is due to the larger sample. However, the large proportion of dead plants in the population indicates a sagebrush decline. This is most likely the result of prolonged drought along with winter injury, which has been common for the sagebrush populations of Utah. No seedlings and few young plants were encountered in 1996. Bitterbrush density is currently 380 plants/acre. Utilization is moderate and percent decadency has declined from 77% in 1990 to 0% in 1996. Vigor has also improved.

Grasses and forbs are irregularly distributed, but provide good cover. Composition is poor, due to the predominance of weedy annuals. Cheatgrass and Japanese brome alone, account for 82% of the grass cover. Bluebunch wheatgrass is the only moderately abundant perennial grass with a quadrat frequency of 44%. The forb component has fair diversity and quality. The most common forb is yellow salsify followed by gray Lomatium and yellow sweetclover. Most forbs showed some evidence of use in 1984. Annual and biennial weeds are common and include a species of particular note, dyers woad, which has increased significantly since 1990.

1984 APPARENT TREND ASSESSMENT

Both soil and vegetative trend are marginally stable at this time. Careful monitoring, however, will be necessary to detect changes in the sagebrush and bitterbrush populations as well as accompanying changes in the occurrence of increaser species. Soil trend is marginally stable on a soil that is potentially

very erodible.

1990 TREND ASSESSMENT

The most preferred browse, bitterbrush, has increased in density while sagebrush has declined slightly. Both sagebrush and bitterbrush tend to have a moderately hedged growth form. Canopy cover from bitterbrush was 6%, while sagebrush averaged only 1% cover. Cheatgrass and Japanese brome are the most prevalent grass species. Bluebunch wheatgrass is still quite common but it did have decreased values for sum of nested frequency and quadrat frequency. There is a fair diversity of perennial forbs, but many are weedy increasers.

TREND ASSESSMENT

soil - stable but fair condition

browse - stable to slightly increasing

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

1996 TREND ASSESSMENT

Soil trend is stable. Protective ground cover is abundant and more than adequate to protect the soil from erosion. The sagebrush and bitterbrush die off which started in the early 1980's appears to have stabilized. Mountain big sagebrush is lightly utilized with improved vigor and a declining decadency rate. Bitterbrush is moderately utilized with good vigor and no decadent plants sampled. No seedlings or young have been sampled during any reading. Trend for browse is considered stable with the decline in density counterbalanced by the lighter use and improved vigor. Some of the lower population estimates can also be attributed to the much larger sample now being taken which gives better estimates for populations that are discontinuous and/or clumped. The herbaceous understory is dominated by annual grasses and weedy forbs which adversely effect shrub recruitment. Sum of nested frequency for perennial grasses increased since 1990, but this increase comes largely from the appearance of bulbous bluegrass. Bluebunch wheatgrass increased slightly in its sum of nested frequency. Sum of nested frequency for forbs declined slightly overall. Sum of nested frequency for dyers woad increased significantly since 1990. Trend for the herbaceous understory is considered stable but in poor condition because it is dominated by weedy species.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable but dominated by annuals and weedy species

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 10

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Aegilops cylindrica (a)	a3	a2	b15	1	1	7	.06
G	Agropyron cristatum	a247	b164	b194	78	65	67	6.13
G	Agropyron intermedium	a3	a20	b44	2	6	15	1.06
G	Agropyron spicatum	52	52	28	22	24	13	.75
G	Aristida purpurea	-	2	-	-	1	-	.03

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	<i>Bromus brizaeformis</i> (a)	-	-	11	-	-	5	.19
G	<i>Bromus japonicus</i> (a)	-	-	69	-	-	23	.91
G	<i>Bromus tectorum</i> (a)	-	-	25	-	-	11	.20
G	<i>Poa bulbosa</i>	a ⁻	b ¹⁵⁵	c ³⁰⁸	-	67	84	24.20
G	<i>Poa pratensis</i>	-	1	-	-	1	-	-
G	<i>Poa secunda</i>	a ²⁷	b ¹⁶⁶	a ¹⁴	14	64	7	.06
G	<i>Secale cereale</i> (a)	a ⁻	b ⁷³	c ⁴⁰	-	27	13	1.60
Total for Grasses		332	635	748	117	256	245	35.23
F	<i>Achillea millefolium</i>	-	-	8	-	-	3	.04
F	<i>Agoseris glauca</i>	-	-	3	-	-	1	.00
F	<i>Alyssum alyssoides</i> (a)	-	-	34	-	-	13	.09
F	<i>Ambrosia psilostachya</i>	a ³	ab ¹⁶	b ²⁷	1	6	9	1.11
F	<i>Artemisia ludoviciana</i>	5	11	11	3	5	5	.50
F	<i>Asclepias asperula</i>	10	9	16	6	5	6	1.27
F	<i>Aster</i> spp.	-	-	2	-	-	1	.03
F	<i>Astragalus utahensis</i>	7	6	2	3	4	1	.00
F	<i>Cirsium</i> spp.	a ⁻	a ⁻	b ¹¹	-	-	6	.10
F	<i>Comandra pallida</i>	a ¹³	b ⁻	b ⁻	5	-	-	-
F	<i>Epilobium brachycarpum</i> (a)	-	-	3	-	-	2	.01
F	<i>Erodium cicutarium</i> (a)	-	-	23	-	-	9	.19
F	<i>Gilia</i> spp. (a)	-	-	42	-	-	17	.18
F	<i>Grindelia squarrosa</i>	a ³	b ³⁵	b ³⁷	1	14	16	.99
F	<i>Hackelia patens</i>	21	-	-	12	-	-	-
F	<i>Helianthus annuus</i> (a)	-	-	41	-	-	20	.28
F	<i>Holosteum umbellatum</i> (a)	-	-	21	-	-	8	.14
F	<i>Isatis tinctoria</i>	13	13	22	7	5	9	.14
F	<i>Lactuca serriola</i>	a ⁻	a ⁻	b ⁴⁸	-	-	21	.18
F	<i>Melilotus alba</i>	-	-	3	-	-	1	.03
F	<i>Medicago sativa</i>	ab ²	a ⁻	b ⁹	2	-	4	.12
F	<i>Oenothera caespitosa</i>	5	-	-	2	-	-	-
F	<i>Tragopogon dubius</i>	a ¹⁷⁷	b ⁸²	c ²¹⁰	76	34	82	4.34
F	Unknown forb-perennial	-	3	3	-	2	2	.09
F	<i>Veronica biloba</i> (a)	-	-	1	-	-	1	.00
Total for Forbs		259	175	577	118	75	237	9.88

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

BROWSE TRENDS --

Herd unit 02 , Study no: 10

Type	Species	Strip Frequency '96	Average Cover % '96
B	Amelanchier alnifolia	1	-
B	Artemisia tridentata vaseyana	11	1.37
B	Gutierrezia sarothrae	61	4.55
Total for Browse		73	5.93

BASIC COVER --

Herd unit 02 , Study no: 10

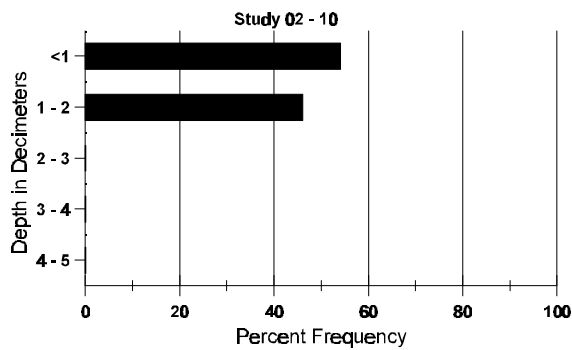
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	394	1.00	1.00	54.75
Rock	127	9.75	0	3.37
Pavement	104	7.00	52.25	2.19
Litter	396	62.50	0	46.81
Cryptogams	62	5.50	.75	.58
Bare Ground	201	14.25	0	4.56

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 10

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.6	73.0 (9.7)	7.8	28.7	40.0	31.3	2.9	4.9	211.2	.5

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 02 , Study no: 10

Type	Quadrat Frequency '96
Elk	41
Deer	12
Cattle	20

BROWSE CHARACTERISTICS --
 Herd unit 02 , Study no: 10

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Amelanchier alnifolia</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20	95	71	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
<i>Artemisia tridentata vaseyana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	9	1	-	-	-	-	-	-	-	10	-	-	-	200	25	31	10
D	84	-	-	6	-	-	-	-	-	-	2	-	-	4	200			6
	90	-	1	-	-	-	-	-	-	-	-	-	-	1	33			1
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	120			6
Total Plants/Acre (excluding Dead & Seedlings)												'84	200	Dec:	100%			
												'90	33		100%			
												'96	220		9%			
<i>Gutierrezia sarothrae</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	206	-	-	-	-	-	-	-	-	206	-	-	-	4120			206
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	96	290	-	-	-	-	-	-	-	-	290	-	-	-	5800			290
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	7	-	-	-	-	-	-	-	-	7	-	-	-	233	11	18	7
	96	197	-	-	-	-	-	-	-	-	197	-	-	-	3940	11	16	197
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	266		-			
												'96	9740		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Juniperus scopulorum</i>																		
M	84	-	-	1	-	-	-	-	-	-	1	-	-	-	33	69	59	1
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	33	102	67	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	33	Dec:	-			
												'90	33		-			
												'96	0		-			
<i>Purshia tridentata</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	49	79	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			

TREND STUDY 2-11-96 (old 3-4)

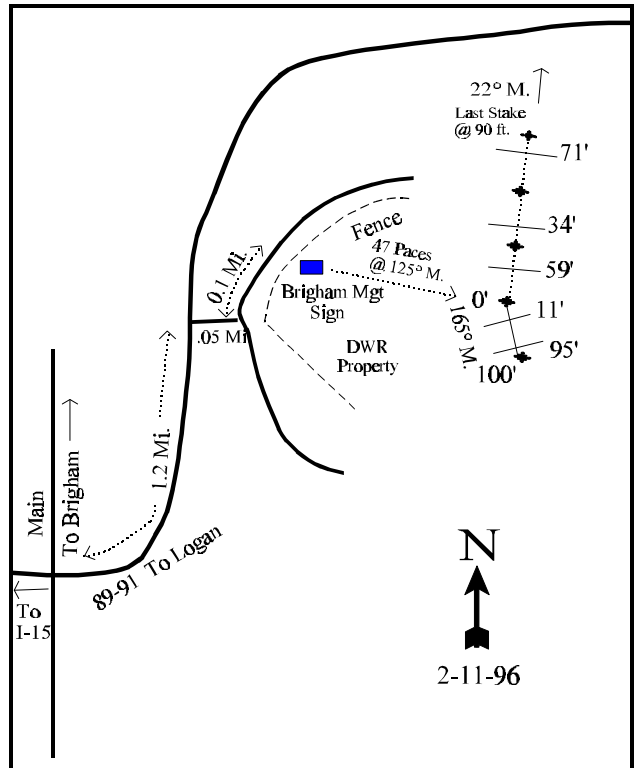
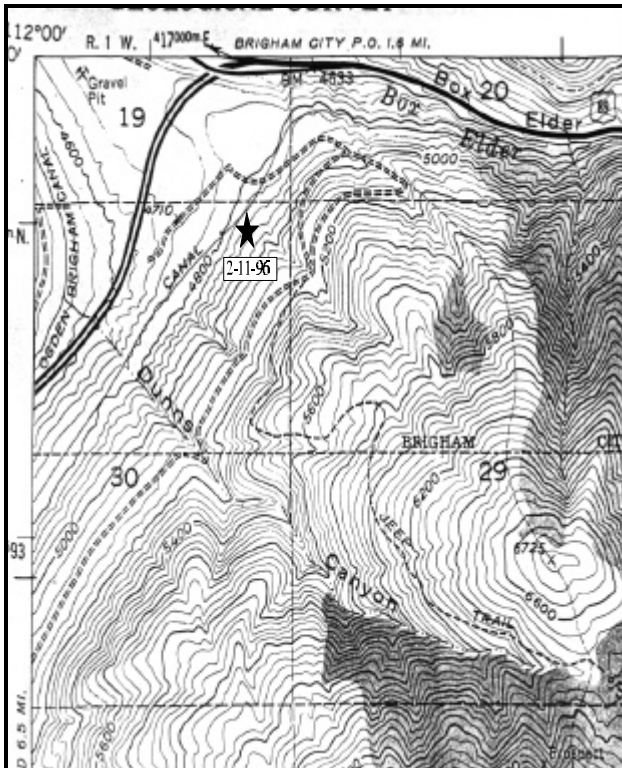
Study site name: Brigham Face. Range type: Bitterbrush.

Compass bearing: frequency baseline 165 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft).

LOCATION DESCRIPTION

From 1100 South and Main Street in Brigham City, proceed northeast for 1.2 miles and turn right (east) at 1250 East. Turn left after 0.05 miles and enter DWR property. Travel 0.1 miles to the Brigham Management Area sign on the south side of the road. From the sign, walk 47 paces bearing 125°M to the 0-foot baseline stake. The 0-foot baseline stake is marked by browse tag # 87. The first 100 feet of the baseline runs 165° M. The remaining 300 feet run off the 0-foot baseline stake and run 22° M.



Map Name: Mantua

Diagrammatic Sketch

Township 9N, Range 1W, Section 19, UTM COOR: 4-17-014E 45 94-140N

DISCUSSION

Trend Study No. 2-10

This study samples an area slightly north of Broad Hollow on gently sloping (25%) terrain located a few hundred meters east of the big game fence on the Cache Valley face. Exposure is westerly and elevation is approximately 4,960 feet. Like most of the winter range east of the big game fence between Logan and Blacksmith Fork rivers, this area is seriously depleted of browse forage and subject to heavy deer and elk use. Quadrat frequency of elk pellet groups was high at 41% in 1996 indicating a relatively high level of elk use. Some local people actually feed elk in the winter near the study site. Cattle pats occurred in 20% of the quadrats while deer pellet groups had a quadrat frequency of 12%. Topographically, terrain is level to gently sloping for 100 to 200 meters east of the fence, then becomes abruptly very steep. The level terrain is the only area that presents any opportunity for any rehabilitation of the vegetative community. The steep slopes are almost totally devoid of browse species and too steep for mechanical treatment. The study area, like most of the remaining gentle terrain, has remnant populations of mountain big sagebrush and bitterbrush and a few Rocky Mountain junipers that have been highlined to a height of 7 or 8 feet. Utilization of all browse species was extremely intense during the severe winters of the early 1980's.

Soil characteristics are very similar to those described in the writeup for study #2, located about one mile south on the same lake terrace. The most recent soil survey names this soil as "Sterling Gravelly Loam" (Erickson and Mortensen, 1974). Soils at the site have a clay loam texture that is very compact restricting soil depth estimates to approximately 10 inches. Rooting depth is obviously not restricted however as evidenced by the presence of deeper rooted mountain big sagebrush. Rocks are not common on the surface but a layer of rock or large gravel occurs in the soil profile between 3 and 8 inches under the soils surface. Soil temperatures are also relatively high at 73°F at an average depth of nearly 10 inches. The soil has a neutral pH of 7.2. Phosphorus could be a limiting factor at only 4.9 ppm. Protective ground cover is abundant and no accelerated erosion is noticeable.

Vegetation at this site is different than at study #2. Mountain big sagebrush is present, but is far less abundant and even more decadent. The site has been seeded (i.e., drilled) with crested wheatgrass prior to study establishment in 1984. The grass seeding has been at least moderately successful and has helped control the annual and perennial weeds.

The remaining browse is in extremely poor condition. It should be noted again that some local people are receiving free hay and feeding the elk in the winter, causing excessively high concentrations of animals and heavier than normal use on the remaining shrubs. A once numerous stand of mountain big sagebrush has been reduced to a mere 200 plants/acre. Moreover, those that remain were classified as 100% decadent in 1984 and 1990. No reproduction was apparent and browsing was so intense that almost no seed was produced. During the 1996 reading, the sample size was increased three fold. Estimated density is currently 220 plants/acre, most of which are mature. Utilization is light and vigor is improved from previous readings. Percent decadence has declined to 9% and some reproduction is evident with the appearance of seedlings, and seed production noted on mature plants. Seedling establishment will have considerable competition due to the abundant herbaceous understory which is dominated by bulbous bluegrass which contributes 69% of the grass cover.

A few large serviceberry and bitterbrush plants still occur on the site. These shrubs are better equipped to deal with the browsing pressure. Furthermore, these species are longer-lived, more resistant to use and will likely outlast the

sagebrush. Broom snakeweed, an increaser, was picked up in small amounts in 1990 and was reportedly not expanding. However, it has expanded dramatically from 266 plants/acre to 9,740 by 1996. Sixty percent of the population consists of young plants and its reproductive potential is also high at 42% (percent of seedlings to estimated population). Age class analysis would indicate an expanding population.

Grass cover is dense accounting for nearly 70% of the total vegetative cover. Grasses consist chiefly of crested and intermediate wheatgrass, which was seeded, with smaller amounts of bluebunch wheatgrass and Sandberg bluegrass. Undesirable annual or perennial grasses include winter rye, jointed goatgrass and small amounts of annual brome grasses.

Forbs are less important than grasses on this site for they only contribute to 22% of the herbaceous cover. They include a number of undesirable invaders and increasers. The most abundant perennial forbs include dyers woad, common ragweed, yellow salsify, and curlycup gumweed. Alfalfa, although rather infrequent, is the best quality forb on the site.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable. Vegetative and litter cover are both extensive and there is little runoff or erosion. A bigger problem is sedimentation from the steeper slopes to the east. Vegetative condition is poor and trend continues to decline. Although establishment of crested wheatgrass has helped stabilize the site from a watershed point of view, it has meant little to wildlife. From the data, it appears that in time, most of the remaining browse plants will be gone.

1990 TREND ASSESSMENT

Sagebrush canopy cover is too low on this site to be measured by the variable plot method. Only 1 decadent sagebrush was encountered. Grasses that have increased substantially include annual rye, Sandberg bluegrass, bulbous bluegrass, and crested wheatgrass. Many undesirable forb species, especially Dyers woad, gumweed, and ragweed, also appear to be increasing at the expense of more useful species. There is little deer use on this site, but elk use has been high since they began feeding them hay in the winter nearby.

TREND ASSESSMENT

soil - stable

browse - down, there is little browse left on the site

herbaceous understory - grasses are up, but the forb trend is downward with composition being mostly weeds, overall trend is up

1996 TREND ASSESSMENT

Ground cover characteristics have improved slightly since 1990 due to a major decline in percent bare ground from 14% to 5%. Since percent litter cover also declined, the decrease in bare ground likely comes from the dramatic increase in bulbous bluegrass which has nearly doubled in nested frequency. Browse is still depleted and shows some improvement. There are only 200 plants/acre, but vigor has improved, utilization is light, percent decadency has declined to 9% and some mature plants are producing seed. Only future monitoring will determine if the few seedlings found this year can become establish in an understory dominated by bulbous bluegrass, crested wheatgrass, intermediate wheatgrass, and winter rye. Sum of nested frequency has remained stable for grasses and increased for forbs. Sum of nested frequency for crested wheatgrass and intermediate wheatgrass increased slightly while sum of nested frequency for bulbous bluegrass nearly doubled (155 to 308). Sum of nested frequency for Sandberg bluegrass and

bluebunch wheatgrass declined. Sum of nested frequency of ragweed, milkweed, curlycup gumweed, and dyers woad increased slightly while frequency of yellow salsify more than doubled. Trend for the herbaceous understory is slightly up but composition is very poor.

TREND ASSESSMENT

soil - up slightly

browse - depleted and in relatively low numbers, but slightly up

herbaceous understory - slightly up, but composition is poor

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 11

T Y P e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron cristatum	a3	b19	a1	1	8	1	.06
G	Agropyron intermedium	a326	b265	a341	99	93	96	30.77
G	Bromus brizaeformis (a)	-	-	44	-	-	17	.21
G	Bromus japonicus (a)	-	-	34	-	-	14	.17
G	Bromus tectorum (a)	-	-	36	-	-	15	.32
G	Poa bulbosa	a6	b31	b28	2	13	12	.24
G	Poa pratensis	-	4	-	-	2	-	-
G	Poa secunda	a22	b80	b55	12	33	21	1.24
Total for Grasses		357	399	539	114	149	176	33.03
F	Agoseris glauca	-	2	-	-	1	-	-
F	Alyssum alyssoides (a)	-	-	2	-	-	1	.00
F	Ambrosia psilostachya	-	-	3	-	-	1	.03
F	Collomia linearis (a)	-	-	1	-	-	1	.00
F	Cryptantha spp.	-	-	3	-	-	1	.00
F	Draba spp. (a)	-	-	10	-	-	3	.04
F	Epilobium brachycarpum (a)	-	-	4	-	-	3	.01
F	Galium aparine (a)	-	-	7	-	-	3	.16
F	Hackelia patens	-	-	4	-	-	2	.03
F	Helianthus annuus (a)	-	7	-	-	4	-	-
F	Holosteum umbellatum (a)	-	-	13	-	-	6	.03
F	Isatis tinctoria	a-	b42	c19	-	17	9	.45
F	Lappula occidentalis (a)	-	-	1	-	-	1	.00
F	Lactuca serriola	a-	b9	a-	-	5	-	-
F	Phlox longifolia	-	-	1	-	-	1	.00
F	Plantago patagonica (a)	-	-	7	-	-	3	.01
F	Polygonum douglasii (a)	-	-	40	-	-	18	.09
F	Taraxacum officinale	1	-	-	1	-	-	-
F	Tragopogon dubius	a2	b20	a-	1	12	-	-
F	Unknown forb-perennial	-	1	-	-	1	-	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
	Total for Forbs	3	81	115	2	40	53	0.89

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

BROWSE TRENDS --

Herd unit 02 , Study no: 11

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	20	3.94
B	Atriplex canescens	2	.38
B	Chrysothamnus nauseosus albicaulis	2	.30
B	Opuntia fragilis	2	-
B	Purshia tridentata	21	16.61
	Total for Browse	47	21.23

BASIC COVER --

Herd unit 02 , Study no: 11

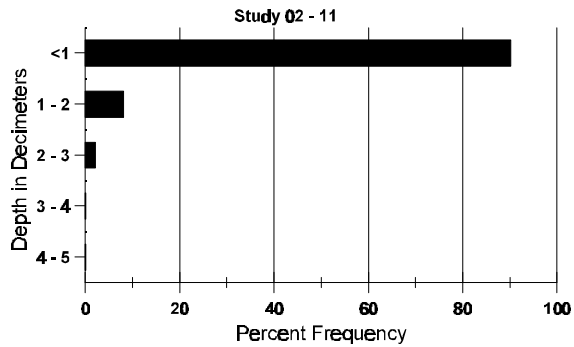
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	363	.75	10.50	55.27
Rock	83	1.50	3.25	2.13
Pavement	84	7.00	9.75	.82
Litter	399	88.75	73.00	77.75
Cryptogams	17	0	0	.30
Bare Ground	64	2.00	3.50	.63

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 11

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.3	62.8 (16.0)	6.2	58.7	22.0	19.3	3.2	21.4	208.0	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 11

Type	Quadrat Frequency '96
Rabbit	5
Deer	4

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 11

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	15	-	-	-	-	-	-	-	-	15	-	-	-	300		15	
Y	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	8	-	-	-	-	-	-	-	-	8	-	-	-	266		8	
	96	55	-	-	-	-	-	-	-	-	55	-	-	-	1100		55	
M	84	1	-	1	-	-	-	-	-	-	2	-	-	-	66	15	10	2
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	30	31	1
	96	28	1	-	1	-	-	-	-	-	30	-	-	-	600	26	39	30
D	84	-	2	1	-	-	-	-	-	-	-	-	3	-	100		3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
Total Plants/Acre (excluding Dead & Seedlings)												'84	199	Dec:	50%			
												'90	299		0%			
												'96	1700		0%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
<i>Atriplex canescens</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	1	-	-	-	-	-	-	-	4	-	-	-	80	54	41	4
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	80		-			
<i>Chrysothamnus nauseosus albicaulis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	11	-	-	-	-	-	-	-	-	11	-	-	-	366			11
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20	21	28	1
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	366		0%			
												'96	40		50%			
<i>Opuntia fragilis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	4	8	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	40		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Purshia tridentata																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	13	-	-	3	-	-	-	-	-	-	-	-	533			16	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	9	-	-	-	-	-	-	-	-	-	-	-	300			9	
	96	1	1	-	-	-	-	-	-	-	-	-	-	40			2	
M	84	-	2	3	-	-	-	-	-	-	-	-	-	166	58	68	5	
	90	9	-	-	6	-	-	-	-	-	-	-	-	500	61	72	15	
	96	17	1	-	-	7	-	-	-	-	-	-	-	500	59	105	25	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	1	-	-	-	1	-	-	-	-	-	-	-	40			2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	166	Dec:	0%			
												'90	800		0%			
												'96	580		7%			

TREND STUDY 2-12-96

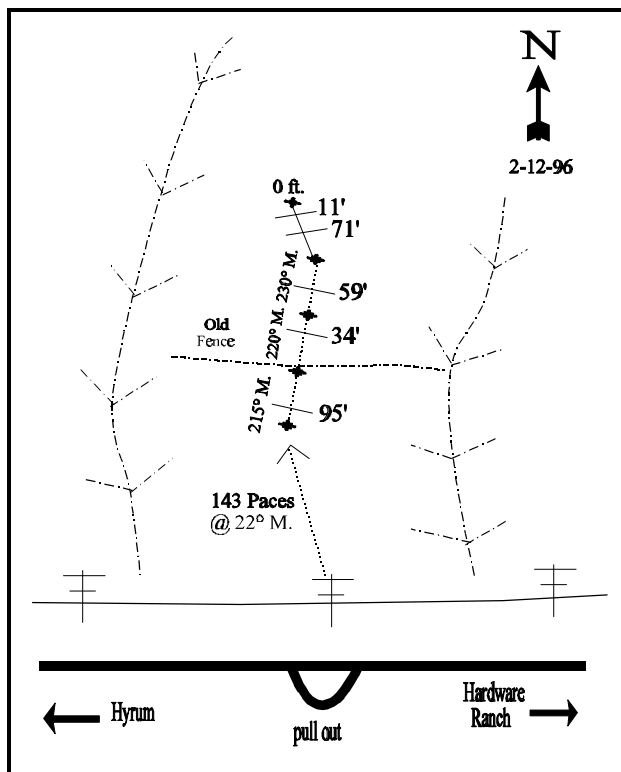
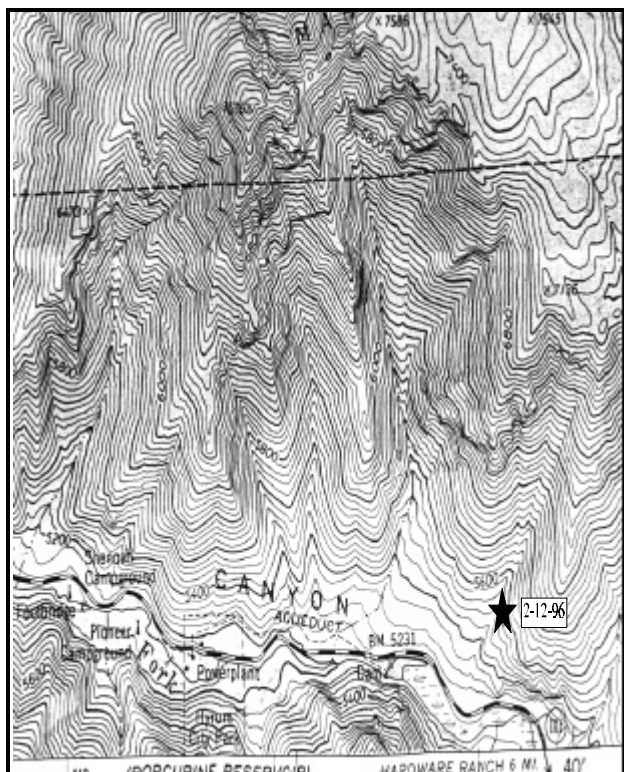
Study site name: Second Dam Blacksmith Fork. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 151 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 71ft), line 2 (59ft), line 3 (34ft), line 4 (95ft).

LOCATION DESCRIPTION

In Hyrum, proceed east up Blacksmith Fork Canyon (U-101) for 0.95 miles to a pull-out near the second dam. This pull-out will be just east of mile marker 15. Look for a power pole north of the east end of the pull-out. From the pole, take a azimuth of 22 degrees magnetic and walk 143 paces to the 400-foot baseline stake marked by browse tag #7985. Bearing of the baseline is 151 degrees true. Note that due to the rocky terrain the 100-foot stake is actually at the 95 foot mark; adjust the tape and belts accordingly. Line 2 runs 230 degrees magnetic. line three runs 220 degrees magnetic. Line 4 runs 215 degrees magnetic.



Map Name: Logan Peak

Diagrammatic Sketch

Township 10N, Range 2E, Section 1, UTM COOR: 4-44-123E 46-08-703N

DISCUSSION

Trend Study No. 2-12

This site is on critical deer winter range located north of the second reservoir in Blacksmith Fork Canyon. This area is typical of the south facing slopes all along the winter range in the canyon. The slope is moderately steep (35% to 40%) and elevation is approximately 5,560 feet. Utilized primarily by deer during all but the most severe winters, hedging of the dominant mountain big sagebrush and antelope bitterbrush has been heavy in the past. Currently deer and elk pellet groups have quadrat frequencies of less than 10%.

The soil survey goes into very little detail, simply classifying the area as "Rock Land". This category includes steep mountain slopes with significant areas of exposed bedrock and very shallow soils derived primarily from limestone and quartzite. Soils show little development and tend to erode easily because of the steep slopes. The soil on the site is moderately shallow with an effective rooting depth of a little over 8 inches, due to underlying limestone which made soil collection difficult and temperature readings difficult. The soil temperature at a depth of almost 9 inches was 59°F. Rock and pavement cover on the surface is abundant (35%) and consists of dark colored limestone which likely elevates day time ground surface temperatures. The soil is slightly alkaline with a pH of 7.4. There is little bare ground exposed and erosion does not appear to be a problem.

Browse composition consists of a moderately low density of mountain big sagebrush with an associated sparse population of antelope bitterbrush. Other species, such as Saskatoon serviceberry, blueberry elder, Rocky Mountain maple, true mountain mahogany, and Rock Mountain juniper provide a desirable variety of forage but they are of minor importance because of their limited abundance. Density of mountain big sagebrush was 933 plants/acre in 1984. Utilization was extremely heavy in 1984 when 82% of the population displayed heavy use. The majority of the population was decadent (64%). Vigor was also poor on 29% of the shrubs. Utilization was light in 1990, but density still declined to 633 plants/acre and percent decadency rose to 68%. In 1996, density declined an additional 40% to 380 plants/acre. A further witness to the decline in sagebrush is the large proportion of dead plants (500 plants/acre) counted in 1996, which meant that more of the population was dead than alive. Utilization is currently light to moderate, yet vigor is poor on 16% of the population and percent decadence is still moderately high at 52%. The larger sample used in 1996 is likely partly responsible for the change in numbers, but it is obvious that sagebrush is still in a state of decline on this site due to factors other than wildlife use and one of the most influential factors throughout the state has been the many years of drought.

Bitterbrush display a stable population density trend at nearly 200 plants/acre. Use was heavy on all plants in 1984 but was light to moderate in 1990 and 1996. Percent decadence was high at 66% in 1984 but declined to 33% in 1990 and 0% in 1996. Vigor is good on all plants but reproduction appears limited. No seedlings were encountered during any of the three readings and a few young were seen in 1996. The rosaceous shrubs appear to be less affected by the extended drought compared to the sagebrushes and appear to recover more quickly because they are more deeply rooted.

The most abundant shrub on the site is broom snakeweed which was first picked up in the sample in 1996. Currently there are approximately 1,200 broom snakeweed plants/acre. Age class structure indicates a young and possibly expanding population. The extended baseline (increased sample size) used in 1996 is partly the reason for the increased density of broom snakeweed but some snakeweed was also found along the original baseline.

Grasses and forbs are moderately abundant. The principle perennial grasses include bluebunch wheatgrass, prairie Junegrass, and Sandberg bluegrass. Three annual brome grasses are also abundant and account for nearly half (48%) of the grass cover. Forbs are diverse, yet contain few valuable perennial species. The majority are annuals or weedy biennials and perennials. Common species include wild onion, arrowleaf balsamroot, bastard toadflax, tapertip hawksbeard, dyers woad, rock goldenrod, and yellow salsify.

1984 APPARENT TREND ASSESSMENT

Soil trend appears to be declining. This site has an exceptionally rocky and poorly developed soil which shows abundant evidence of down slope movement. Plant pedestaling is common and a considerable area of erosion pavement is exposed. Vegetative trend is in doubt. Upon initial examination, it appears that the key browse species are declining in density. The causative factors, however, are not entirely clear. Our best estimate at this time is that trend is declining or at best barely stable.

1990 TREND ASSESSMENT

No significant changes in density or composition have occurred on this site. The browse component appears to have improved growth and vigor. The mountain big sagebrush and bitterbrush were classified as lightly hedged in 1990. No young of these key species were found and there is an excessively high percentage of decadent sagebrush, 68%, in the population. Sagebrush canopy cover averages 6%. Grasses in the understory are productive and competitive. Ground cover components are unchanged on the erodible, 40% slope, and soil erosion continues.

TREND ASSESSMENT

soil - down

browse - stable to slightly downward

herbaceous understory - grass trend is up; forb trend is stable, but composition is made up of mostly weeds

1996 TREND ASSESSMENT

Soil trend is up, with percent bare ground declining from 16% to 5% and litter cover increasind. Mountain big sagebrush is still probably in a state of decline with a continuing high percent decadence, poor vigor, and little reproduction. Antelope bitterbrush displays a stable trend with a decline in percent decadence (33% to 0%) and light to moderate use. Overall browse trend is considered slightly down due to the condition of the sagebrush population and the high density of broom snakeweed. Trend for grasses is slightly down because sum of nested frequency of the two most abundant perennial grasses declined significantly. Sum of nested frequency of prairie Junegrass increased significantly but it only has a quadrat frequency of 3% and contributes <1% of the grass cover. Sum of nested frequency of forbs increased due largely to the 122 point increase in nested frequency of yellow salsify. The forb composition is still poor however, with few valuable forage species. Overall herbaceous trend is stable.

TREND ASSESSMENT

soil - up

browse - slightly downward

herbaceous understory - slightly down for grasses, slightly up for forbs, but grasses make up the majority of the herbaceous cover (70%), therefore trend is considered slightly down

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 12

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	<i>Agropyron spicatum</i>	151	176	154	61	69	61	6.40
G	<i>Bromus brizaeformis</i> (a)	-	-	11	-	-	7	.03
G	<i>Bromus japonicus</i> (a)	-	-	280	-	-	84	5.56
G	<i>Bromus tectorum</i> (a)	-	-	213	-	-	65	4.00
G	<i>Koeleria cristata</i>	18	8	11	8	4	3	.21
G	<i>Poa bulbosa</i>	-	-	4	-	-	2	.01
G	<i>Poa pratensis</i>	-	4	-	-	2	-	-
G	<i>Poa secunda</i>	_a 66	_b 162	_b 158	34	70	57	3.68
Total for Grasses		235	350	831	103	145	279	19.91
F	<i>Achillea millefolium</i>	6	1	-	2	1	-	-
F	<i>Agoseris glauca</i>	-	1	3	-	1	1	.00
F	<i>Allium acuminatum</i>	_a 60	_b 3	_b 28	31	1	7	2.14
F	<i>Alyssum alyssoides</i> (a)	-	-	227	-	-	74	.89
F	<i>Astragalus utahensis</i>	2	4	1	1	4	1	.03
F	<i>Balsamorhiza sagittata</i>	17	24	12	12	11	6	.43
F	<i>Calochortus nuttallii</i>	2	1	3	2	1	1	.00
F	<i>Cirsium</i> spp.	2	4	5	1	2	2	.19
F	<i>Collomia linearis</i> (a)	7	-	1	4	-	1	.00
F	<i>Comandra pallida</i>	_a 35	_b 2	_{ab} 17	15	2	9	.07
F	<i>Collinsia parviflora</i> (a)	-	-	7	-	-	3	.01
F	<i>Crepis acuminata</i>	_a 5	_b 28	_{ab} 17	3	14	7	.25
F	<i>Epilobium brachycarpum</i> (a)	-	-	11	-	-	5	.02
F	<i>Eriogonum umbellatum</i>	1	2	-	1	1	-	.00
F	<i>Galium aparine</i> (a)	-	-	3	-	-	2	.01
F	<i>Holosteum umbellatum</i> (a)	-	-	10	-	-	5	.05
F	<i>Isatis tinctoria</i>	_a -	_b 13	_b 19	-	7	9	.07
F	<i>Lactuca serriola</i>	_a -	_b 15	_a 5	-	9	2	.06
F	<i>Linum lewisii</i>	2	1	3	1	1	2	.03
F	<i>Lithospermum ruderale</i>	2	-	-	1	-	-	.03
F	<i>Lomatium grayi</i>	_{ab} 13	_a 27	_b 4	6	13	2	.01
F	<i>Melilotus officinalis</i>	-	5	1	-	2	1	.00
F	<i>Penstemon</i> spp.	-	-	3	-	-	1	.03
F	<i>Petradoria pumila</i>	_a 34	_a 34	_b 9	13	16	4	.71
F	<i>Ranunculus testiculatus</i> (a)	-	-	13	-	-	5	.02
F	<i>Senecio</i> spp.	1	-	-	1	-	-	-
F	<i>Tragopogon dubius</i>	_a 18	_b 53	_c 175	8	26	74	2.85
F	<i>Veronica biloba</i> (a)	-	-	46	-	-	21	.15

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	
	Total for Forbs	207	218	623	102	112	245	8.13

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

BROWSE TRENDS --

Herd unit 02 , Study no: 12

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	19	3.20
B	Chrysothamnus nauseosus albicaulis	2	.76
B	Chrysothamnus viscidiflorus stenophyllus	5	.06
B	Eriogonum heracleoides	1	.15
B	Gutierrezia sarothrae	25	.65
B	Purshia tridentata	9	1.99
	Total for Browse	61	6.82

BASIC COVER --

Herd unit 02 , Study no: 12

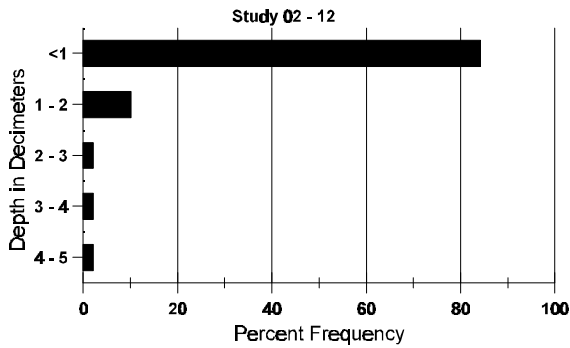
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	374	1.25	9.75	33.04
Rock	331	43.00	39.00	31.60
Pavement	204	12.25	8.25	3.85
Litter	387	26.25	25.00	31.88
Cryptogams	119	4.25	1.75	4.36
Bare Ground	197	13.00	16.25	4.64

SOIL ANALYSIS DATA -

Herd Unit 02, Study no: 12

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
8.2	58.8 (8.8)	7.4	36.6	35.1	28.4	3.4	10.0	176.0	.7

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 12

Type	Quadrat Frequency '96
Elk	6
Deer	8

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 12

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Amelanchier alnifolia</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	54	47	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Artemisia tridentata vaseyana</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	2	8	-	-	-	-	-	-	8	2	-	-	333	34	30	10
	90	6	-	-	-	-	-	-	-	-	6	-	-	-	200	30	31	6
	96	7	1	-	-	-	-	-	-	-	8	-	-	-	160	30	47	8
D	84	-	3	15	-	-	-	-	-	-	9	1	8	-	600			18
	90	13	-	-	-	-	-	-	-	-	12	-	-	1	433			13
	96	6	3	1	-	-	-	-	-	-	7	-	-	3	200			10
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	500			25
Total Plants/Acre (excluding Dead & Seedlings)												'84	933	Dec:	64%			
												'90	633		68%			
												'96	380		53%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Chrysothamnus nauseosus albicaulis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	47	72	2
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	40		-			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66	15	10	2
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	100	18	23	3
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120	18	30	6
D	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Total Plants/Acre (excluding Dead & Seedlings)												'84	132	Dec:	25%			
												'90	100		0%			
												'96	140		0%			
<i>Eriogonum heracleoides</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20	3	4	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
<i>Gutierrezia sarothrae</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	22	-	-	-	-	-	-	-	-	22	-	-	-	440			22
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	41	-	-	-	-	-	-	-	-	41	-	-	-	820	10	16	41
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	1260		-			

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Purshia tridentata</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	-	2	-	-	-	-	-	-	2	-	-	-	66	28	36	2
	90	3	-	-	1	-	-	-	-	-	4	-	-	-	133	24	30	4
	96	4	4	-	-	-	-	-	-	-	8	-	-	-	160	33	76	8
D	84	-	-	4	-	-	-	-	-	-	4	-	-	-	133			4
	90	1	1	-	-	-	-	-	-	-	2	-	-	-	66			2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'84	199	Dec:	67%			
												'90	199		33%			
												'96	180		0%			
<i>Rosa woodsii</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	10	6	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			

TREND STUDY 2-13-96

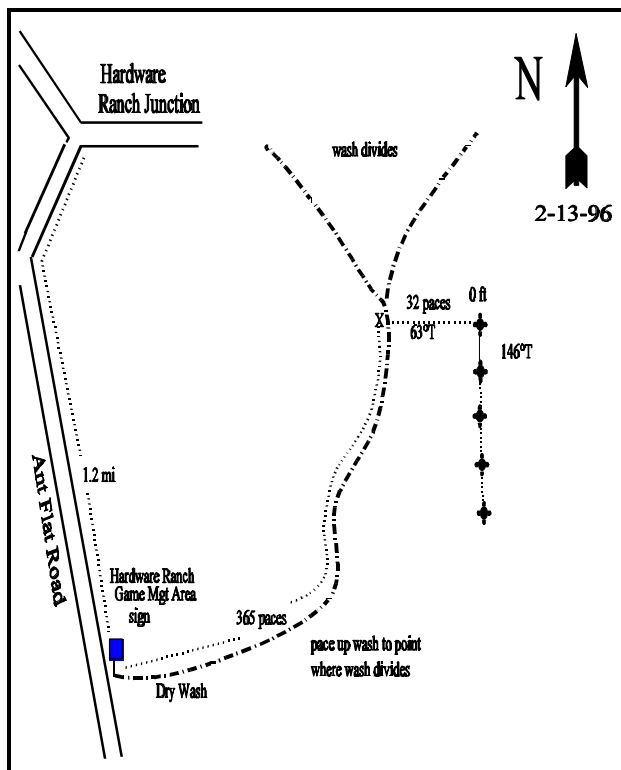
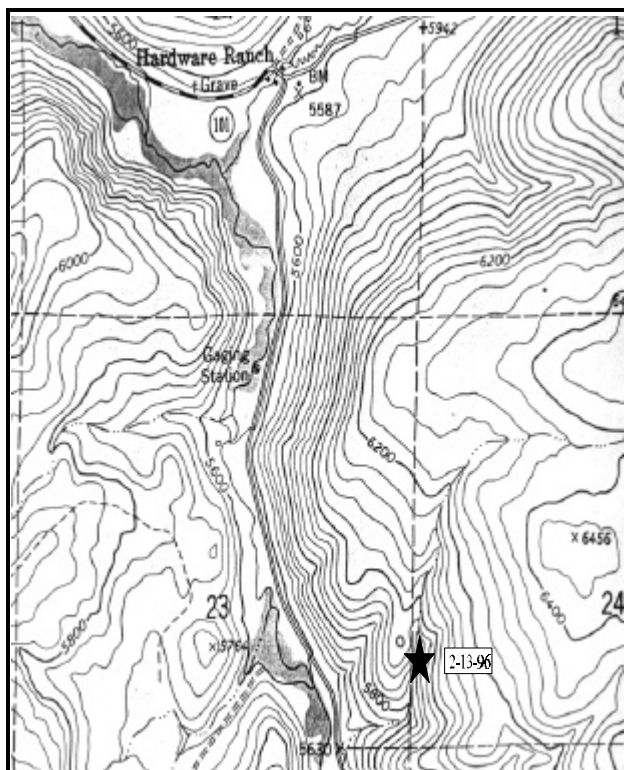
Study site name: Hardware Plateau. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 146 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Hardware Ranch, proceed south on the Ant Flat road for 1.2 miles. This mileage should end at a sign that reads: "Welcome to Hardware Ranch Game Management Area." Stop here. Walk up the bottom of the wash (to the east of the sign) 365 paces, to a very definite fork in the drainage. From the tip or junction of the fork take a bearing of 63 degrees true and walk 32 paces to the 0-foot stake of the baseline, marked by browse tab #7984. Baseline runs at 146 degrees true.



Map Name: Hardware Ranch

Diagrammatic Sketch

Township 10N, Range 3E, Section 24, UTM COOR: 4-53-400E 46-04 207N

DISCUSSION

Trend Study No. 2-13

This study is located a short distance up one of the small draws at the western edge of the Hardware Plateau. These areas are relatively small in acreage, yet extremely important to wintering deer and elk. The site is a moderately steep (60%) with a west facing slope at 5,960 feet elevation. The range type is mountain big sagebrush/grass which also contains a scattered mixture of other shrub species. Pellet groups were abundant and two carcasses from the 1983-84 winter were found on the site during study establishment in 1984. Currently use appears significantly lighter with quadrat frequency of deer pellet groups at 18% while that of elk are at 7%. One deer was flushed from a drainage near the site and 3 dead deer and 1 dead elk were found near the site in 1996. Yellow bellied marmots are numerous around the larger rock outcrops.

Soils in this area are classed as "Yeates Hollow Extremely Rocky Silt Loam, 30 to 60 Percent Slopes." These are moderately shallow soils where bedrock is normally encountered at about 46 inches depth. Derived from quartzite and sandstone, the Yeates soil has poor permeability and runoff is normally quite rapid. Roots penetrate to bedrock and soil reaction ranges from neutral to slightly acid (Erickson and Mortensen, 1974). On the study site, the soil has a loam texture and is very rocky on the surface and through the profile. Due to the rocky nature of the soil, effective rooting depth (see methods) was estimated at about 10 inches with a soil penetrometer. This is obviously an underestimate as deeper rooted shrubs including mountain big sagebrush and antelope bitterbrush are growing on the site, but it gives a relative index of rooting depth which is much easier to get than digging several soil pits. The rocky surface and profile, along with the moderately steep west aspect contribute to a relatively high soil temperature (74°F). Some inevitable soil erosion occurs on the site due to the steep slope, but protective ground cover is abundant and well dispersed.

Although the study site is classified as a big sagebrush grass type, increaser shrubs, including narrowleaf low rabbitbrush, mountain snowberry, woods rose, and Oregon hollygrape are quite numerous and currently (1996) account for 62% of the browse cover. Mountain big sagebrush numbers now less than 300 plants/acre, while in 1984 its density was 333 plants/acre. In the past the sagebrush population had been classified as heavily browsed in 1984 (50%) and 1990 (75%) and had an overall decadent appearance of 69% and 75% respectively. Now, only 14% are classified as heavily browsed and percent decadence is down to 21%. No seedlings were found, but 14% of the population were identified as young plants. The number of dead sagebrush plants are a concern for they outnumber live ones by a ratio of nearly 2 dead for every live one. This kind of loss for sagebrush has been noted on many marginal sites throughout Utah. Because of slope (60%), aspect (west), soils, extended drought, intraspecific competition, and accompanied by relatively high soil temperatures, some thinning and die-off would be expected for a subspecies that requires more moisture than the other two sagebrush subspecies. This downward trend appears to have turned around with the end of the drought we have been in since 1985.

Serviceberry and bitterbrush offer additional preferred forage. Serviceberry currently numbers approximately 440 plants/acre, but produces less than 1% of the shrub cover. Mature plants average only 17 by 21 inches, a decline from an average of 27 by 22 inches reported in 1984. Utilization was heaviest in 1990 when 53% of the shrubs displayed heavy use. Currently 36% of the serviceberry are heavily hedged (>60% of twigs browsed). Vigor is good with percent decadence declining to zero. Bitterbrush has steadily declined in density from 333 plants/acre in 1984 to only 80 plants/acre in 1996, yet there are not enough dead plants to account for this much of a loss. Much of this population change could be explained by the much larger sample size, giving a better population estimate

for species that characteristically has distributions that are clumped or discontinuous. Bitterbrush produces only 6% of the browse cover on the site. Utilization was heavy on all plants sampled in 1984 and 1990, yet vigor was normal. However, percent decadence was also relatively high at 60% in 1984 and 50% in 1990. Currently only 50% of the bitterbrush appear heavily hedged, vigor is good and percent decadence has declined to 25%. No reproduction is evident and no seedlings and young have been encountered during any readings.

Less desirable shrubs, woods rose and snowberry, do offer additional forage. Woods rose numbers about 1,520 plants/acre, nearly 80% of which are mature plants. Vigor is good and 62% of the plants display heavy use. Snowberry has a density of 460 plants/acre. Use is mostly moderate.

The study area has a good grass cover and a fair forb cover. Perennial species predominate, however a few annuals, especially cheatgrass brome provide a high amount of fine fuel litter when dry. Annual brome grasses account for 36% of the grass cover. The most important perennial grasses include bluebunch wheatgrass and Sandberg bluegrass. These species combine to produce nearly 18% cover, or account for 64% of the grass cover.

Common perennial forbs include Louisiana sagebrush, arrowleaf balsamroot, western yarrow, silvery lupine, and common stickseed. Forbs and grass show little evidence of any current grazing use and are in good vigor.

1984 APPARENT TREND ASSESSMENT

Considering the extremely rocky and undeveloped nature of this soil, erosion is noticeable and is probably within acceptable limits. Rock itself is a significant ground cover element with many of the interspaces and rock crevices covered with a light litter cover. Grass and forb cover are fair and probably exceed that of shrubs. Soil trend is stable or slightly declining. With respect to preferred browse species, trend is down. Excessive use on the more important browse species is causing their decline and allowing a concurrent increase of less desirable shrubs.

1990 TREND ASSESSMENT

Browse continues to decline on this DWR winter range property which is used by deer, elk, moose, and domestic sheep. Chukars are common. The overall poor vigor and heavy use of the browse is compounded by extended drought and competition with annual grasses and forbs. Together, this is causing low seed production. Even with good seed production, there are not many safe sites for seedling establishment. A majority of the sagebrush, bitterbrush, and serviceberry plants are decadent or already dead. The serviceberry classified as young are sprouts from old root crowns. The samples of these key species are small due to the sparsity of the browse population, but all the data indicate a decline density. Grasses, mainly bluebunch wheatgrass, Sandberg bluegrass and cheatgrass, are the dominant vegetation. Forbs are also prominent. They have increased slightly. Considering the steep slope, erosion is within acceptable limits due to the good cover values.

TREND ASSESSMENT

soil - stable

browse - down except for slight increase for serviceberry

herbaceous understory - slightly up, increase in perennial grasses and many of the forbs

1996 TREND ASSESSMENT

Ground cover characteristics have changed somewhat since 1990. Percent rock cover is up from 21% to 25% while pavement cover increased from 1% to 5%. Litter cover increased slightly while percent bare ground declined from 17% to 7%. Erosion is minimal due to the high proportion of grass and forb cover. Trend for soil is considered slightly up. Key browse species, mountain big sagebrush, appears to have an improving trend. Density is still low at only 280 plants/acre, but young plants comprise 14% of the population, utilization is more moderate, vigor improved, and percent decadency has declined from 75% to 21%. Bitterbrush has displayed a continual estimated decline in density since 1984, however it only contributes 6% of the browse cover. Population is currently down to less than 100 plants/acre, but browsing is not as heavy (100% to 50% heavy use) and percent decadence has declined from 50% to 25%. Serviceberry also shows reduced heavy use, improved vigor and less decadent plants. Overall trend for browse is slightly up but depleted. Trend for the herbaceous understory is down. Sum of nested frequency for perennial grasses is down 23% while sum of nested frequency of forbs has declined 48%. Sum of nested frequency of the two key perennial grasses, bluebunch wheatgrass and Sandberg bluegrass, have declined significantly. Key forbs including, western yarrow, arrowleaf balsamroot, sulfur eriogonum, and silvery lupine have all declined significantly since 1990.

TREND ASSESSMENT

soil - improved

browse - slightly improved but in relatively low numbers

herbaceous understory - down with significant decreases in sum of nested frequencies for key grasses and forbs

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 13

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	_a 267	_b 305	_a 232	94	100	85	9.70
G	Bromus japonicus (a)	-	-	10	-	-	5	.05
G	Bromus tectorum (a)	-	-	296	-	-	89	9.67
G	Koeleria cristata	-	2	-	-	2	-	-
G	Poa fendleriana	-	-	4	-	-	3	.04
G	Poa pratensis	-	4	3	-	2	1	.03
G	Poa secunda	244	252	197	93	89	66	7.83
Total for Grasses		511	563	742	187	193	249	27.33
F	Achillea millefolium	_a 175	_a 133	_b 69	62	58	34	.82
F	Agoseris glauca	-	1	-	-	1	-	-
F	Alyssum alyssoides (a)	-	-	64	-	-	26	.42
F	Arabis spp.	-	6	8	-	3	3	.01
F	Artemisia ludoviciana	15	20	21	5	7	7	2.30
F	Balsamorhiza sagittata	_a 60	_a 61	_b 26	34	31	13	.77
F	Calochortus nuttallii	-	3	-	-	1	-	-
F	Cirsium spp.	10	19	5	5	9	4	.19
F	Collinsia parviflora (a)	-	-	50	-	-	20	.15

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	<i>Crepis acuminata</i>	a-	b153	c28	-	72	18	.34
F	<i>Cymopterus</i> spp.	-	-	2	-	-	1	.00
F	<i>Epilobium brachycarpum</i> (a)	-	-	83	-	-	35	.93
F	<i>Erodium cicutarium</i> (a)	-	-	52	-	-	23	.65
F	<i>Eriogonum umbellatum</i>	20	12	7	9	6	3	.33
F	<i>Hackelia patens</i>	27	15	33	12	9	16	.33
F	<i>Holosteum umbellatum</i> (a)	-	-	12	-	-	6	.03
F	<i>Lactuca serriola</i>	-	-	16	-	-	7	.03
F	<i>Lomatium grayi</i>	-	1	-	-	1	-	-
F	<i>Lupinus argenteus</i>	a58	b34	c12	34	18	6	.34
F	<i>Penstemon</i> spp.	13	12	4	7	5	2	.06
F	<i>Phacelia</i> spp.	-	-	12	-	-	4	.48
F	<i>Ranunculus testiculatus</i> (a)	-	-	23	-	-	10	.07
F	<i>Senecio multilobatus</i>	a80	b-	b-	44	-	-	-
F	<i>Sisymbrium altissimum</i> (a)	-	-	12	-	-	7	.09
F	<i>Tragopogon dubius</i>	2	-	2	2	-	2	.01
Total for Forbs		460	470	541	214	221	247	8.41

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

BROWSE TRENDS --

Herd unit 02 , Study no: 13

T y p e	Species	Strip Frequency '96	Average Cover % '96
B	<i>Amelanchier alnifolia</i>	9	.06
B	<i>Artemisia tridentata</i> <i>vaseyana</i>	14	1.30
B	<i>Chrysothamnus</i> <i>viscidiflorus</i> <i>viscidiflorus</i>	17	1.79
B	<i>Mahonia repens</i>	15	.07
B	<i>Prunus virginiana</i>	5	.03
B	<i>Purshia tridentata</i>	3	.38
B	<i>Rosa woodsii</i>	12	.72
B	<i>Symphoricarpos</i> <i>oreophilus</i>	6	1.31
Total for Browse		81	5.68

BASIC COVER --

Herd unit 02 , Study no: 13

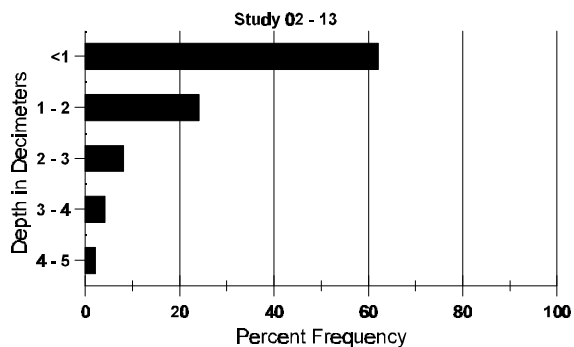
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	368	1.75	16.25	43.72
Rock	326	17.50	20.50	25.35
Pavement	212	2.25	.75	5.00
Litter	389	66.75	44.50	45.87
Cryptogams	83	6.50	1.25	1.18
Bare Ground	180	5.25	16.75	7.04

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 13

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.9	73.8 (10.1)	6.7	42.3	31.7	26.0	4.0	34.0	307.2	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 13

Type	Quadrat Frequency '96
Elk	7
Deer	18

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 13

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Amelanchier alnifolia</i>																		
S	84	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	8	1	-	-	-	-	-	-	9	-	-	-	300		9	
	90	-	2	6	3	1	1	-	-	-	10	2	-	1	433		13	
	96	6	5	1	-	-	-	-	-	-	12	-	-	-	240		12	
M	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33	27	22	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	3	7	-	-	-	-	-	-	10	-	-	-	200	17	21	10
D	84	-	-	1	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	2	-	2	-	-	-	-	4	-	-	-	133		4	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	40		2		
Total Plants/Acre (excluding Dead & Seedlings)											'84	366	Dec:	9%				
											'90	566		23%				
											'96	440		0%				
<i>Artemisia tridentata vaseyana</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	1	2	-	-	-	-	-	-	-	3	-	-	-	100	14	9	3
	90	1	-	-	-	-	-	-	-	-	-	-	1	-	33	13	13	1
	96	-	7	2	-	-	-	-	-	-	9	-	-	-	180	24	34	9
D	84	1	1	5	-	-	-	-	-	-	7	-	-	-	233		7	
	90	-	-	3	-	-	-	-	-	-	3	-	-	-	100		3	
	96	-	3	-	-	-	-	-	-	-	2	-	-	1	60		3	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	480		24		
Total Plants/Acre (excluding Dead & Seedlings)											'84	333	Dec:	70%				
											'90	133		75%				
											'96	280		21%				

A G E	YR	Form Class (No. of 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	84	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	19	-	-	-	-	-	-	-	-	18	-	1	-	633	16	18	19
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	766	Dec:	4%			
												'90	0		0%			
												'96	0		0%			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	10	1	-	1	-	-	-	-	-	12	-	-	-	400	17	21	12
	96	20	2	-	-	-	-	-	-	-	20	2	-	-	440	15	24	22
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	433		-			
												'96	440		-			
<i>Gutierrezia sarothrae</i>																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33	7	11	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Mahonia repens</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	41	-	-	-	-	-	-	-	-	41	-	-	-	820	4	5	41
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	980		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Prunus virginiana</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	1	1	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	-	-	1	2	-	-	-	-	-	3	-	-	-	60	19	18	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	100		-			
<i>Purshia tridentata</i>																		
M	84	-	-	4	-	-	-	-	-	-	4	-	-	-	133	18	20	
	90	-	-	2	-	-	-	-	-	-	2	-	-	-	66	15	18	
	96	-	-	-	2	-	1	-	-	-	3	-	-	-	60	19	36	
D	84	-	-	6	-	-	-	-	-	-	6	-	-	-	200			
	90	-	-	2	-	-	-	-	-	-	2	-	-	-	66			
	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20			
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			
Total Plants/Acre (excluding Dead & Seedlings)												'84	333	Dec:	60%			
												'90	132		50%			
												'96	80		25%			
<i>Rhus glabra cismontana</i>																		
M	84	1	1	-	-	-	-	-	-	-	2	-	-	-	66	43	41	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Rosa woodsii</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			
	96	5	1	11	-	-	-	-	-	-	17	-	-	-	340			
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	16	7	36	-	-	-	-	-	-	59	-	-	-	1180	12	11	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40			
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	1520		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Sambucus cerulea																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	1	-	-	-	-	-	-	-	-	-	33	31	20	1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0	84	135	0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	33		-			
												'96	0		-			
Symphoricarpos oreophilus																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	4	4	-	-	-	-	-	-	-	-	-	-	160			8	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	1	14	-	-	-	-	-	-	-	-	-	-	300	20	27	15	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	460		-			

TREND STUDY 2-14-96

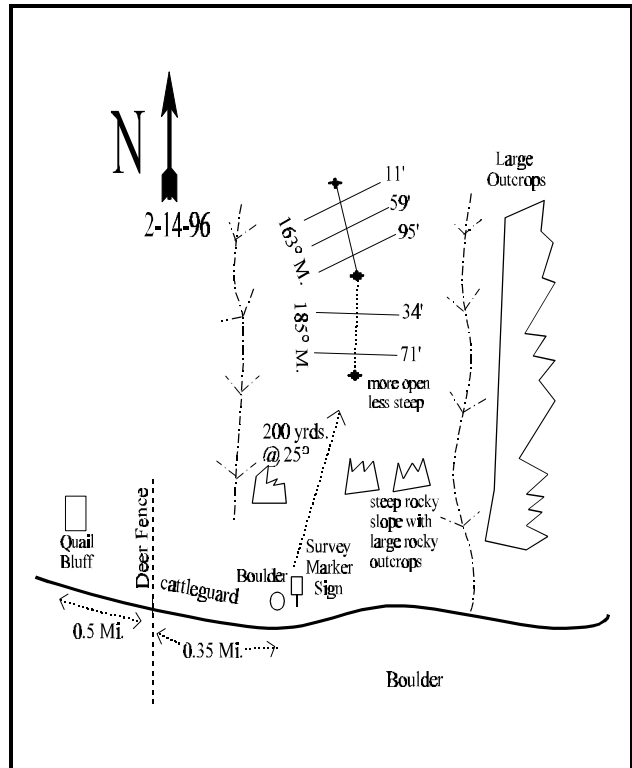
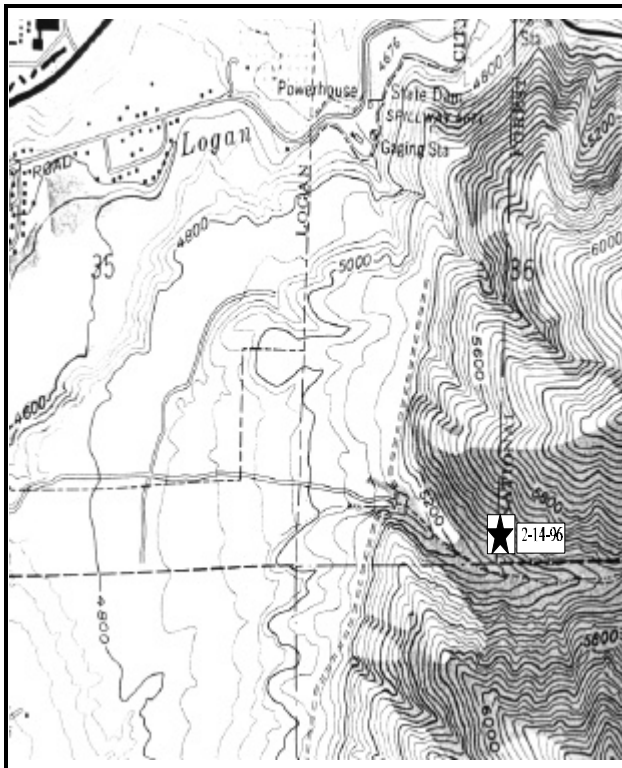
Study site name: Dry Canyon. Range type: Juniper.

Compass bearing: frequency baseline 146 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11, 59 & 95ft), line 2 (34 & 71ft).

LOCATION DESCRIPTION

Proceed up Mountain Road in Logan past Quail Hollow Housing Development to the intersection of 25 North and 1400 East. Begin to note mileage here. Proceed 0.5 miles to a cattle guard and deer fence. Continue up road for 0.35 miles to a survey post marker sign. Walk approximately 200 yards at a bearing of 25 degrees magnetic from the survey sign to the 200-foot baseline stake. The 0-foot baseline stake is marked by browse-tag #7934. Bearing of the baseline is 163 degrees magnetic. Line 2 has a bearing of 185 degrees magnetic.



Map Name: Logan

Diagrammatic Sketch

Township 12N, Range 1E, Section 36, UTM COOR: 4-34-989E 46-20-313N

DISCUSSION

Trend Study No. 2-14

This site is on a steep (65% to 70%) and rocky south facing slope located approximately 1/4 mile up Dry Canyon at an elevation of 5,580 feet. The range type is scattered Utah juniper (approximately 70 trees/acre) associated with an equally depleted and sparse understory. Deer use of the area was reported heavy during the 1984 reading. Many pellet groups were found that year and available browse was heavily utilized. Currently, deer use appears light and pellet groups infrequent. Due to a very limited amount of browse forage, this area is likely used primarily for its thermal cover.

Soil is "Richmond Very Stony Loam" similar to that found elsewhere on the Cache "face." This is a shallow and exceptionally rocky soil with a high erosion potential. This site has many variable sized rocks on the surface which easily move down slope. Although not on the study area proper, many nearby sites have small talus slopes and outcrops of exposed bedrock. Parent material is limestone. Effective rooting depth (see methods) was estimated at 12 inches in 1996 with a soil penetrometer. Soil temperature is moderately high at 70°F at about 12 inches. The soil has little structure and is easily disturbed. The soil is moderately alkaline with a pH of 7.9. Both phosphorus and potassium could be limiting at 4.2 and 6.2 ppm respectively. Due to the abundant rock cover, erosion is not excessive.

Browse production is low. Apart from Utah juniper which has a canopy cover of 18% and accounts for 83% of the browse cover, the only shrub of any significance is black sagebrush. Population density of black sagebrush was estimated between 700 and 900 plants/acre respectively in 1984 and 1990. Utilization was heavy in 1984 and mostly light in 1990. The increased sample size used in 1996 estimated only 120 plants/acre, with the majority (66%) classified as decadent. No seedlings or young were sampled. There are an equal number of dead sagebrush as there are alive. The number of dead plants still does not account for the loss from about 900 plants/acre in 1990 to 120 plants/acre in 1996. Because of the clumped and discontinuous nature of the black sagebrush population, most of the change in the population must be attributed to the much larger sample size which gives greatly improved accuracy for this kind of browse population. This explanation still does not downplay the fundamental importance of such a low population estimate for a critically key browse species on this site.

Broom snakeweed numbers nearly 2,000 plants/acre and has an age class structure characteristic of an expanding population. Other shrubs are sporadic in their occurrence. They include; littleleaf mountain mahogany, bush ocean-spray, Rocky Mountain smooth sumac, and silver rubber rabbitbrush.

The herbaceous understory is depleted and dominated by rattlesnake brome and cheatgrass which account for 86% of the herbaceous cover. Perennial herbaceous plants occur infrequently. Bluebunch wheatgrass is the only fairly abundant perennial grass. A few low value forbs are scattered throughout the area but combine to produce less than 1% total cover and probably account for less than 10 pounds/acre of forage.

1984 APPARENT TREND ASSESSMENT

Soil trend is declining. A rocky and unproductive soil is rapidly being eroded away because of lack of vegetative cover and a very steep slope. Vegetatively, the trend is relatively stable despite poor condition. Both black sagebrush and Utah juniper appear to have stable populations.

1990 TREND ASSESSMENT

This juniper-dominated slope has a very low site potential due to the shallow, rocky and undeveloped soil. The soil is easily disturbed on the steep slope. Rock and pavement together make up 72% of the ground cover. As in 1984, the vegetative trend appears stable, but in poor condition when considering it as a deer winter range. The black sagebrush appears very vigorous and lightly hedged; it has increased some since 1984. Junipers number 84 trees/acre. Most are highlined mature trees. The nested and quadrat frequencies of perennial grasses and forbs are low, and show slight declines.

TREND ASSESSMENT

soil- down, poor condition

browse - stable to slightly increasing, but only for black sagebrush

herbaceous understory - slightly declining

1996 TREND ASSESSMENT

The soil is poor and undeveloped. However, percent litter cover increased by 42% and percent bare ground has declined from 11% to 3%. Trend is considered up. Browse is depleted on the site. Density estimates from the new, larger sample used in 1996, indicate only 120 plants/acre, 66% of which are decadent. There are not enough dead plants to indicate the reduction was solely a die-off, therefore most of the noted decrease could be attributed to the larger sample size giving a better estimate for this discontinuously distributed browse species. Utilization is lighter, but no reproduction is evident and trend is considered down. Trend for the herbaceous understory is also down. Sum of nested frequency of bluebunch wheatgrass, the only abundant perennial grass, declined significantly. Sum of nested frequency for forbs increased, yet a large part of the increase is the result of the appearance of dyers woad on the site. Combined, forbs produce less than 1% cover.

TREND ASSESSMENT

soil - up but in poor condition

browse - down and depleted

herbaceous understory - down and depleted

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 14

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	_a 138	_a 124	_b 73	63	59	33	2.58
G	Bromus brizaeformis (a)	-	-	266	-	-	90	3.40
G	Bromus tectorum (a)	-	-	343	-	-	97	14.56
G	Oryzopsis hymenoides	9	9	-	4	3	-	-
G	Poa pratensis	_a -	_b 18	_a -	-	8	-	-
G	Poa secunda	_{ab} 15	_a 5	_b 26	6	2	10	.32
Total for Grasses		162	156	708	73	72	230	20.87
F	Alyssum alyssoides (a)	-	-	82	-	-	32	.29
F	Cirsium spp.	3	6	-	1	2	-	-
F	Cryptantha spp.	5	4	3	3	2	1	.03

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	Isatis tinctoria	a-	a-	b43	-	-	24	.44
F	Oenothera caespitosa	2	-	6	1	-	2	.03
F	Sisymbrium altissimum (a)	-	-	1	-	-	1	.00
F	Tragopogon dubius	a38	b7	b19	22	6	9	.12
F	Unknown forb-perennial	-	2	-	-	1	-	-
Total for Forbs		48	19	154	27	11	69	0.92

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

BROWSE TRENDS --

Herd unit 02 , Study no: 14

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia nova	5	.53
B	Gutierrezia sarothrae	39	.80
B	Juniperus osteosperma	5	6.50
Total for Browse		49	7.84

BASIC COVER --

Herd unit 02 , Study no: 14

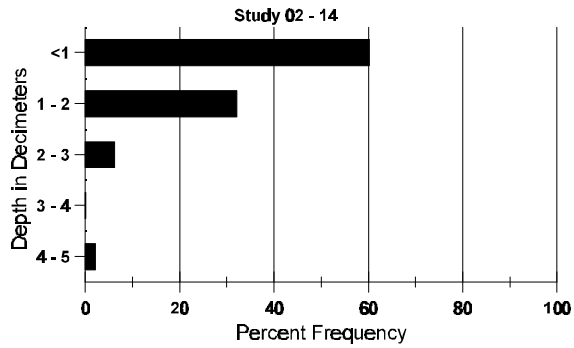
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	357	.25	2.00	30.41
Rock	366	51.00	53.25	49.99
Pavement	58	9.75	19.25	1.37
Litter	367	19.25	14.00	23.96
Cryptogams	105	5.50	.25	1.38
Bare Ground	145	14.25	11.25	3.12

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 14

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.0	70.0 (12.1)	7.9	46.7	34.0	19.3	2.2	4.2	6.4	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 14

Type	Quadrat Frequency '96
Rabbit	1
Deer	7

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 14

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia nova</i>																		
S	84	6	-	-	-	-	-	-	-	-	6	-	-	-	200		6	
	90	7	-	-	-	-	-	-	-	-	7	-	-	-	233		7	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	3	4	-	-	-	-	-	-	-	7	-	-	-	233		7	
	90	11	-	-	-	-	-	-	-	-	11	-	-	-	366		11	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	2	2	-	-	-	-	-	-	4	-	-	-	133	16	33	4
	90	5	-	1	-	-	-	-	-	-	6	-	-	-	200	19	22	6
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	15	33	2
D	84	-	-	11	-	-	-	-	-	-	9	-	2	-	366		11	
	90	9	1	-	-	-	-	-	-	-	10	-	-	-	333		10	
	96	2	2	-	-	-	-	-	-	-	4	-	-	-	80		4	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	120		6		
Total Plants/Acre (excluding Dead & Seedlings)												'84	732	Dec:	50%			
												'90	899		37%			
												'96	120		67%			

A G E	YR	Form Class (No. of 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	18	-	-	-	-	-	-	-	-	18	-	-	-	360		18	
Y	84	6	-	-	-	-	-	-	-	-	6	-	-	-	200		6	
	90	12	-	-	-	-	-	-	-	-	12	-	-	-	400		12	
	96	39	-	-	-	-	-	-	-	-	39	-	-	-	780		39	
M	84	18	-	-	-	-	-	-	-	-	18	-	-	-	600	11 12	18	
	90	12	-	-	-	-	-	-	-	-	12	-	-	-	400	7 9	12	
	96	59	-	-	-	-	-	-	-	-	59	-	-	-	1180	10 15	59	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	800	Dec:	0%			
												'90	833		4%			
												'96	1960		0%			
<i>Juniperus osteosperma</i>																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33	49 36	1	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	157 157	1	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	100	- -	5	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	66		-			
												'96	100		-			

TREND STUDY 2-15-96

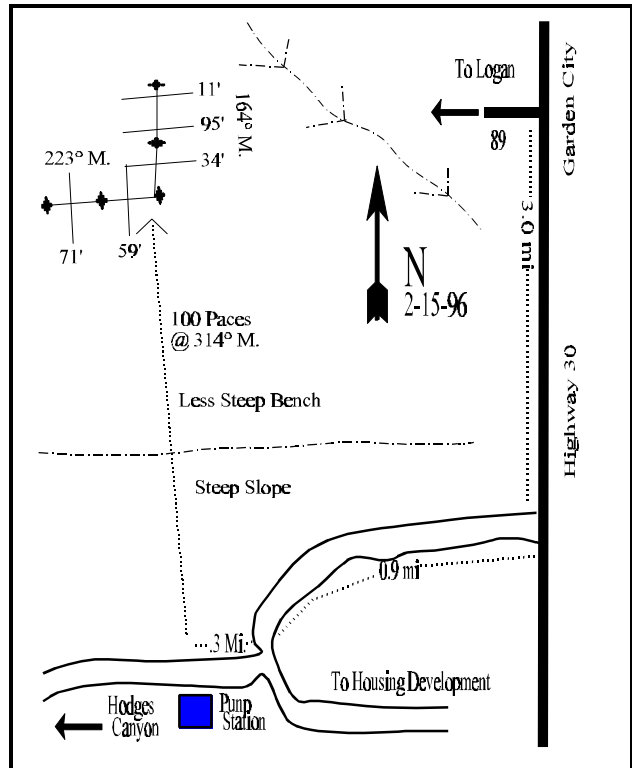
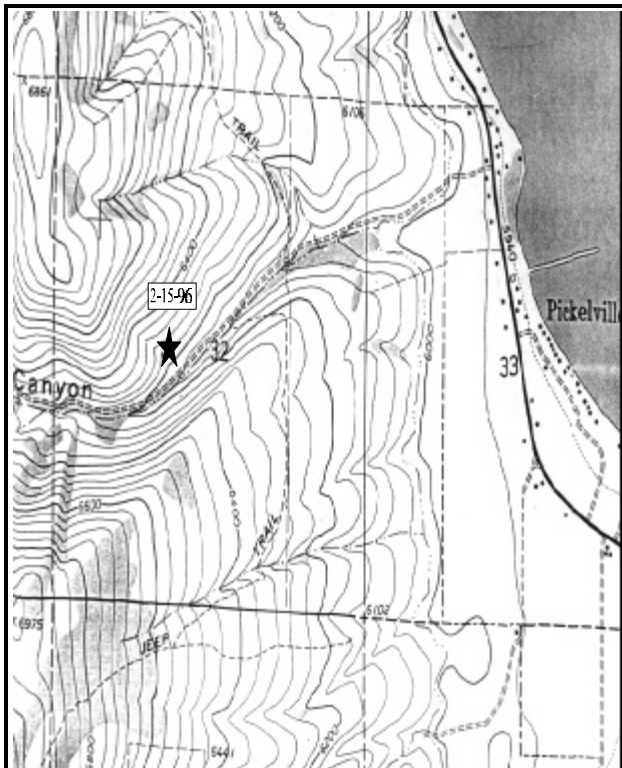
Study site name: Lower Hodge's Canyon . Range type: Mixed mountain brush .

Compass bearing: frequency baseline 164 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the Garden City junction of U-89 and U-30 proceed south for 3.0 miles and turn right. Travel west for 0.9 miles to a point where the main road curves sharply to the left. Continue straight up Hodge's Canyon from this point for 0.3 miles to a small concrete pump station on the left. At the pump station take a bearing of 314 degrees magnetic and walk up the steep slope for approximately 100 paces to the 200-foot stake of the baseline (study situated more or less on a bench). Walk two hundred feet beyond at 344 degrees magnetic to the 0-foot stake of the baseline, marked by browse-tag #7980. bearing of the baseline is 164 degrees magnetic. The baseline doglegs at the 200-foot baseline stake and runs 223 degrees magnetic.



Map Name: Garden City

Diagrammatic Sketch

Township 14N , Range 5E , Section 32 , UTM COOR: 4-65-352E 46-40-550N

DISCUSSION

Trend Study No. 2-15

Study Number 15 is one of four established within the Rich County portion of herd unit #2. Located in lower Hodges Canyon, the site is on a south facing, 30% to 35% slope and 6,340 feet in elevation. This location is considered to be within severe winter range on this portion of the unit. The vegetative community is a mountain big sagebrush-grass type, which also contains good numbers of other shrubs. Deer pellet groups can be found in moderate numbers along with a few elk pellet groups. Sheep and cattle also use the site but have had no obvious impact.

The Rich County soil survey classifies the soil at the study site as within the "Yeates Hollow-Obray complex." All of the soils in this mapping unit are deep, well-drained, and derived from sedimentary rock. Although not highly permeable to water, the Yeates Hollow soil has good water holding qualities and only a moderate erosion hazard (Campbell and Lacey, 1982). Soils on the site are moderately shallow and rocky throughout the profile. Due to the rocky nature of the soil, effective rooting depth (see methods) was estimated at only 12 inches in 1996. However, deeper rooted shrubs are numerous indicating no rooting depth restrictions. The soil is slightly acid with a pH of 6.5 with a sandy clay loam texture. The soil surface is adequately protected from erosion due to abundant and well dispersed vegetation and litter cover.

The key browse species include mountain big sagebrush and antelope bitterbrush which account for 64% of the browse cover. Mountain big sagebrush has maintained a stable population of about 1,200 plants/acre since 1984. However, the population has also continued to have a high decadency rate, ranging from 68% in 1984 to 53% in 1996. Currently 42% of the decadent sagebrush are classified as dying. In addition, dead plants, first sampled in 1996, are almost as numerous as live plants (940 plants/acre). Utilization was moderate to heavy in 1984 and light to moderate in 1990 and 1996. Vigor has continued to be poor on about one third of the shrubs sampled since 1984. Reproduction is also limited. No seedlings have been encountered during any of the readings. Young plants were found in 1990 in good numbers (133 plants/acre) but few (40 plants/acre) were found in 1996.

Bitterbrush has increased from 333 plants/acre estimated in 1984 to 1,580 by 1996. The population is moderately utilized, in good vigor with a low decadence. The bitterbrush is becoming increasingly mature but reproduction appears adequate to maintain the population.

Shrubs of secondary importance include serviceberry and snowberry. Together they provide an additional 26% of the browse cover. Serviceberry number only 460 plants/acre. The average mature shrub measures only 2 feet high with a crown diameter of nearly 4 feet. Utilization is currently moderate. There are no decadent plants but two thirds of the population display poor vigor due to a rust infestation. Snowberry has a moderately dense population of 1,660 plants/acre with mature plants of similar size to serviceberry. Utilization is mostly light.

A diverse mixture of grass species provides the bulk of understory production and cover. Five perennial grasses are found on the site, but only bluebunch wheatgrass and Sandberg bluegrass are abundant. Annual grasses were reported to occur infrequently in 1984, currently the most numerous grass is annual cheatgrass. It produces 21% total cover and accounts for 63% of the grass cover and 55% of the herbaceous cover on the site. Forbs provide comparatively little forage, however they are still an important source of variety. Composition is fairly typical for this kind of site. Common perennial species include arrowleaf balsamroot, bastard toadflax, tapertip hawksbeard, a Penstemon, and yellow

salsify.

1984 APPARENT TREND ASSESSMENT

This is a good condition site with a stable soil and vegetative trend. Soil erosion is minimal and there is little evidence to suggest any significant change in vegetative composition or density is forthcoming.

1990 TREND ASSESSMENT

Most all vegetative components on this site have stayed about the same or have increased on this diverse mountain brush site. Both the bitterbrush and sagebrush are generally moderately hedged. Mountain big sagebrush provides 16% canopy cover. The herbaceous understory shows good increases in quadrat and nested frequencies and remains dominated by bluebunch wheatgrass.

TREND ASSESSMENT

soil - stable

browse - stable to slightly improving

herbaceous understory - up

1996 TREND ASSESSMENT

Soil trend is up with increased litter cover and a decline in percent bare ground from 9% in 1990 to only 1% in 1996. Unfortunately it appears that the decline in bare ground and increase in litter cover is the result of the abundance of cheatgrass. Annual grasses and forbs were not previously included in the sampling, so no comparisons can be made. However, it was reported in 1984 that annual grasses were infrequent. Now, cheatgrass accounts for over half (55%) of the herbaceous cover and has a nested frequency value close to the maximum of 400. The browse trend appears slightly down for sagebrush but stable for bitterbrush. The sagebrush population is mostly decadent with one third of the population in poor vigor. Reproduction is limited. Utilization has not been extremely heavy on the site so the high proportion of decadent sagebrush is likely a result of prolonged drought. The bitterbrush population is becoming increasingly mature. Utilization is moderate and vigor is good. Overall, the browse trend is considered stable. Trend for the herbaceous understory is down. Sum of nested frequency for perennial grasses is down 28%, while sum of nested frequency for perennial forbs has declined 43%. Four of the five perennial grasses found on the site declined significantly in their sum of nested frequency values.

TREND ASSESSMENT

soil - up

browse - stable

herbaceous understory - down

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 15

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	_a 139	_b 196	_a 158	57	71	58	7.81
G	Bromus tectorum (a)	-	-	381	-	-	105	20.75
G	Koeleria cristata	16	11	21	10	7	9	.63

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	<i>Poa fendleriana</i>	_a 19	_{ab} 11	_b 4	11	5	2	.06
G	<i>Poa pratensis</i>	_a 64	_a 89	_b 6	28	36	4	.12
G	<i>Poa secunda</i>	_a 10	_b 119	_b 118	4	54	47	3.69
Total for Grasses		248	426	688	110	173	225	33.09
F	<i>Achillea millefolium</i>	7	4	6	3	2	4	.19
F	<i>Agoseris glauca</i>	-	8	4	-	3	2	.01
F	<i>Alyssum alyssoides</i> (a)	-	-	148	-	-	53	1.20
F	<i>Arabis</i> spp.	-	11	-	-	5	-	-
F	<i>Artemisia ludoviciana</i>	-	-	2	-	-	1	.15
F	<i>Astragalus beckwithii</i>	-	-	3	-	-	1	.03
F	<i>Astragalus convallarius</i>	18	6	8	9	2	5	.02
F	<i>Balsamorhiza sagittata</i>	6	4	8	3	2	4	.59
F	<i>Camelina microcarpa</i> (a)	-	-	3	-	-	1	.00
F	<i>Calochortus nuttallii</i>	-	3	3	-	1	1	.00
F	<i>Chaenactis douglasii</i>	-	1	-	-	1	-	-
F	<i>Cirsium</i> spp.	4	11	4	2	5	3	.06
F	<i>Collomia</i> spp. (a)	-	-	1	-	-	1	.00
F	<i>Comandra pallida</i>	_a 22	_b 40	_{ab} 27	9	16	10	.22
F	<i>Collinsia parviflora</i> (a)	-	-	18	-	-	7	.06
F	<i>Crepis acuminata</i>	_a 10	_b 90	_c 49	5	39	25	.72
F	<i>Epilobium brachycarpum</i> (a)	-	-	14	-	-	8	.04
F	<i>Erigeron</i> spp	-	-	6	-	-	2	.18
F	<i>Eriogonum umbellatum</i>	6	3	-	2	3	-	-
F	<i>Hackelia patens</i>	-	-	9	-	-	4	.09
F	<i>Lactuca serriola</i>	-	-	2	-	-	2	.01
F	<i>Linum lewisii</i>	-	2	3	-	1	2	.03
F	<i>Lupinus</i> spp.	3	-	-	1	-	-	-
F	<i>Orthocarpus tolmiei</i> (a)	-	-	2	-	-	1	.03
F	<i>Penstemon</i> spp.	_a 33	_b 70	_a 21	16	33	13	.41
F	<i>Phlox longifolia</i>	_a 3	_b 122	_a 22	1	48	12	.08
F	<i>Tragopogon dubius</i>	_{ab} 28	_a 14	_b 43	16	6	17	.49
F	Unknown forb-perennial	3	2	-	1	2	-	-
Total for Forbs		143	391	406	68	169	179	4.68

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

BROWSE TRENDS --

Herd unit 02 , Study no: 15

Type	Species	Strip Frequency '96	Average Cover % '96
B	Amelanchier alnifolia	16	1.43
B	Artemisia tridentata vaseyana	44	7.25
B	Chrysothamnus viscidiflorus stenophyllus	13	.65
B	Eriogonum heracleoides	6	1.41
B	Eriogonum microthecum	21	.78
B	Purshia tridentata	55	11.32
B	Symphoricarpos oreophilus	49	6.24
B	Tetradymia canescens	2	.03
Total for Browse		206	29.13

BASIC COVER --

Herd unit 02 , Study no: 15

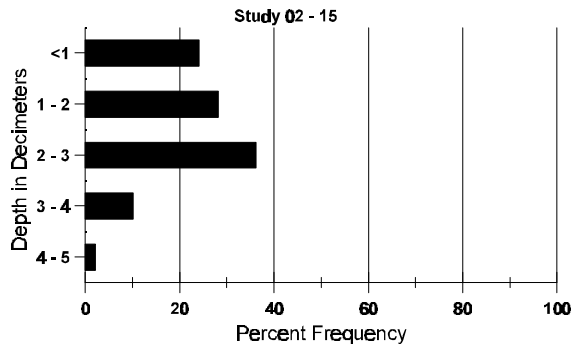
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	394	1.00	12.25	66.81
Rock	86	2.25	3.75	1.15
Pavement	80	1.25	1.75	.69
Litter	400	86.75	72.75	77.68
Cryptogams	57	.25	.50	.49
Bare Ground	87	8.50	9.00	1.20

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 15

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.7	53.8 (12.0)	6.5	49.3	25.7	25.0	2.7	23.1	198.4	.4

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 15

Type	Quadrat Frequency '96
Rabbit	1
Elk	3
Deer	19

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 15

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Amelanchier alnifolia</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	-	1	-	-	20			1
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	3	-	-	1	-	-	5	-	-	-	333			5
	96	1	3	-	6	-	-	-	-	-	1	2	6	1	200			10
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	2	1	-	-	-	-	3	-	-	-	200	37	33	3
	96	-	10	3	-	-	-	-	-	-	2	1	9	1	260	26	46	13
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	533		-			
												'96	460		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	1	-	-	-	-	-	2	-	-	-	133			2
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	84	-	4	2	-	-	-	-	-	-	5	-	-	1	400	34	46	6
	90	4	2	-	1	-	-	-	-	-	7	-	-	-	466	36	53	7
	96	13	8	2	1	1	-	-	-	-	21	-	4	-	500	30	39	25
D	84	1	8	4	-	-	-	-	-	-	8	-	5	-	866			13
	90	4	3	-	1	-	-	-	-	-	2	1	1	4	533			8
	96	11	12	4	4	-	-	-	-	-	16	-	2	13	620			31
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	940			47
Total Plants/Acre (excluding Dead & Seedlings)												'84	1266	Dec:	68%			
												'90	1132		47%			
												'96	1160		53%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
M	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133	19	30	2
	90	1	-	-	1	-	-	-	-	-	2	-	-	-	133	28	33	2
	96	16	-	-	-	-	-	-	-	-	16	-	-	-	320	20	32	16
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	0%			
												'90	133		0%			
												'96	340		6%			
<i>Eriogonum heracleoides</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220	9	15	11
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	220		-			
<i>Eriogonum microthecum</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	28	-	-	6	-	-	-	-	-	34	-	-	-	680	14	22	34
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	680		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Purshia tridentata</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	-	2	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	2	-	-	2	-	-	-	-	-	4	-	-	-	80		4	
M	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200	15	27	3
	90	-	2	2	2	2	1	-	-	-	8	-	1	-	600	18	32	9
	96	16	38	8	9	2	-	-	-	-	73	-	-	-	1460	22	41	73
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	1	-	5	-	-	-	-	-	6	-	-	-	400		6	
	96	-	1	1	-	-	-	-	-	-	1	-	-	1	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
Total Plants/Acre (excluding Dead & Seedlings)												'84	333	Dec:	0%			
												'90	1133		35%			
												'96	1580		3%			
<i>Symphoricarpos oreophilus</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	2	-	-	-	-	-	7	-	-	-	140		7	
Y	84	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8	
	90	6	-	-	2	-	-	1	-	-	6	1	2	-	600		9	
	96	2	-	-	7	-	-	-	-	-	9	-	-	-	180		9	
M	84	9	-	-	-	-	-	-	-	-	9	-	-	-	600	29	44	9
	90	43	15	-	4	-	-	-	-	-	59	1	2	-	4133	25	35	62
	96	42	4	-	28	-	-	-	-	-	67	-	7	-	1480	24	41	74
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60		3	
Total Plants/Acre (excluding Dead & Seedlings)												'84	1133	Dec:	0%			
												'90	4999		5%			
												'96	1660		0%			
<i>Tetradymia canescens</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	19	30	3
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	60		-			

TREND STUDY 2-16-96

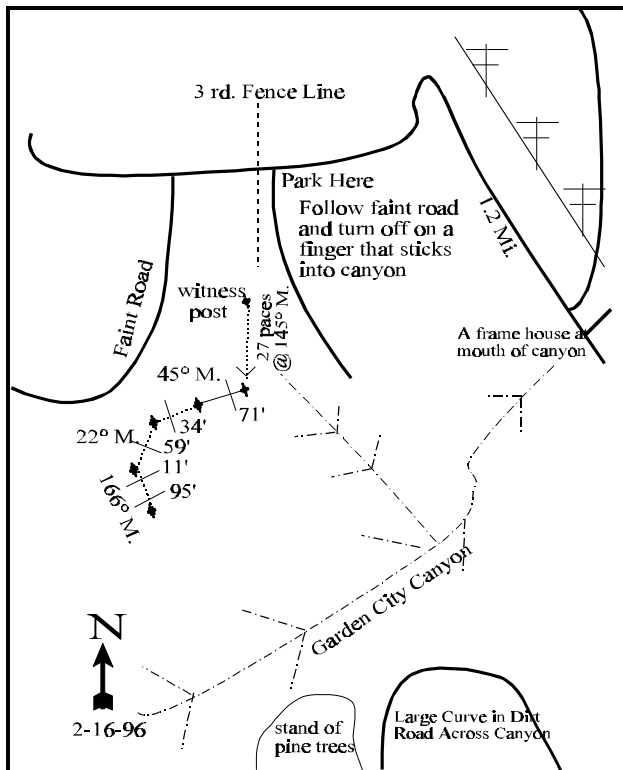
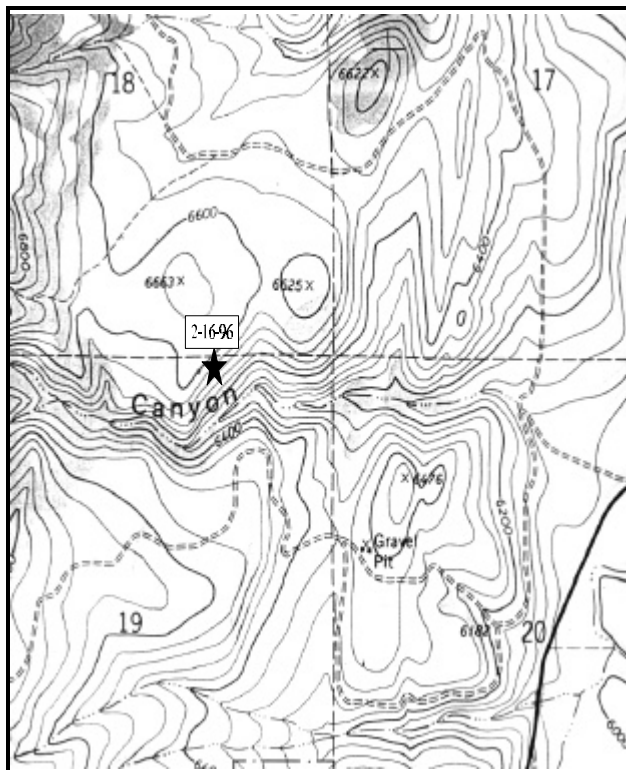
Study site name: Garden City Canyon. Range type: Curlleaf mountain mahogany.

Compass bearing: frequency baseline 166 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft).

LOCATION DESCRIPTION

From Garden City, proceed west on US-89 to Garden City. Turn right at 525 W. Proceed for 0.25 miles and turn right. Stay left at forks and continue for 1.2 miles to a fence with a gate. Park here. Follow a faint road to the left and turn off on a finger that sticks into the canyon. Proceed to a witness post on the east side of the plateau. From witness post walk 27 paces at 145 degrees magnetic to the 400-foot stake of the baseline. The 0-foot baseline stake is down the slope 300 feet. The 0-foot stake is marked by browse tag #7936. Azimuth of the baseline is 166 degrees magnetic. Line 2 runs 22 degrees magnetic. Lines 3 and 4 run 45 degrees magnetic.



Map Name: Garden City

Diagrammatic Sketch

Township 14N, Range 5E, Section 19, UTM COOR: 4-64-661E 46-44-106N

DISCUSSION

Trend Study No. 2-16

This study samples winter range on the north rim of Garden City Canyon in Rich County. The site is heavily used by deer and elk. It is typical of the small mahogany knolls and hillsides so common in this area. More level sites adjacent to the knolls support vigorous stands of mountain big sagebrush and bitterbrush. Big game, however, seem to prefer the more exposed and less densely vegetated knolls and hillsides. Pellet group data also shows a moderately high number of elk utilize the site. The study site is a moderately steep (45%) south to southeast facing slope with an elevation of 6,580 feet. The vegetational type is characterized by curlleaf mountain mahogany with an associated mixture of mountain brush.

Soil is "Foxol Very Stony Loam", a soil series that occurs on moderately steep slopes. Foxol soil is shallow, slightly acid, moderately permeable, and excessively drained. Soil parent material is quartzite and depth to bedrock is normally about 15 inches (Campbell and Lacey, 1982). Soil on the site has a clay loam texture with an effective rooting depth (see methods) estimated at only 9 inches in 1996. The soil is moderately acid with a pH of 5.8. The surface is exceptionally rocky, with many large boulders and exposed bedrock. In spite of these characteristics, there is relatively little erosion. Cover from vegetation, litter, and rock is abundant leaving little unprotected soil (2%).

Browse composition is highly variable which makes designating a single key species difficult. The most conspicuous shrub, although not the most numerous, is curlleaf mountain mahogany. Many of the mahogany are large and tree-like in stature. Estimates from the shrub density strips indicate a population of 289 plants/acre in 1996. Seventy one percent of the population consist of mature plants which are tall enough to be mostly unavailable. Overhead canopy cover of mahogany is highly variable but averages about 16%. Most of the tall mahogany have been highlined and utilization of available plants is moderate to heavy. Vigor is normal for all individuals and percent decadency is moderate at 21%.

Other important browse on the site include a combination of low sagebrush and mountain big sagebrush, bitterbrush, and serviceberry. Low sagebrush is much more abundant and widespread. For this report, all sagebrush are combined into low sagebrush (*Artemisia arbuscula*). The combined sagebrush account for 45% of the understory shrub cover. Density is currently estimated at 2,600 plants/acre. Utilization is light to moderate with generally good vigor and low decadency (10%). Bitterbrush are not abundant and number only about 140 plants/acre which are heavily hedged. Serviceberry has also been heavily browsed in the past, but current use is light to moderate. Density is approximately 220 plants/acre. Mature plants are stunted and measure only about 2 feet in height. Percent decadence has improved from 66% in 1990 to 27% in 1996, but vigor is poor in 36% of the population.

The herbaceous understory consisted primarily of perennial grasses in 1984. Most important were bluebunch wheatgrass followed by Sandberg bluegrass, muttongrass, Kentucky bluegrass, and prairie Junegrass. Annual grasses, especially cheatgrass brome, occurred only in scattered patches. By 1996, cheatgrass is by far the most numerous herbaceous species on the site. Cheatgrass, along with Japanese brome account for 66% of the grass cover. It was reported in 1996 that about half of the brome grasses were infected with smut. Bluebunch wheatgrass remains the most abundant perennial grass with Sandberg bluegrass also being fairly abundant. Prairie Junegrass, muttongrass, and Kentucky bluegrass were not found in the surveys of 1990 or 1996.

Forbs are a minor component. Composition includes relatively few species of high

or even medium palatability. All forbs combined produce less than 2% cover. It is possible that the shallow and excessively drained soil is not conducive to a productive forb component. Annual forbs contribute 53% of the forb cover.

1984 APPARENT TREND ASSESSMENT

Most of the measured trend indicators suggest stable soil and vegetative trends. Although soil is shallow and rocky, there is no evidence of significant erosion problems. Vegetatively, the area should continue to possess a strong grass understory and a mixed stand of browse with curlleaf mountain mahogany as the dominant species.

1990 TREND ASSESSMENT

This study site is representative of curlleaf mountain mahogany winter range on south-facing slopes and ridge tops along the eastern side of the herd unit. Snow limits use in some winters, but the area is frequented by deer, elk, and moose. Within the diverse browse community, only curlleaf mountain mahogany is heavily to severely hedged which is not unusual for it is the most preferred browse. The bulk of the mahogany forage production is unavailable to most big game animals because of it's height. It's population has increased slightly because of the young age class. The increased decadency should not be of concern because it is a long lived species. It is not unusual to find individuals more than 300 years of age in most areas of Utah. Data for sagebrush shows a large decline for low sagebrush while mountain big sagebrush increased substantially during this same period. The herbaceous understory remains dominated by bluebunch wheatgrass. Considering the steep slope and rockiness of the site, there is minimal erosion due to adequate litter and vegetative cover.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable

1996 TREND ASSESSMENT

The soil trend is up slightly due to a slight increase in litter cover and a decline in bare ground. Trend for the key browse species, curlleaf mountain mahogany, appears stable. The increased sample size used this year may be partly responsible for the change in mahogany density. Mahogany on the site are very unevenly distributed. Utilization is more moderate on available plants and percent decadence slightly lower. Understory browse, serviceberry and low sagebrush display stable trends with lighter use and improved decadency rates. Bitterbrush is heavily utilized but maintains good vigor and low decadence. Overall, the browse trend appears stable. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses and forbs have remained similar to 1990. Since annuals were not included in the previous readings, we do not know for sure if they have increased. However, the 1984 report states that cheatgrass occurred only in isolated patches. Currently, cheatgrass and Japanese brome are abundant and well dispersed. In addition, while perennial grass and forb sum of nested frequency values remained unchanged since 1990, percent litter cover increased while percent bare ground declined. This may be the result of an increase in annual cheatgrass.

TREND ASSESSMENT

soil - up slightly

browse - stable

herbaceous understory - stable but dominated by cheatgrass

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 16

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	<i>Agropyron spicatum</i>	157	167	165	61	60	64	7.06
G	<i>Bromus japonicus</i> (a)	-	-	55	-	-	17	1.23
G	<i>Bromus tectorum</i> (a)	-	-	341	-	-	98	18.94
G	<i>Koeleria cristata</i>	7	-	-	4	-	-	-
G	<i>Poa fendleriana</i>	3	-	-	1	-	-	-
G	<i>Poa pratensis</i>	_a 25	_b -	_b -	12	-	-	-
G	<i>Poa secunda</i>	_a 44	_b 131	_b 137	22	51	53	3.46
G	<i>Sitanion hystrix</i>	-	-	1	-	-	1	.03
Total for Grasses		236	298	699	100	111	233	30.72
F	<i>Agoseris glauca</i>	4	1	4	2	1	1	.00
F	<i>Alyssum alyssoides</i> (a)	-	-	122	-	-	43	.56
F	<i>Arabis</i> spp.	-	3	4	-	1	3	.04
F	<i>Artemisia ludoviciana</i>	1	-	-	1	-	-	-
F	<i>Camelina microcarpa</i> (a)	-	-	3	-	-	1	.00
F	<i>Calochortus nuttallii</i>	-	6	-	-	2	-	-
F	<i>Cirsium</i> spp.	7	7	11	4	4	5	.28
F	<i>Comandra pallida</i>	19	24	24	9	10	10	.15
F	<i>Collinsia parviflora</i> (a)	-	-	4	-	-	2	.01
F	<i>Crepis acuminata</i>	-	1	7	-	1	3	.24
F	<i>Epilobium brachycarpum</i> (a)	-	-	48	-	-	21	.28
F	<i>Erigeron divergens</i>	-	1	-	-	1	-	-
F	<i>Gayophytum</i> spp.	-	-	1	-	-	1	.00
F	<i>Lappula occidentalis</i> (a)	-	-	2	-	-	1	.00
F	<i>Pellaea breweri</i>	5	-	-	3	-	-	-
F	<i>Penstemon</i> spp.	-	1	-	-	1	-	-
F	<i>Petradoria pumila</i>	-	-	1	-	-	1	.03
F	<i>Phlox longifolia</i>	-	2	-	-	1	-	-
F	<i>Polygonum douglasii</i> (a)	-	-	3	-	-	1	.00
F	<i>Sisymbrium altissimum</i> (a)	-	-	3	-	-	1	.03
F	<i>Tragopogon dubius</i>	_a 15	_b 4	_b 6	9	2	2	.01
F	<i>Wyethia amplexicaulis</i>	1	3	3	1	1	1	.03
Total for Forbs		52	53	246	29	25	97	1.68

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

BROWSE TRENDS --

Herd unit 02 , Study no: 16

Type	Species	Strip Frequency '96	Average Cover % '96
B	Amelanchier alnifolia	11	.41
B	Artemisia arbuscula	56	7.85
B	Cercocarpus ledifolius	14	3.65
B	Eriogonum heracleoides	2	-
B	Eriogonum microthecum	1	1
B	Juniperus scopulorum	0	.88
B	Mahonia repens	7	.03
B	Opuntia fragilis	3	.18
B	Pachistima myrsinites	3	.18
B	Purshia tridentata	6	.71
B	Symphoricarpos oreophilus	16	1.72
Total for Browse		119	15.64

BASIC COVER --

Herd unit 02 , Study no: 16

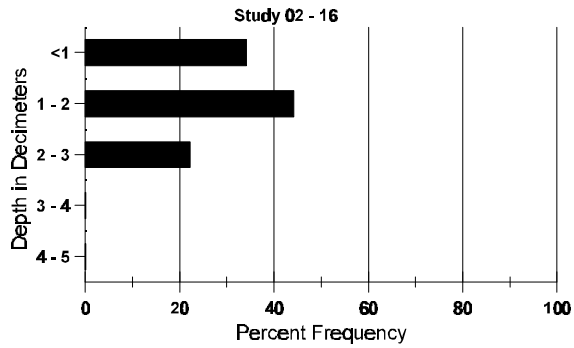
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	377	2.25	10.25	50.30
Rock	260	33.75	28.00	20.68
Pavement	63	.50	.25	.58
Litter	387	58.75	55.00	56.87
Cryptogams	36	1.75	1.75	.48
Bare Ground	85	3.00	4.75	2.30

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 16

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.0	65.5 (9.0)	5.8	32.6	39.1	28.4	4.7	31.5	259.2	.4

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 16

Type	Quadrat Frequency '96
Rabbit	6
Elk	25
Deer	19

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 16

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Amelanchier alnifolia</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	33			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	7	-	-	-	-	-	-	-	-	7	-	-	-	233			7
	90	1	1	-	1	-	-	-	-	-	-	3	-	-	100			3
	96	2	-	-	-	-	-	-	-	-	1	1	-	-	40			2
M	84	-	4	6	-	-	-	-	-	-	10	-	-	-	333	31	33	10
	90	-	-	1	-	-	1	-	-	-	1	1	-	-	66	35	25	2
	96	-	6	-	-	-	-	-	-	-	2	2	-	2	120	27	26	6
D	84	-	2	1	-	-	-	-	-	-	3	-	-	-	100			3
	90	2	3	4	-	1	-	-	-	-	2	5	-	3	333			10
	96	2	1	-	-	-	-	-	-	-	-	1	-	2	60			3
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
Total Plants/Acre (excluding Dead & Seedlings)												'84	666	Dec:	15%			
												'90	499		67%			
												'96	220		27%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia arbuscula</i>																		
S	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	1	2	-	-	-	-	-	-	-	3	-	-	-	100		3	
	90	3	1	-	1	-	-	-	-	-	5	-	-	-	166		5	
	96	6	1	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	84	-	24	7	-	-	-	-	-	-	24	-	7	-	1033	13 26	31	
	90	23	3	1	3	-	-	-	-	-	30	-	-	-	1000	17 16	30	
	96	89	20	-	-	-	-	-	-	-	109	-	-	-	2180	13 26	109	
D	84	-	4	14	-	-	-	-	-	-	15	-	3	-	600		18	
	90	10	4	-	-	-	-	-	-	-	6	2	5	1	466		14	
	96	9	3	2	-	-	-	-	-	-	11	-	-	3	280		14	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	580		29	
Total Plants/Acre (excluding Dead & Seedlings)												'84	1733	Dec:	35%			
												'90	1632		29%			
												'96	2600		11%			
<i>Cercocarpus ledifolius</i>																		
S	84	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	2	2	1	-	-	-	-	5	-	-	-	166		5	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	1	-	-	-	-	9	2	12	-	-	-	400	68 74	12	
	90	-	-	-	-	-	-	6	1	-	7	-	-	-	233	183 83	7	
	96	1	-	-	-	1	-	1	7	-	9	-	-	-	200	- -	10	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	1	3	-	-	-	1	-	-	5	-	-	-	166		5	
	96	-	-	1	1	-	1	-	-	-	3	-	-	-	60		3	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
Total Plants/Acre (excluding Dead & Seedlings)												'84	433	Dec:	0%			
												'90	565		29%			
												'96	280		21%			
<i>Eriogonum heracleoides</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	- -	2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	40		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Eriogonum microthecum</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	10	26	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
<i>Juniperus scopulorum</i>																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33	67	83	1
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	33	118	98	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	66		-			
												'96	0		-			
<i>Mahonia repens</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	6	-	-	-	-	-	-	-	-	6	-	-	-	200			6
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	23	-	-	-	-	-	-	-	-	23	-	-	-	766			23
	90	14	-	-	1	-	-	-	-	-	15	-	-	-	500			15
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	51	-	-	-	-	-	-	-	-	51	-	-	-	1700	8	6	51
	90	105	4	-	4	-	-	-	-	-	113	-	-	-	3766	7	4	113
	96	39	-	-	-	-	-	1	-	-	40	-	-	-	800	4	6	40
Total Plants/Acre (excluding Dead & Seedlings)												'84	2466	Dec:	-			
												'90	4266		-			
												'96	800		-			
<i>Opuntia fragilis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100	6	29	5
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	100		-			
<i>Pachistima myrsinites</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33	6	7	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120	7	12	6
Total Plants/Acre (excluding Dead & Seedlings)												'84	33	Dec:	-			
												'90	0		-			
												'96	180		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Purshia tridentata</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	1	-	-	-	-	-	2	-	-	-	66		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	1	-	-	-	-	-	-	1	-	-	-	33	24	33	1
	96	-	3	3	-	-	-	-	-	-	6	-	-	-	120	16	36	6
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	132		25%			
												'96	140		14%			
<i>Symphoricarpos oreophilus</i>																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	5	-	-	-	-	-	-	-	-	4	-	1	-	100		5	
M	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66	18	26	2
	90	3	-	-	2	-	-	-	-	-	5	-	-	-	166	15	28	5
	96	15	1	-	-	-	-	-	-	-	16	-	-	-	320	19	37	16
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	99	Dec:	0%			
												'90	199		0%			
												'96	460		9%			

TREND STUDY 2-17-96

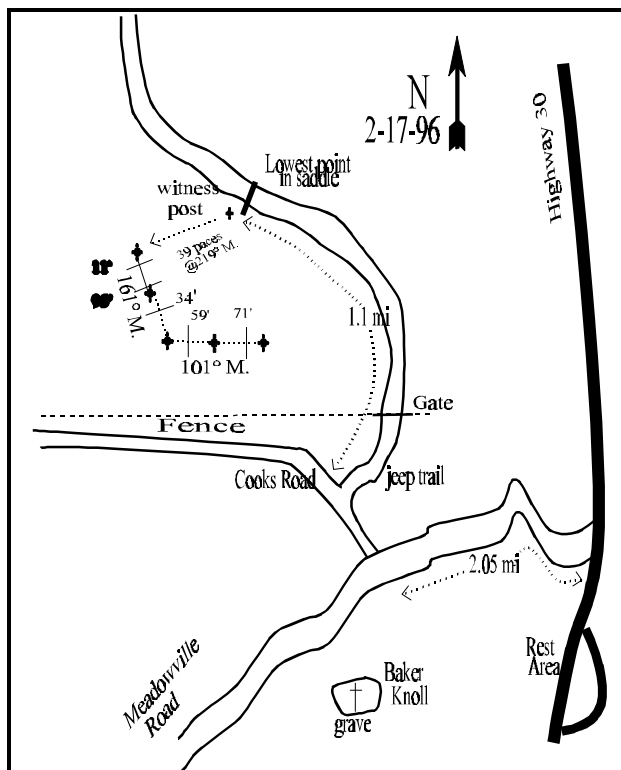
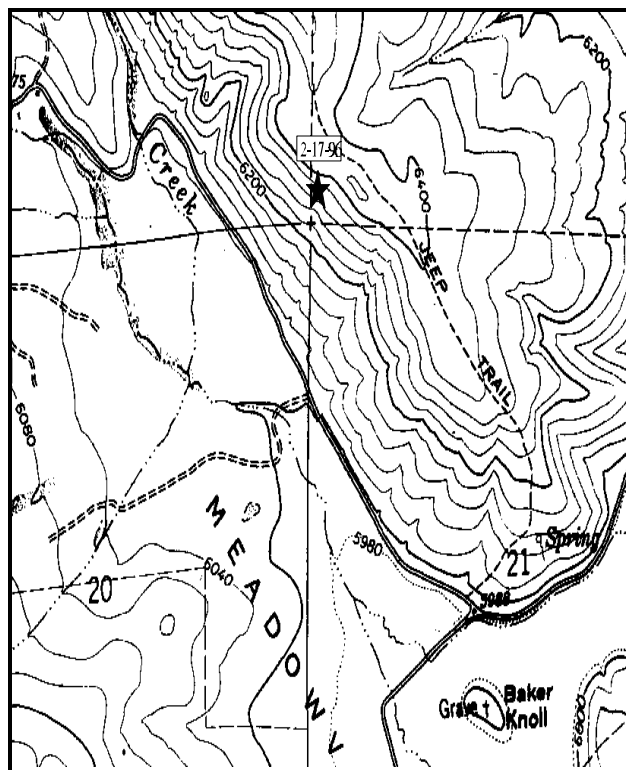
Study site name: Meadowville. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 161 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

At the intersection of Highway 30 and Meadowville road turn west on Meadowville Road and proceed 2.05 miles. Turn right (north) onto Cook's Road and turn immediately right onto the jeep trail. Proceed 1.1 miles, passing a spring on the right and following the ridgetop, to the witness post in the low spot of a small saddle. Walk 39 paces at 219 degrees magnetic from the witness post to the 0-foot stake. The 0-foot stake of the baseline is marked by browse tag # 7939. The 0-foot stake is also approximately 75 yards from a fence to the west. The baseline runs 161 degrees magnetic. Line three and four dogleg and run parallel to the fence at a bearing of 101 degrees magnetic.



Map Name: Meadowville

Diagrammatic Sketch

Township 13N, Range 5E, Section 16, UTM COOR: 4-66-608E 46-34-899N

DISCUSSION

Trend Study No. 2-17

This site is located on a moderately steep (35%) southwest facing slope overlooking the north end of Meadowville Valley, an area considered critical deer winter range. More specifically, the study area appears to be a "key" wintering site. Abundant evidence exists to support this thinking. Pellet group frequency and heavy browse utilization are only two of the factors. Other factors include the presence of two winter killed deer carcasses and five shed antlers in 1984. This area is also grazed by cattle and possibly sheep. Elevation is approximately 6,360 feet. The range type is mountain big sagebrush/grass.

Soil is "Solak Gravelly Loam," a shallow sandstone-limestone-quartzite conglomerate, where bedrock is normally found 10 to 20 inches below the surface. Solak soil is moderately permeable to water but runoff is rapid and the erosion hazard is high. The principal limiting factors are low available water capacity and a limited root zone (Campbell and Lacey, 1982). The soil on the site has a clay loam texture with a neutral pH of 7.1. Effective rooting depth (see methods) was estimated at 16 inches. Rock and pavement are fairly common on the surface and in the profile. Protective ground cover is abundant and erosion is not a problem.

Mountain big sagebrush is dominant even though narrowleaf rabbitbrush and broom snakeweed are more numerous. The sagebrush population is moderately to heavily browsed and has a distinctly decadent appearance with reduced vigor. Density of mature plants has remained similar to 1990, increasing from 200 to 260 plants/acre. However, overall density has declined with each reading. It appears that the decadent component of the population is slowly dying out. Decadent plants numbered 1,466 plants/acre in 1984, 966 by 1990, and 520 in 1996. Percent decadency has slowly declined from 100% in 1984 to 68% in 1990 and 60% in 1996. Currently vigor is poor on over half of the population (58%) and 65% of the decadent sagebrush appear to be dying. Poor vigor noted in 1996 was the result of shriveled leaves and a general poor appearance on affected individuals. Some sagebrush are producing seed and a few seedlings and young were encountered in 1990 and 1996.

Additional forage is available from a few scattered antelope bitterbrush. These shrubs currently number about 200 plants/acre, are heavily hedged and have normal vigor. Percent decadence is low at 10%.

Co-dominant with sagebrush is the increaser, narrowleaf low rabbit brush. It accounts for 36% of the shrub cover with an estimated 1,900 plants/acre. Mature plants average one foot in height with a crown of two feet. Age class structure would indicate a stable population with 95% of the shrubs classified as mature. Broom snakeweed is also abundant at 1,400 plants/acre estimated in 1996. It also appears to have a stable population.

The herbaceous understory is dominated by cheatgrass brome which accounts for 62% of the grass cover and 53% of the herbaceous cover. Perennial grasses are represented by moderate amounts of bluebunch wheatgrass and Indian ricegrass, followed by lesser amounts of Sandberg bluegrass. All of these showed evidence of light to moderate utilization by cattle in 1984. Forb growth is sparse and generally low in stature. The most numerous perennial forbs are Utah milkvetch, arrowleaf balsamroot, thistle, wayside gromwell, and yellow salsify.

1984 APPARENT TREND ASSESSMENT

In spite of a soil that potentially is highly erodible, this site seems relatively stable. The current rate of erosion is slow but could easily become

greater, especially if the dominant big sagebrush cover were to be seriously reduced. Vegetatively, there are some problems which may indicate a declining trend. Most significant is the decadent age structure of mountain big sagebrush and an apparent increaser is broom snakeweed, an undesirable increaser. The principal causative factor is probably heavy game and livestock use and the associated trampling damage. This is a rather fragile, low potential site that requires more careful management to maintain a stable trend.

1990 TREND ASSESSMENT

As in 1984, there is still a high and increasing population of undesirable increasers and a high percentage of decadent plants in the sagebrush population. However, where all the sagebrush were classified as decadent in 1984, now 20% of the population is seedling and young plants. Sagebrush canopy cover is 6%. Sagebrush population decreased by 34%. Bitterbrush has conversely increased it's numbers by 62%. Despite heavy grazing, total grass frequency increased largely due to increases in bluebunch wheatgrass and Sandberg bluegrass. Cover value for bare ground mostly increased because of litter losses. This could change after we get through the drought and receive "normal" precipitation.

TREND ASSESSMENT

soil - slightly downward, because of more bare soil, most likely drought related

browse - stable to down, lower sagebrush densities, increased broom snakeweed but increases in bitterbrush

herbaceous understory - slight increase, mostly due to grasses

1996 TREND ASSESSMENT

Soil trend is up with an increase in litter cover and a decline in percent bare ground from 17% to 4%. Trend for the key browse species, mountain big sagebrush, is down. Utilization is heavier than in 1990, but still relatively low at only 28%. Reproduction is limited and the proportion of shrubs displaying poor vigor has increased from 28% to 58%. Decadence is still high at 60% but similar to 1990 estimates. The downward trend does not appear to be use related. Undesirable increasers, narrowleaf low rabbitbrush and broom snakeweed, are numerous but do not appear to be increasing further. Trend for the herbaceous understory is stable. Sum of nested frequency of grasses and forbs are similar to 1990. Sum of nested frequency for bluebunch wheatgrass and Indian ricegrass increased significantly while frequency of Sandberg bluegrass declined significantly.

TREND ASSESSMENT

soil - up

browse - down

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 17

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron dasystachyum	5	-	-	2	-	-	-
G	Agropyron spicatum	_a 95	_b 120	_b 146	42	53	58	6.50
G	Bromus tectorum (a)	-	-	367	-	-	98	19.65

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	<i>Oryzopsis hymenoides</i>	61	61	73	28	25	34	3.82
G	<i>Poa pratensis</i>	3	-	3	2	-	1	.03
G	<i>Poa secunda</i>	_a 83	_b 152	_a 89	31	63	38	1.50
G	<i>Sitanion hystrix</i>	5	3	4	3	1	1	.03
Total for Grasses		252	336	682	108	142	230	31.56
F	<i>Achillea millefolium</i>	-	-	5	-	-	3	.04
F	<i>Agoseris glauca</i>	-	4	-	-	3	-	-
F	<i>Alyssum alyssoides</i> (a)	-	-	292	-	-	88	2.44
F	<i>Astragalus utahensis</i>	56	51	34	30	22	19	.48
F	<i>Balsamorhiza sagittata</i>	2	6	4	2	2	2	.39
F	<i>Castilleja chromosa</i>	8	1	4	3	1	2	.01
F	<i>Camelina microcarpa</i> (a)	-	-	2	-	-	2	.01
F	<i>Chaenactis douglasii</i>	1	8	5	1	4	3	.04
F	<i>Cirsium</i> spp.	22	19	25	11	12	12	.39
F	<i>Comandra pallida</i>	1	-	-	1	-	-	-
F	<i>Collinsia parviflora</i> (a)	-	-	3	-	-	1	.00
F	<i>Descurainia</i> spp. (a)	-	-	15	-	-	6	.03
F	<i>Linum lewisii</i>	_a -	_a -	_b 10	-	-	5	.02
F	<i>Lithospermum ruderale</i>	_a 11	_{ab} 16	_b 22	5	8	12	1.00
F	<i>Navarretia intertexta</i> (a)	-	-	3	-	-	1	.00
F	<i>Phlox hoodii canescens</i>	8	4	16	3	2	7	.16
F	<i>Phlox longifolia</i>	-	3	11	-	1	4	.02
F	<i>Polygonum douglasii</i> (a)	-	-	3	-	-	1	.00
F	<i>Sisymbrium altissimum</i> (a)	-	-	3	-	-	1	.03
F	<i>Tragopogon dubius</i>	_a 26	_a 19	_b 49	13	10	27	.54
F	Unknown forb-perennial	-	3	-	-	2	-	-
Total for Forbs		135	134	506	69	67	196	5.63

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

BROWSE TRENDS --

Herd unit 02 , Study no: 17

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	35	4.47
B	Chrysothamnus viscidiflorus stenophyllus	44	3.99
B	Eriogonum microthecum	3	.15
B	Gutierrezia sarothrae	24	.32
B	Opuntia fragilis	7	.27
B	Purshia tridentata	9	1.14
B	Tetradymia canescens	21	.60
Total for Browse		143	10.96

BASIC COVER --

Herd unit 02 , Study no: 17

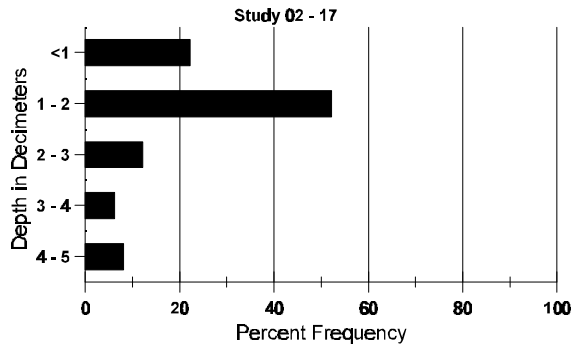
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	388	2.50	11.50	53.66
Rock	210	10.00	9.00	10.95
Pavement	191	13.75	16.25	3.86
Litter	395	66.25	45.00	52.17
Cryptogams	32	.25	1.75	.09
Bare Ground	133	7.25	16.50	4.17

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 17

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.7	59.8 (14.8)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 17

Type	Quadrat Frequency '96
Rabbit	3
Elk	7
Deer	15
Cattle	2

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 17

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Amelanchier alnifolia																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	1	-	-	-	-	-	-	-	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	33		100%			
												'96	0		0%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	96	3	1	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	5	1	-	-	-	-	-	-	-	6	-	-	-	200	24	22	
	96	3	5	5	-	-	-	-	-	-	6	3	4	-	260	25	33	
D	84	-	4	40	-	-	-	-	-	-	23	-	20	1	1466		44	
	90	11	6	2	1	-	-	-	-	-	10	2	1	7	666		20	
	96	11	6	7	2	-	-	-	-	-	5	-	4	17	520		26	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1160		58	
Total Plants/Acre (excluding Dead & Seedlings)												'84	1466	Dec:	100%			
												'90	966		69%			
												'96	860		60%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	6	-	-	-	-	-	-	-	-	6	-	-	-	200	9	11	
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	133	10	10	
	96	84	-	-	6	-	-	-	-	-	90	-	-	-	1800	13	24	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Total Plants/Acre (excluding Dead & Seedlings)												'84	233	Dec:	0%			
												'90	133		0%			
												'96	1900		3%			
<i>Eriogonum microthecum</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80	12	11	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	100		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Gutierrezia sarothrae</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	42	-	-	-	-	-	-	-	-	42	-	-	-	1400		42	
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
Y	84	111	-	-	-	-	-	-	-	-	111	-	-	-	3700		111	
	90	272	6	-	-	-	-	-	-	-	278	-	-	-	9266		278	
	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
M	84	112	-	-	-	-	-	-	-	-	112	-	-	-	3733	7 11	112	
	90	72	-	-	-	-	-	-	-	-	72	-	-	-	2400	9 11	72	
	96	60	-	-	-	-	-	-	-	-	60	-	-	-	1200	7 10	60	
D	84	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	90	8	-	-	-	-	-	-	-	-	7	-	-	1	266		8	
	96	2	-	-	-	-	-	-	-	-	1	-	-	1	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	7599	Dec:	2%			
												'90	11932		2%			
												'96	1400		3%			
<i>Opuntia fragilis</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	96	4	-	-	1	-	-	-	-	-	5	-	-	-	100	5 12	5	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	180		-			
<i>Purshia tridentata</i>																		
Y	84	2	1	-	-	-	-	-	-	-	-	3	-	-	100		3	
	90	-	-	5	-	-	-	-	-	-	5	-	-	-	166		5	
	96	1	1	-	1	-	-	-	-	-	3	-	-	-	60		3	
M	84	-	1	1	-	-	-	-	-	-	-	1	-	1	66	11 49	2	
	90	1	1	3	1	-	-	-	-	-	6	-	-	-	200	13 21	6	
	96	1	2	3	-	-	-	-	-	-	6	-	-	-	120	14 44	6	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	2	-	-	-	-	-	-	-	2	-	-	-	66		2	
	96	-	-	-	-	-	1	-	-	-	-	-	-	1	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	166	Dec:	0%			
												'90	432		15%			
												'96	200		10%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Tetradymia canescens																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	84	3	-	-	-	-	-	-	-	-	3	-	-	-	100	7	12	3
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66	8	15	2
	96	16	3	2	1	-	-	-	-	-	22	-	-	-	440	11	17	22
D	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	2	-	1	-	-	-	-	-	-	2	-	-	1	60		3	
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	25%			
												'90	99		33%			
												'96	600		10%			

TREND STUDY 2-18-96

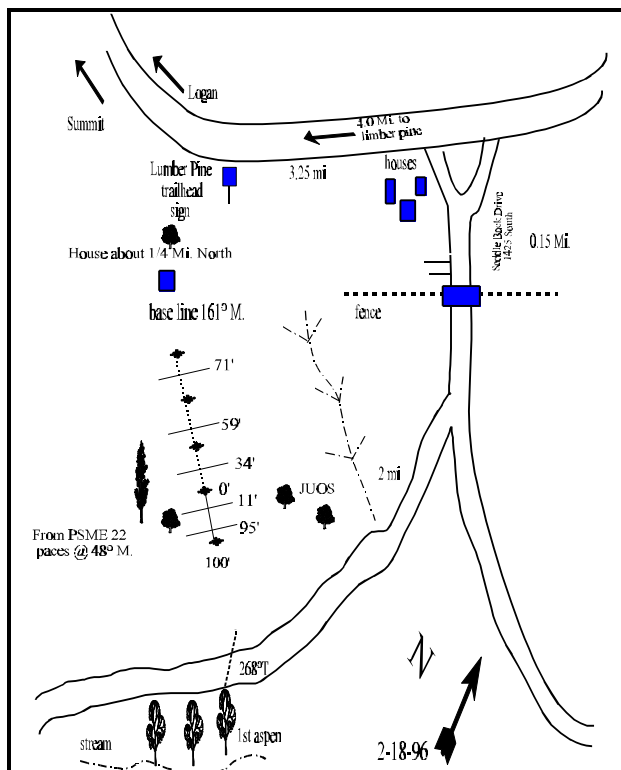
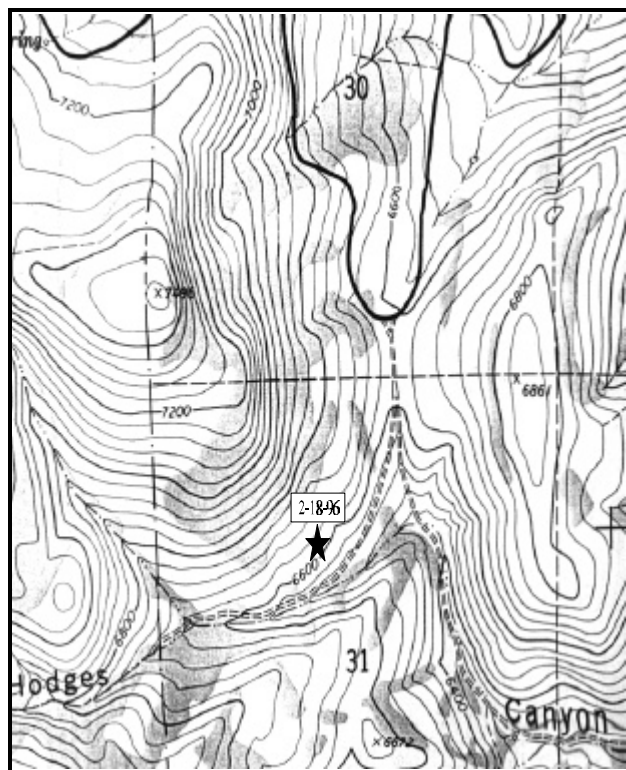
Study site name: Upper Hodges Canyon . Range type: Mixed mountain brush .

Compass bearing: frequency baseline 161 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Bear Lake Summit in Logan Canyon proceed towards Garden City. Begin to note mileage just past the summit at the "Limber Pine" trailhead sign. Proceed 4.0 miles and turn right at the dirt road (Saddle Back Drive, 1435 So.). Proceed 0.15 miles to a gate, go through the gate and take the first road to the right. Travel 0.20 miles to the first aspen tree on the left and stop. Walk at 268 degrees true to a large juniper at the top of the first ridge. Walk west to a PSME. On an azimuth of 48 degrees magnetic from the pine walk 22 paces to the 0-foot stake of the baseline marked by browse tag #7981. Baseline runs at 161 degrees magnetic. The rest of the baseline runs north off the 0-foot baseline at an azimuth of 343 degrees magnetic.



Map Name: Garden City

Diagrammatic Sketch

Township 14N , Range 5E , Section 31 , UTM COOR: 4-64-283E 46-40-459N

DISCUSSION

Trend study No. 2-18

This study is located approximately one mile further up Hodges Canyon than study number #2-15, a location that probably is above the upper limit of severe deer winter range. The primary big game user would be deer and elk but pellet groups of either occur infrequently. Cattle use the area in summer. The study site is a mixed mountain brush type on a gentle (20%) southeast facing slope at 6,640 feet elevation.

Soil characteristics are identical to those described for study 2-15, the lower Hodges Canyon site. The "Yeates Hollow" soil is very deep, well drained and productive. Soil should not be limiting to plant growth. The erosion hazard is only moderate (Campbell and Lacey, 1982). Soil at the site has a loam to a clay loam texture with a moderately acid pH of 6.0. Organic matter is high at 5.8%. Effective rooting depth (see methods) was estimated at almost 13 inches as determined with a soil penetrometer. The study site has a diverse plant community that provides adequate ground cover to help prevent soil erosion.

The key browse species are mountain big sagebrush and antelope bitterbrush which account for 43% of the browse cover. Mountain big sagebrush density was estimated at 1,799 plants/acre in 1984. The population was moderate to heavily hedged, in good vigor and with a decadency rate of 44%. No seedlings were encountered and young plants were infrequent. Density increased by 1990 due to an increase in young and mature plants. Utilization was light to moderate and percent decadency declined to 23%. Vigor was reduced in 44% of the decadent sagebrush however. The sagebrush has maintained a fairly stable mature population since 1990. The number of decadent plants has declined from 23% of the population to 10%, however the number of young have gone down from 15% to 1%. Dead plants, first counted in 1996, indicate that there is one dead plant to every three live plants. This high ratio would support the data which suggest a decline in population density since 1990. Utilization is light to moderate and vigor good on most plants. Recruitment is reduced with only one seedling and one young plant encountered in the density strips.

Bitterbrush has maintained a stable population density since 1984 at around 1,500 plants/acre. Utilization was very heavy in 1984 with 75% of the shrubs displaying heavy use (>60% of twigs browsed). Use was mostly light in 1990, then heavy again in 1996. Vigor continues to be normal and decadency low at 10%.

Serviceberry also produces some preferred forage on the site. Population density is currently 840 plants/acre. Mature plants average just over 3 feet in height with a crown of nearly 4 feet. Heavy use occurred on 67% of the shrubs in 1984. During the 1990 reading use was moderate and vigor was good. However, decadency increased from zero to 66%. By 1996, use was again moderate to heavy and vigor reduced due to a rust infestation. Percent decadency declined however, to 7%. Other shrubs found on the site include mountain snowberry, chokecherry, woods rose, snowbrush ceanothus, and wyeth eriogonum.

The herbaceous understory is diverse and productive with both grasses and forbs making substantial contributions to total forage production. Among grasses, the important species are Kentucky bluegrass, bluebunch wheatgrass, and Sandberg bluegrass. Grasses showed evidence of light use by cattle in 1984, with no species preference apparent. Utilization by livestock was much heavier in 1990 and 1996 making identification difficult. Unutilized grasses included Kentucky bluegrass, and subalpine needlegrass.

Forb composition includes a large number of species, yet only a few are important to monitor. The most abundant forb species are increasers and include mulesears

wyethia, western yarrow, pacific aster, and Fremont geranium. All of these species have increased significantly in sum of nested frequency since 1990. Mulesears is the most abundant forb and an increaser with heavy grazing. It accounts for 70% of the forb cover and 33% of the herbaceous cover. This forb is used occasionally by deer and elk but not usually by livestock (stubbendieck et. al 1986).

1984 APPARENT TREND ASSESSMENT

This site is ecologically stable in almost all respects. The soil surface has an almost complete cover of live vegetation and litter and shows few signs of erosion. In vegetational terms, any potential increase of mulesears wyethia should be closely monitored and checked against any perceived decrease in the key species.

1990 TREND ASSESSMENT

This 6,640 foot elevation site receives year-round use by deer. There is also sign of elk and moose. Cattle were present on this private land when the study was read on July 25, 1990. Perennial grasses had been heavily grazed, making identification difficult. Density and diversity of herbaceous species is high and not significantly changed from 1984. Key browse species, most notably mountain big sagebrush and bitterbrush, show improvements in age class structure reduced heavy use and improved decadency rates. Sagebrush canopy cover averages 9%, bitterbrush cover is 4%. The browse is lightly to moderately hedged.

TREND ASSESSMENT

soil - stable

browse - up

herbaceous understory - slightly improved

1996 TREND ASSESSMENT

Soil trend is slightly up due to a decline in percent bare ground. Vegetation and litter cover are abundant and well dispersed. The browse trend is stable for the key species, mountain big sagebrush and antelope bitterbrush. However, mountain big sagebrush has declined in density since 1990. Sample size was increased in 1996 but the high proportion of dead plants on the site (480 plants/acre) would suggest a decline in sagebrush density has occurred. But, it should be kept in mind that sagebrush only makes up 20% of the browse cover. Utilization is similar to that reported in 1990 with similar vigor but a decline in percent decadency from 23% to 10%. Bitterbrush shows a stable trend with heavier use than was found in 1990. The herbaceous trend is stable for grasses and slightly up for forbs. Sum of nested frequency for perennial grasses remained stable since 1990. However, bluebunch wheatgrass, Kentucky bluegrass, and Sandberg bluegrass have all increased significantly in sum of nested frequency. Forbs increased in sum of nested frequency with western yarrow, pacific aster, sticky geranium, and mulesears wyethia increasing significantly. Unfortunately all of these species are considered increasers under heavy livestock grazing. Overall, trend for the herbaceous understory is slightly up.

TREND ASSESSMENT

soil - up slightly

browse - stable for key species

herbaceous understory - up slightly but dominated by mulesears wyethia

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 18

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	<i>Agropyron spicatum</i>	126	145	168	52	55	58	4.32
G	<i>Agropyron trachycaulum</i>	_a 72	_b -	_b -	32	-	-	-
G	<i>Bromus japonicus</i> (a)	-	-	15	-	-	6	.25
G	<i>Bromus marginatus</i>	28	29	28	14	15	14	.72
G	<i>Bromus tectorum</i> (a)	-	-	128	-	-	40	3.05
G	<i>Carex</i> spp.	_a -	_b 12	_a 6	-	5	2	.03
G	<i>Dactylis glomerata</i>	-	-	3	-	-	1	.03
G	<i>Elymus cinereus</i>	3	2	3	1	1	1	.15
G	<i>Koeleria cristata</i>	_a 63	_b 23	_b 19	28	10	11	.33
G	<i>Melica bulbosa</i>	2	3	2	2	2	1	.00
G	<i>Poa fendleriana</i>	_a -	_b 90	_c 24	-	34	13	.41
G	<i>Poa pratensis</i>	_{ab} 90	_a 78	_b 129	34	35	45	6.44
G	<i>Poa secunda</i>	_a -	_b 11	_c 97	-	6	35	4.33
G	<i>Stipa columbiana</i>	_a 19	_b 113	_a 34	13	46	13	.60
G	<i>Stipa lettermani</i>	-	-	4	-	-	2	.01
Total for Grasses		403	506	660	176	209	242	20.72
F	<i>Achillea millefolium</i>	_a 116	_b 49	_a 105	41	22	40	1.31
F	<i>Agoseris glauca</i>	5	5	-	2	3	-	-
F	<i>Arabis</i> spp.	_a -	_b 24	_a -	-	11	-	-
F	<i>Aster chilensis</i>	_a 27	_b 28	_a 91	11	12	33	1.36
F	<i>Balsamorhiza hookeri</i>	3	1	1	1	1	1	.15
F	<i>Camelina microcarpa</i> (a)	-	-	3	-	-	1	.00
F	<i>Calochortus nuttallii</i>	_a 14	_b 6	_b -	7	2	-	-
F	<i>Cirsium</i> spp.	1	1	-	1	1	-	-
F	<i>Collomia linearis</i> (a)	-	-	10	-	-	4	.02
F	<i>Comandra pallida</i>	21	16	20	9	8	8	.11
F	<i>Collinsia parviflora</i> (a)	-	-	43	-	-	20	.10
F	<i>Crepis acuminata</i>	-	6	5	-	2	2	.03
F	<i>Epilobium brachycarpum</i> (a)	-	-	5	-	-	3	.01
F	<i>Eriogonum umbellatum</i>	-	1	-	-	1	-	-
F	<i>Geranium viscosissimum</i>	24	14	26	13	9	17	1.81
F	<i>Lappula occidentalis</i> (a)	-	-	2	-	-	1	.00
F	<i>Lactuca serriola</i>	-	3	3	-	2	1	.00
F	<i>Linum lewisii</i>	3	1	-	1	1	-	.00
F	<i>Lupinus sericeus</i>	_a 20	_{ab} 9	_b -	10	4	-	.03
F	<i>Machaeranthera canescens</i>	-	1	-	-	1	-	-
F	<i>Navarretia</i> spp.	-	-	3	-	-	1	.00

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	Penstemon humilis	2	1	-	1	1	-	-
F	Penstemon spp.	-	3	5	-	1	2	.03
F	Phlox longifolia	a-	b14	b22	-	8	10	.15
F	Polygonum douglasii (a)	-	-	18	-	-	7	.03
F	Potentilla gracilis	3	-	-	1	-	-	-
F	Senecio multilobatus	-	5	-	-	3	-	-
F	Solidago missouriensis	a-	a-	b12	-	-	5	.27
F	Taraxacum officinale	-	3	8	-	1	3	.01
F	Tragopogon dubius	14	24	20	7	11	8	.16
F	Unknown forb-perennial	a13	b3	b-	6	1	-	-
F	Veratrum californicum	1	-	-	1	-	-	-
F	Viguiera multiflora	-	2	-	-	1	-	-
F	Wyethia amplexicaulis	105	101	124	53	44	54	12.93
Total for Forbs		372	321	526	165	151	221	18.58

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

BROWSE TRENDS --

Herd unit 02 , Study no: 18

T y p e	Species	Strip Frequency	Average Cover %
		'96	'96
B	Amelanchier alnifolia	35	4.27
B	Artemisia tridentata vaseyana	46	6.62
B	Ceanothus velutinus	1	.15
B	Chrysothamnus viscidiflorus stenophyllus	2	-
B	Eriogonum heracleoides	17	.81
B	Mahonia repens	2	.04
B	Prunus virginiana	3	.21
B	Purshia tridentata	53	7.83
B	Rosa woodsii	5	.78
B	Symphoricarpos oreophilus	59	11.19
Total for Browse		223	31.92

BASIC COVER --

Herd unit 02 , Study no: 18

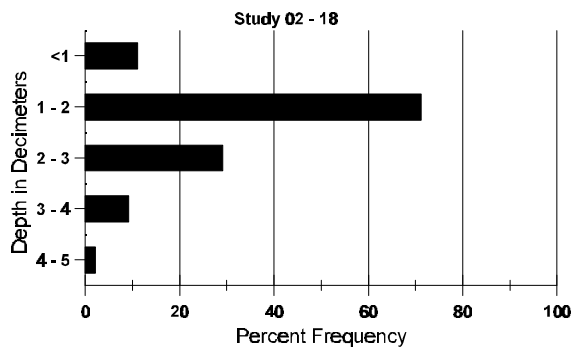
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	370	1.50	5.75	60.86
Rock	71	.25	1.00	2.48
Pavement	61	.50	.25	.30
Litter	397	89.50	80.75	68.50
Cryptogams	20	0	0	.28
Bare Ground	119	8.25	12.25	3.43

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 18

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.5	53.8 (14.8)	6.0	38.9	34.1	27.0	5.8	45.8	243.2	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 18

Type	Quadrat Frequency '96
Elk	1
Deer	8
Cattle	6

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 18

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Amelanchier alnifolia</i>																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	1	-	-	1	-	-	-	66		1	
	96	1	-	-	-	-	-	-	-	-	-	1	-	-	20		1	
M	84	-	1	2	-	-	-	-	-	-	3	-	-	-	200	40	32	3
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66	23	20	1
	96	-	26	12	-	-	-	-	-	-	3	15	20	-	760	38	46	38
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	1	-	2	1	-	-	-	-	4	-	-	-	266		4	
	96	-	1	1	-	1	-	-	-	-	2	-	1	-	60		3	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)											'84	200	Dec :	0%				
											'90	398		67%				
											'96	840		7%				
<i>Artemisia tridentata vaseyana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	5	-	-	-	-	-	1	-	-	6	-	-	-	400		6	
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	9	5	-	-	-	-	-	-	14	-	-	-	933	26	19	14
	90	16	2	-	6	-	-	-	-	-	23	1	-	-	1600	28	42	24
	96	38	21	1	-	-	-	-	-	-	58	-	2	-	1200	27	36	60
D	84	-	7	5	-	-	-	-	-	-	11	1	-	-	800		12	
	90	8	-	1	-	-	-	-	-	-	5	-	1	3	600		9	
	96	1	5	1	-	-	-	-	-	-	3	-	-	4	140		7	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	480		24	
Total Plants/Acre (excluding Dead & Seedlings)											'84	1799	Dec :	44%				
											'90	2600		23%				
											'96	1360		10%				

A G E	YR	Form Class (No. of 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 velutinus</i>																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20	4	13	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	1	-	-	-	-	-	-	-	-	1	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	0%			
												'90	0		0%			
												'96	40		50%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	23	31	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	60		-			
<i>Eriogonum heracleoides</i>																		
S	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	34	-	-	-	-	-	-	-	-	34	-	-	-	2266		34	
	90	2	-	-	1	-	-	-	-	-	2	1	-	-	200		3	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	13	-	-	-	-	-	-	-	-	13	-	-	-	866	28	17	
	90	29	-	-	7	-	-	1	-	-	35	-	2	-	2466	7	12	
	96	20	-	-	-	-	-	-	-	-	20	-	-	-	400	6	12	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	1	-	1	-	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	80		4	
Total Plants/Acre (excluding Dead & Seedlings)												'84	3132	Dec:	0%			
												'90	2666		0%			
												'96	500		8%			
<i>Mahonia repens</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	2	-	-	5	-	-	-	-	-	7	-	-	-	140	6	5	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	140		-			

A G E	YR	Form Class (No. of 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>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	3	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	1	1	-	-	-	-	-	-	-	2	-	-	-	40	45	49	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	100		-			
<i>Purshia tridentata</i>																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	1	2	-	-	-	-	-	-	-	3	-	-	-	200		3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	1	1	-	-	40		2	
M	84	1	1	11	-	-	-	-	-	-	13	-	-	-	866	23	19	
	90	7	4	-	4	2	-	-	-	-	17	-	-	-	1133	25	36	
	96	2	25	36	1	4	-	-	-	-	67	1	-	-	1360	22	35	
D	84	-	1	7	-	-	-	-	-	-	8	-	-	-	533		8	
	90	-	-	-	-	1	-	-	-	-	1	-	-	-	66		1	
	96	-	3	5	-	-	-	-	-	-	7	-	-	1	160		8	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
Total Plants/Acre (excluding Dead & Seedlings)												'84	1599	Dec:	33%			
												'90	1199		6%			
												'96	1560		10%			
<i>Rosa woodsii</i>																		
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	15	10	
	96	2	-	-	6	-	-	-	-	-	8	-	-	-	160	15	8	
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	-			
												'90	66		-			
												'96	160		-			

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Symphoricarpos oreophilus																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	84	18	-	1	-	-	-	-	-	-	19	-	-	-	1266		19	
	90	3	2	3	-	-	-	-	-	-	8	-	-	-	533		8	
	96	7	-	-	1	-	-	-	-	-	6	-	2	-	160		8	
M	84	6	1	1	-	-	-	-	-	-	8	-	-	-	533	32 25	8	
	90	1	4	-	4	2	-	3	-	-	14	-	-	-	933	28 40	14	
	96	52	11	2	32	-	-	-	-	-	83	-	14	-	1940	31 44	97	
D	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	1	1	-	-	-	-	-	-	-	-	1	1	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	1865	Dec:	4%			
												'90	1466		0%			
												'96	2140		2%			

TREND STUDY 2-19-96

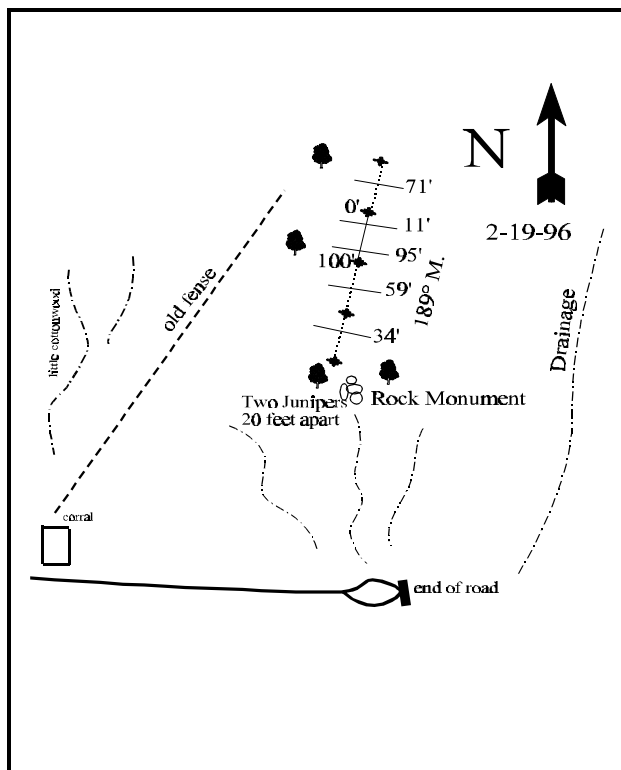
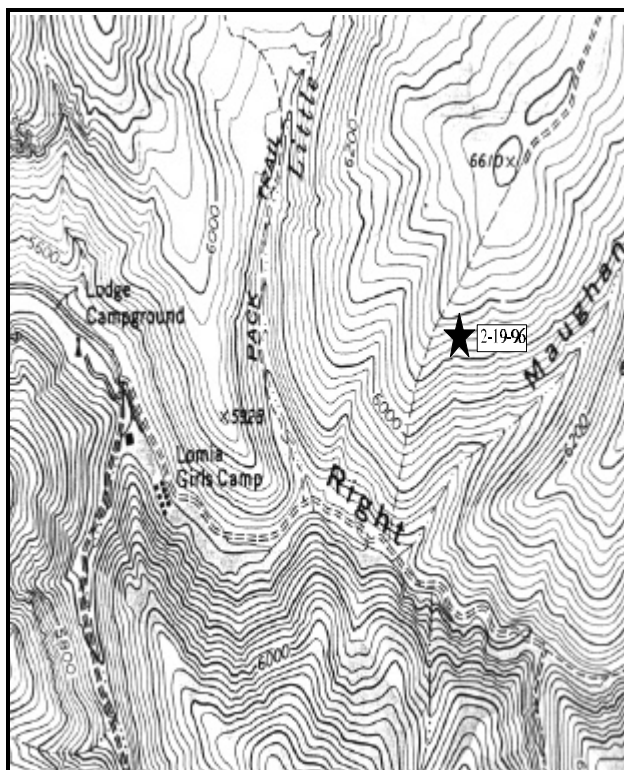
Study site name: Right Fork Logan Canyon. Range type: Bitterbrush.

Compass bearing: frequency baseline 189 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft).

LOCATION DESCRIPTION

Drive up the Right Fork of Logan Canyon. Bear left at the girls camp. Go 0.6 miles to the end of the road just past the corral. Hike up the ridge to the north, going about 3/4 mile towards the ridgeline. Look for a rock monument between two junipers that are 20 feet apart. The baseline runs 189 degrees magnetic. Lines 2 and 3 continue south from the 100 foot baseline. Line 4 runs off the 0-foot baseline stake at 9 degrees magnetic.



Map Name: Temple Peak

Diagrammatic Sketch

Township 12N, Range 3E, Seciton 16, UTM COOR: 4-49-511E 46-25-324N

DISCUSSION

Trend study No. 2-19

This trend study, established in 1990, samples an area representative of important elk and deer winter range in the Right Fork of Logan Canyon on south-facing slopes from Cowley to Willow Canyon. Elk pellet groups were common with a quadrat frequency of 47% in 1996. Deer sign is moderately abundant with a quadrat frequency of 22%. The site is on a south-southeast aspect with a 35% slope and an elevation of 6,100 feet. The land is administered by the U.S. Forest Service. Cows were allowed into the Little Cottonwood drainage on the date of study establishment (6/25/90), but they did not appear to utilize the upper slopes that year. During the 1996 reading, cattle sign was noted on the study site.

The soil is moderately shallow and very rocky with a slightly alkaline pH of 7.6. Texture is a clay loam. Effective rooting depth (see methods) was estimated at about 8.5 inches with a layer of rock encountered at that depth. The presence of deeper rooted shrubs on the site would suggest that this layer of rock has cracks and long fissures, allowing deeper rooted plants to become established. Rock and pavement comprised 27% of the ground cover. Vegetative cover from grasses and forbs and litter is good leaving 13% bare ground cover which had a value of 19% in 1990. Some soil movement occurs but it is not excessive.

The key browse species is bitterbrush. Density is low at only 232 plants/acre in 1990 and 320 in 1996. The increase in density is mostly the result of the larger sample used in 1996. All of the bitterbrush sampled in 1990 displayed heavy use and percent decadency was high at 71%. Use was more moderate in 1996 with heavy use reported on 44% of the population. Decadency declined to 18%. Vigor is normal with good leader growth. The population appears stable but an obvious die off has occurred, illustrated by the high proportion of dead plants in the population (1 dead to every 2 live).

A few serviceberry and mountain big sagebrush offer additional preferred forage on the site but they occur in small numbers. Snowberry is abundant but mostly unutilized. The large decline in snowberry density is mostly the result of the larger sample used in 1996 for there were no dead plants found in the population to explain the large drop in the population. As explained in other site writeups, the much larger sample design gives significantly better population estimates for species that characteristically are clumped or discontinuous in their respective distributions. Junipers are scattered across the slope.

The site supports a vigorous stand of bluebunch wheatgrass, but bulbous bluegrass is the most abundant species making up 60% of the grass cover. Annual grasses (mostly cheatgrass) are also present but accounts for only 4% of the grass cover. Perennial forbs on the site are primarily early season species, yet are numerous enough to provide some spring forage. By far the most abundant perennial forb is gray lomatium which makes up 71% of the forb cover.

1990 APPARENT TREND ASSESSMENT

The persistent, long-lived bitterbrush endure heavy use every year. There appears to be no recruitment at this time and the dead plants are evidenced by numerous skeletons which have not been replaced. The long term trend appears to be down with the decline of the key browse species. The grasses remain valuable for elk winter forage. There is some soil movement on the steeper slopes, but the soil trend is stable for this type of site.

1996 TREND ASSESSMENT

Trend for soil is up due to an increase in litter cover and a decline in percent bare ground. Trend for the key browse is up. It is clear that the population has declined in the past, but since 1990 heavy use has declined from 100% to 44%, vigor has improved, and percent decadence has declined from 71% to 18%. The increase in population density appears to be due in most part to the larger sample used in 1996. Trend for the herbaceous understory is slightly up for grasses and slightly down for forbs. Trend is considered stable overall. Composition of the grasses could be better. Bulbous bluegrass is still dominant and has increased significantly in its sum of nested frequency value.

TREND ASSESSMENT

soil - up

browse - up, but browse has a relatively low density while only providing 12% of the total vegetative cover, making it a minor component of the plant community

herbaceous understory - stable but composition could be better

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 19

T Y P e	Species	Nested Frequency		Quadrat Frequency		Average Cover % '96
		'90	'96	'90	'96	
G	Agropyron spicatum	161	*229	67	85	10.63
G	Bromus brizaeformis (a)	-	14	-	7	.23
G	Bromus tectorum (a)	-	148	-	52	1.09
G	Poa bulbosa	208	*342	75	99	17.93
G	Poa pratensis	2	-	1	-	-
G	Poa secunda	144	*10	62	5	.07
Total for Grasses		515	743	205	248	29.97
F	Alyssum alyssoides (a)	-	179	-	67	.48
F	Allium spp.	5	-	2	-	-
F	Aster chilensis	-	3	-	1	.15
F	Astragalus utahensis	8	2	3	2	.06
F	Balsamorhiza sagittata	-	1	-	1	.71
F	Chaenactis douglasii	-	-	-	-	.00
F	Cirsium spp.	-	1	-	1	.00
F	Collomia linearis (a)	-	3	-	1	.00
F	Comandra pallida	2	5	1	3	.07
F	Collinsia parviflora (a)	-	6	-	2	.03
F	Crepis acuminata	89	29	42	15	.62
F	Descurainia spp. (a)	-	2	-	1	.00
F	Epilobium brachycarpum (a)	-	7	-	3	.01
F	Erodium cicutarium (a)	-	3	-	1	.00
F	Hackelia patens	2	-	1	-	-

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover % '96
		'90	'96	'90	'96	
F	Lactuca serriola	15	4	6	3	.01
F	Lomatium grayi	234	205	84	80	7.01
F	Machaeranthera canescens	-	2	-	1	.03
F	Penstemon humilis	9	17	4	9	.12
F	Phacelia spp.	-	2	-	1	.03
F	Sisymbrium spp. (a)	16	-	6	-	-
F	Tragopogon dubius	7	*48	4	27	.42
F	Veronica biloba (a)	-	3	-	1	.00
Total for Forbs		387	522	153	220	9.81

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

BROWSE TRENDS --

Herd unit 02 , Study no: 19

T y p e	Species	Strip Frequency '96	Average Cover % '96
B	Amelanchier alnifolia	3	.18
B	Artemisia tridentata vaseyana	6	.03
B	Chrysothamnus viscidiflorus stenophyllus	15	.48
B	Mahonia repens	4	.21
B	Purshia tridentata	12	2.35
B	Sambucus cerulea	2	.38
B	Symphoricarpos oreophilus	8	2.04
Total for Browse		50	5.68

BASIC COVER --

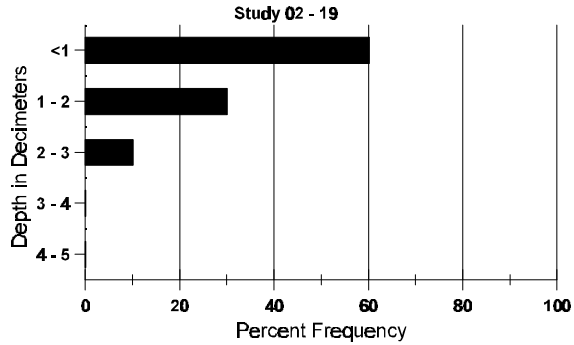
Herd unit 02 , Study no: 19

Cover Type	Nested Frequency '96	Average Cover %	
		'90	'96
Vegetation	369	10.00	42.68
Rock	322	31.50	23.11
Pavement	255	12.50	3.64
Litter	392	26.25	30.87
Cryptogams	102	1.00	1.75
Bare Ground	248	18.75	13.05

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

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
8.4	63.4 (10.3)	7.6	27.6	34.4	38.0	4.2	13.8	115.2	.7

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 02 , Study no: 19

Type	Quadrat Frequency '96
Elk	47
Deer	22
Cattle	1

BROWSE CHARACTERISTICS --
 Herd unit 02 , Study no: 19

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Amelanchier alnifolia</i>																		
S	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	-	-	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
Y	90	-	1	1	-	-	-	-	-	-	1	1	-	-	66	-	-	2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	1	-	-	1	-	-	-	-	-	-	2	-	40	25	28	2
D	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	1	-	-	-	-	-	-	-	-	1	-	20	-	-	1
Total Plants/Acre (excluding Dead & Seedlings)												'90	66	Dec:		0%		
												'96	60			33%		

A G E	YR	Form Class (No. of 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	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	4	1	-	-	-	-	-	-	-	5	-	-	-	100	28	45	
D	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	1	-	-	-	-	-	-	-	-	-	1	-	20		1	
X	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	120		6	
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	0%			
												'96	160		13%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	90	6	5	4	1	-	-	-	-	-	16	-	-	-	533	13	15	
	96	15	-	-	-	-	-	-	-	-	15	-	-	-	300	15	26	
Total Plants/Acre (excluding Dead & Seedlings)												'90	599	Dec:	-			
												'96	340		-			
<i>Mahonia repens</i>																		
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	24	-	-	-	-	-	-	-	-	24	-	-	-	480	3	4	
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	520		-			
<i>Purshia tridentata</i>																		
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	90	-	-	2	-	-	-	-	-	-	2	-	-	-	66	29	56	
	96	-	7	4	-	1	-	-	-	-	12	-	-	-	240	40	74	
D	90	-	-	5	-	-	-	-	-	-	4	-	1	-	166		5	
	96	-	-	3	-	-	-	-	-	-	3	-	-	-	60		3	
X	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	160		8	
Total Plants/Acre (excluding Dead & Seedlings)												'90	232	Dec:	72%			
												'96	320		19%			
<i>Sambucus cerulea</i>																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	29	44	
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	40		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Symphoricarpos oreophilus																		
Y	90	-	-	-	2	-	-	5	-	-	7	-	-	-	233		7	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	90	31	5	-	-	-	-	-	-	33	-	3	-	1200	26	21	36	
	96	6	-	-	3	-	-	-	-	8	-	1	-	180	27	50	9	
D	90	2	-	1	-	-	-	-	-	3	-	-	-	100			3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
Total Plants/Acre (excluding Dead & Seedlings)												'90	1533	Dec:	7%			
												'96	200		0%			

TREND STUDY 2-20-96

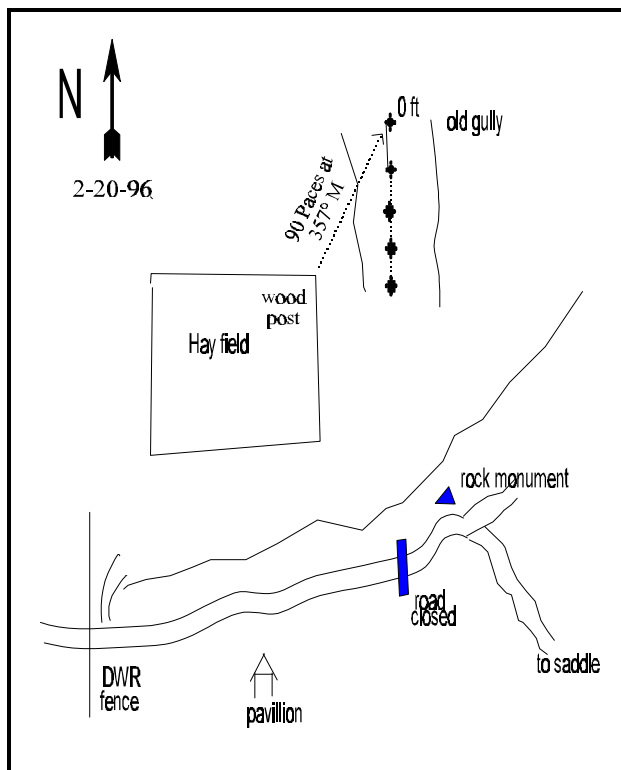
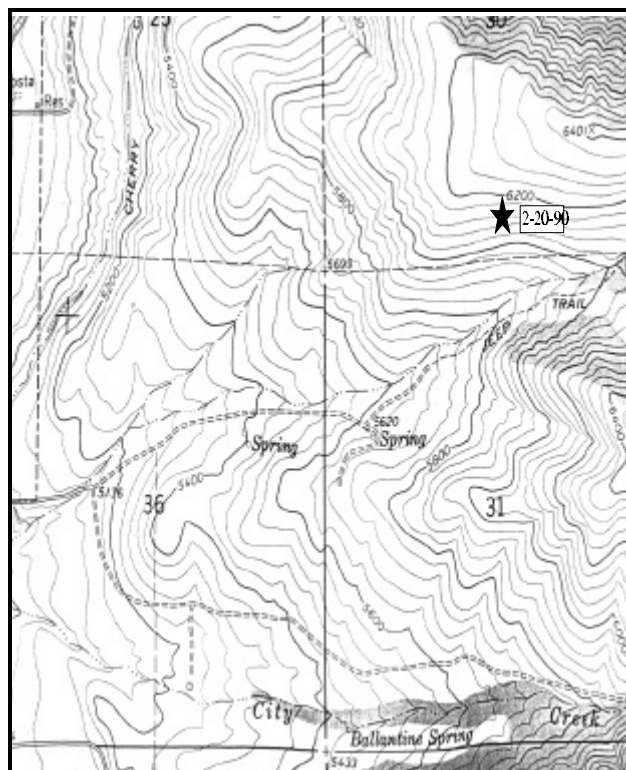
Study site name: Richmond WMA. Range type: Bitterbrush.

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the intersection of 250 East and 400 South in Richmond, go 0.2 miles south on 250 East and turn left between a house and a hayfield. Go east 0.5 miles to a fork, keep left. Go 0.7 miles to a gate at DWR property boundary. If the road is still driveable, continue 0.3 miles up the drainage to the end of the road. There is an old fork, and a rock monument. From the rock pile, walk in a northwest direction to the hayfield. From the northeast corner of the fence surrounding the hayfield, walk 90 paces at 357 degrees magnetic to the 0-foot baseline stake. The site is on the bitterbrush transplant area. The study stakes run southerly at 180°M from the 0-foot baseline stake.



Map Name: Richmond

Diagrammatic Sketch

Township 14N, Range 2E, Section 31, UTM COOR: 4-35-923E 46-40-814N

DISCUSSION

Trend study No. 2-20

This is a relatively "new" study that was set up to monitor the success of a 1990 bitterbrush transplant on the Richmond Wildlife Management Area and to replace a nearby study which was on private land. The site is on a south facing aspect with a slope of 20% to 25%. Elevation is about 6,000 feet. The 5,000 seedlings were planted in March shortly after the snow had melted from the site. Rains in April were beneficial to establishment. On June 26, 1990, a majority of the transplanted bitterbrush seedlings were classified as having good vigor. Dry and dead transplants were also encountered. The bitterbrush had not been browsed and no deer sign was observed on the site. Currently, the site is dominated by annual grasses and some perennial forbs and grass. No wildlife sign was observed but cattle and horses have been utilizing the site.

The soil is moderately deep with an estimated effective rooting depth (see methods) of nearly 15 inches. Parent material is limestone and texture is a clay loam. There is little rock on the surface and in the profile, yet the soil temperature was still relatively high because of the sites slope and aspect, averaging nearly 70°F at a depth of 16 inches. There is high percentage of vegetative and litter cover, due to the abundance of annual species, primarily annual bromes. Bare soil was estimated at 31% in 1990. This was mostly related to the disturbed spots where the bitterbrush was planted. Percent bare ground is currently only 3% and erosion is not a problem.

There was little browse on the site before the transplant took place. A few mountain big sagebrush occur near the site. The density of transplanted bitterbrush was estimated to be 466 seedlings/acre in 1990. Vigor was normal. During the 1996 reading only one mature bitterbrush plant was encountered in the shrub density strips. This is probably indicative of the extremely dry conditions that have persisted since 1990. Estimated density is currently 20 plants/acre. Utilization is light and vigor good.

The herbaceous understory is very abundant, likely one of the reasons why the transplants were not more successful. The grass component is dominated by Japanese brome and cheatgrass which account for 99% of the grass cover. Perennial grasses are represented by small numbers of bluebunch wheatgrass, prairie Junegrass, Kentucky bluegrass, and Sandberg bluegrass. All have quadrat frequencies of less than 5% with all but Sandberg bluegrass having declined in frequency since 1990.

Forbs are diverse and productive but they include several annual and perennial weeds. These forb species include pacific aster, willow weed, curlycup gumweed, oneflower helianthella, prickly lettuce, and yellow salsify. Hooker balsamroot produces 52% of the forb cover and is currently the dominant forb on the site. Grasshoppers are abundant and appear to be utilizing the balsamroot leaves.

1990 APPARENT TREND ASSESSMENT

The success of the transplant depends to a large extent on weather conditions and degree of competition with herbaceous species, although these impacts could be modified by management intervention (watering, weeding). Utilization by big game is more difficult to manage. Browse forage is limited in the area and would be a valuable addition to the winter range. If successful, it could be a good example for future projects. At this early stage, success of the treatment is difficult to predict. Based only on the initial data, the trend for winter range value is upward. Soil movement is negligible, and the trend is stable.

1996 TREND ASSESSMENT

The soil trend is up with a decline in percent bare ground from 31% to 3% and an increase in litter cover from 46% to 75%. Unfortunately the increase in litter cover is primarily from annual and biannual weeds which provide intense competition with the transplanted bitterbrush. The browse trend is down after the transplant. The post treatment density of 466 seedling bitterbrush has declined to only 20 mature plants/acre. There is not enough browse on the site to support wintering deer. The herbaceous trend is also down. Sum of nested frequency for perennial grasses has declined by 82%. Annual grasses were not included in the 1990 sample, but they currently dominate the grass component by providing 99% of the grass cover. It appears that perennial grasses could soon be eliminated on the site due to competition with annuals. Sum of nested frequency for perennial forbs have increased slightly since 1990 due to significant increases in the sum of nested frequencies for one flower helianthella, prickly lettuce, pacific aster, and yellow salsify, all of which are weedy increasers. It will be practically impossible to get browse seedlings or transplants to become establish without controlling the abundant weedy herbaceous understory.

TREND ASSESSMENT

soil - up

browse - down with few transplants surviving to become mature plants

herbaceous understory - down with perennial grasses declining and weedy annual and biennial grasses and forbs dominating

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 20

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover % '96
		'90	'96	'90	'96	
G	Agropyron spicatum	20	12	9	4	.19
G	Bromus japonicus (a)	-	364	-	97	22.11
G	Bromus tectorum (a)	-	108	-	35	2.23
G	Koeleria cristata	-	-	-	-	.00
G	Melica bulbosa	15	*-	7	-	-
G	Poa pratensis	74	*4	35	1	.03
G	Poa secunda	-	4	-	2	.03
Total for Grasses		109	492	51	139	24.60
F	Achillea millefolium	3	-	1	-	-
F	Achillea millefolium	-	3	-	1	.00
F	Agoseris glauca	13	18	6	8	.14
F	Alyssum alyssoides (a)	-	95	-	39	.24
F	Artemisia ludoviciana	2	2	1	1	.15
F	Aster spp.	-	21	-	8	.28
F	Astragalus spp.	6	-	3	-	-
F	Balsamorhiza hookeri	169	*123	75	59	15.10
F	Collomia linearis (a)	-	3	-	1	.03
F	Crepis acuminata	8	-	4	-	-

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover % '96
		'90	'96	'90	'96	
F	<i>Epilobium brachycarpum</i> (a)	-	232	-	83	7.38
F	<i>Erodium cicutarium</i> (a)	-	15	-	7	.13
F	<i>Grindelia squarrosa</i>	-	20	-	9	.71
F	<i>Hackelia patens</i>	-	1	-	1	.03
F	<i>Helianthella uniflora</i>	-	26	-	12	1.45
F	<i>Lappula occidentalis</i> (a)	-	7	-	4	.05
F	<i>Lactuca serriola</i>	20	*98	12	41	1.05
F	<i>Lithospermum ruderales</i>	7	3	5	1	.06
F	<i>Lomatium grayi</i>	120	*10	53	4	.16
F	<i>Lupinus argenteus</i>	19	*-	11	-	-
F	<i>Navarretia intertexta</i> (a)	-	4	-	2	.01
F	<i>Phlox longifolia</i>	-	2	-	1	.00
F	<i>Polygonum douglasii</i> (a)	-	18	-	8	.04
F	<i>Tragopogon dubius</i>	3	*104	1	48	1.28
F	<i>Veronica biloba</i> (a)	-	28	-	12	.08
F	<i>Viola</i> spp.	10	*-	7	-	-
F	<i>Wyethia amplexicaulis</i>	-	*12	-	4	.59
Total for Forbs		380	845	179	354	29.02

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

BROWSE TRENDS --

Herd unit 02 , Study no: 20

Type	Species	Strip Frequency '96	Average Cover % '96
B	<i>Artemisia tridentata vaseyana</i>	1	-
B	<i>Purshia tridentata</i>	1	.03
Total for Browse		2	.03

BASIC COVER --

Herd unit 02 , Study no: 20

Cover Type	Nested Frequency '96	Average Cover %	
		'90	'96
Vegetation	391	14.00	56.94
Rock	133	7.00	5.10
Pavement	51	1.75	.43
Litter	400	46.25	75.11
Cryptogams	-	0	0
Bare Ground	131	31.00	2.84

SOIL ANALYSIS DATA --
 Herd Unit 02, Study no: 20

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.7	69.2 (16.1)	7.0	24.6	40.4	35.0	2.8	39.5	329.6	.6

PELLET GROUP FREQUENCY --
 Herd unit 02 , Study no: 20

Type	Quadrat Frequency '96
Horse	1
Cattle	1

BROWSE CHARACTERISTICS --
 Herd unit 02 , Study no: 20

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	19	24	1
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	20		-			
<i>Purshia tridentata</i>																		
S	90	13	-	-	1	-	-	-	-	-	13	-	-	1	466			14
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	19	19	1
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	20		-			
<i>Rosa woodsii</i>																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20	21	0
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	0		-			

TREND STUDY 2-21-96

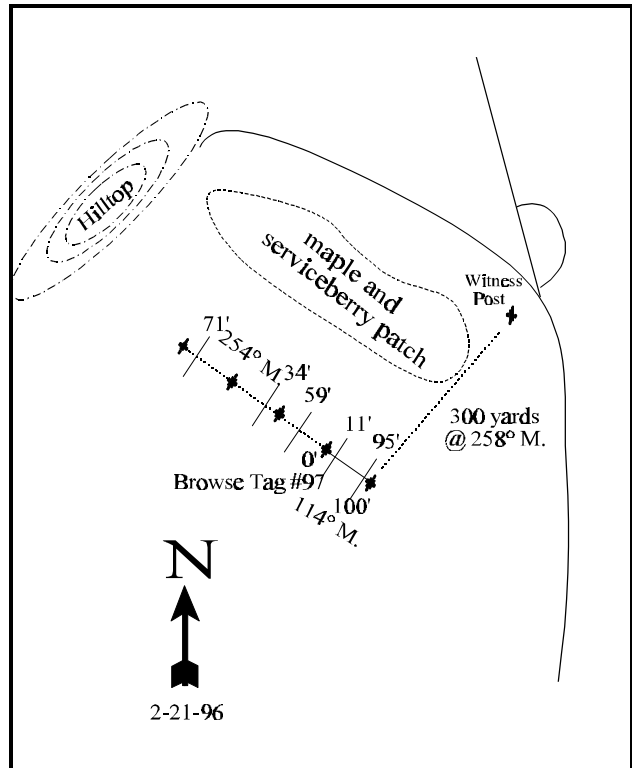
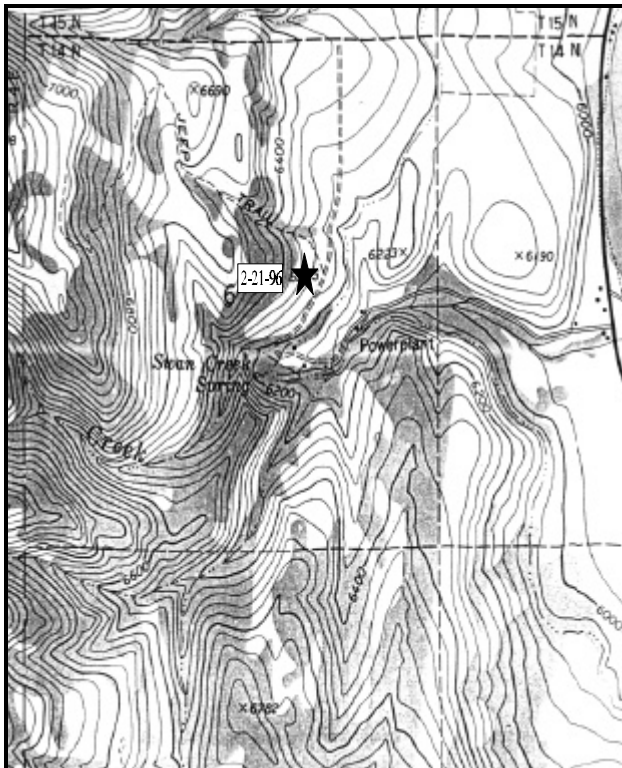
Study site name: Swan Creek. Range type: Curlleaf mountain mahogany.

Compass bearing: frequency baseline 114 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft).

LOCATION DESCRIPTION

Drive approximately 3.0 miles north of Garden City on US 89. Turn left on 2150 North in Lakota (1 mile south of Idaho border). Go approximately 1 mile on the narrow road up Swan Creek, staying right at 1 major fork. Just past the creek from the spring, before the pump house, turn right and go 0.2 miles up a jeep road to another fork. Park here, then walk up across the slope 300 yards at 258 degrees magnetic to the 100-foot baseline stake. The 0-foot baseline stake is 100 feet to the northwest. The rest of the baseline run 254 degrees magnetic off the 0-foot baseline stake. The study site is in the mahogany grove. The study is marked by 2½ foot tall fenceposts.



Map Name: Garden City

Diagrammatic Sketch

Township 14N, Range 5E, Section 6, UTM COOR: 4-64 349E 46-48 518N

DISCUSSION

Trend study No. 2-21

This site was established on DWR property in the Swan Creek drainage. It contains areas that receive significant use by wintering elk, deer, and moose. The trend study is located on a curlleaf mountain mahogany hillside with an associated understory of bitterbrush, serviceberry, mountain snowberry, and mountain big sagebrush. The range type provides excellent cover and forage. The site has a southeast aspect with a 30% slope and an elevation of 6,400 feet. It is representative of the more heavily used type on the DWR property, as the higher east-facing slopes have more snow cover. The ridge top is a rocky, windblown bedding area for elk. Deer and elk pellet groups are fairly abundant with current (1996) quadrat frequencies of 32% and 27% respectively. The DWR owns only a portion of the section. The remainder is privately owned and used for cabins, recreation, and limited agriculture.

The soil has a loam texture with a slightly alkaline pH of 7.5. It is relatively shallow with an estimated effective rooting depth (see methods) of only 10 inches. However, deeper rooted shrubs like curlleaf mountain mahogany are growing on the site. This would suggest that the rooting depth is not restricted in some places. The soil is rocky on the surface and throughout the profile with bedrock layers exposed on the slope that look like steps. Rock cover is about 23%. The site has good litter and vegetative ground cover, where together it equals 88% of the total cover.

The site is dominated by a stand of relatively large curlleaf mountain mahogany which provide nearly 19% overhead canopy cover. Estimated density was 166 plants/acre in 1990, 80% of which are mature trees which are mostly unavailable to browsing. Seedlings and young were uncommon. During the 1996 reading, 86% of the trees were classified as mature. One third of the mature mahogany were determined as unavailable due to height and being highlined. The available plants show moderate to heavy hedging, but retain good vigor. Point-center quarter data estimated 148 mahogany/acre with an average diameter of just over 4½ inches.

Important understory shrubs include serviceberry, mountain big sagebrush, and bitterbrush. Serviceberry is moderately abundant with 840 plants/acre estimated in 1996. It is somewhat hedged and has a stable population. Vigor is reduced, however due to an infestation of rust. Mountain big sagebrush and bitterbrush occur in small numbers, are lightly hedged, and appear to have stable populations.

Bluebunch wheatgrass and Sandberg bluegrass are prominent in the understory. However, annual brome grasses (Japanese and cheatgrass brome), account for 62% of the grass cover. Forbs are moderately diverse but not abundant. The only common species of perennial forbs include arrowleaf balsamroot and rock goldenrod which provides 75% of the forb cover.

1990 APPARENT TREND ASSESSMENT

The vegetative trend for big game winter range values on this diverse browse site is currently stable. The soil condition is good, and the trend is also stable. The browse trend appears stable but the increaser species should be closely monitored. The herbaceous component is adequate but composition could be better.

1996 TREND ASSESSMENT

Trend for soil appears up due to a decline in bare ground from 15% to 5%. Vegetation and litter cover are abundant and erosion is not a problem on this

site. The browse trend appears stable for the key species, curlleaf mountain mahogany. Serviceberry, an important understory shrub, also has a stable trend. Trend for the herbaceous understory is stable for grasses but down for forbs. Sum of nested frequency of perennial forbs has declined 50% with most species declining in sum of nested frequency value. Overall, trend for the herbaceous understory is slightly down.

TREND ASSESSMENT

soil - up

browse - stable

herbaceous understory - slightly down for perennial grasses and down for forbs; slightly down overall

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 21

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover % '96
		'90	'96	'90	'96	
G	Agropyron spicatum	286	*222	95	76	6.91
G	Bromus japonicus (a)	-	162	-	51	5.26
G	Bromus tectorum (a)	-	168	-	51	8.59
G	Oryzopsis hymenoides	-	4	-	2	.03
G	Poa bulbosa	-	3	-	3	.09
G	Poa pratensis	-	1	-	1	.03
G	Poa secunda	55	*105	27	42	1.46
Total for Grasses		341	665	122	226	22.39
F	Achillea millefolium	6	-	3	-	-
F	Achillea millefolium	-	7	-	3	.16
F	Agoseris glauca	25	26	12	14	.12
F	Alyssum alyssoides (a)	-	183	-	70	.99
F	Arabis spp.	10	*-	5	-	-
F	Balsamorhiza sagittata	76	52	34	27	3.67
F	Castilleja chromosa	4	-	2	-	-
F	Camelina microcarpa (a)	-	12	-	8	.06
F	Calochortus nuttallii	19	*-	10	-	-
F	Cirsium spp.	7	4	4	3	.19
F	Comandra pallida	26	*4	11	2	.01
F	Collinsia parviflora (a)	-	9	-	3	.01
F	Crepis acuminata	106	*16	56	8	.19
F	Epilobium brachycarpum (a)	-	2	-	2	.01
F	Eriogonum umbellatum	5	-	2	-	-
F	Hackelia patens	7	*16	3	9	.19
F	Lactuca serriola	3	-	1	-	-
F	Lomatium spp.	5	-	2	-	-
F	Penstemon spp.	25	13	11	6	.13

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover % '96
		'90	'96	'90	'96	
F	<i>Petradoria pumila</i>	58	58	22	27	3.01
F	<i>Phlox longifolia</i>	28	*-	14	-	-
F	<i>Tragopogon dubius</i>	7	9	3	4	.02
F	<i>Veronica biloba</i> (a)	-	*10	-	4	.07
F	<i>Zigadenus paniculatus</i>	9	*-	5	-	-
Total for Forbs		426	421	200	190	8.87

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

BROWSE TRENDS --

Herd unit 02 , Study no: 21

Type	Species	Strip Frequency '96	Average Cover % '96
B	<i>Amelanchier alnifolia</i>	26	2.77
B	<i>Artemisia tridentata vaseyana</i>	7	.30
B	<i>Cercocarpus ledifolius</i>	11	2.38
B	<i>Cercocarpus montanus</i>	1	-
B	<i>Chrysothamnus viscidiflorus stenophyllus</i>	9	.86
B	<i>Eriogonum microthecum</i>	23	.87
B	<i>Gutierrezia sarothrae</i>	32	.69
B	<i>Mahonia repens</i>	29	.40
B	<i>Purshia tridentata</i>	4	.06
B	<i>Symphoricarpos oreophilus</i>	22	.93
Total for Browse		164	9.30

BASIC COVER --

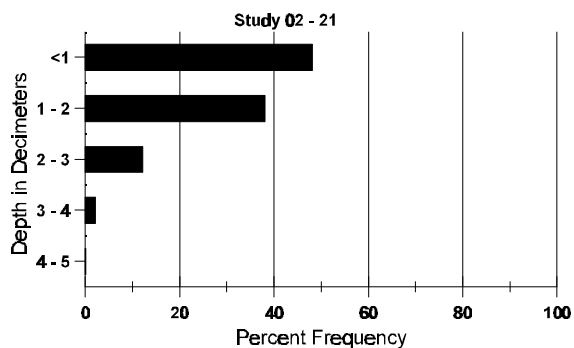
Herd unit 02 , Study no: 21

Cover Type	Nested Frequency '96	Average Cover %	
		'90	'96
Vegetation	366	7.50	39.27
Rock	289	21.25	21.62
Pavement	99	3.00	1.18
Litter	392	53.25	48.38
Cryptogams	48	0	.50
Bare Ground	126	15.00	5.15

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 21

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.3	58.0 (11.9)	7.5	34.6	38.1	27.4	6.6	9.6	230.4	.7

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 21

Type	Quadrat Frequency '96
Rabbit	2
Elk	27
Deer	32

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 21

AGE	YR	Form Class (No. of 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>																		
S	90	1	-	-	1	-	-	-	-	-	1	-	1	-	66			2
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	90	6	6	-	1	1	-	-	-	-	13	-	1	-	466			14
	96	7	3	-	-	-	-	-	-	-	8	2	-	-	200			10
M	90	1	8	1	-	-	-	-	-	-	7	3	-	-	333	28	17	10
	96	4	16	5	-	-	-	-	-	-	15	10	-	-	500	18	31	25
D	90	-	-	2	-	-	-	-	-	-	-	2	-	-	66			2
	96	1	4	2	-	-	-	-	-	-	2	1	1	3	140			7
X	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)											'90	865	Dec:	8%				
											'96	840		17%				

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
S	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	2	-	-	-	-	-	-	-	-	2	-	-	40		2		
M	90	1	-	-	-	-	-	-	-	-	1	-	-	33	26	17	1	
	96	1	2	-	-	-	-	-	-	-	2	-	-	60	10	22	3	
D	90	-	1	1	-	-	-	-	-	-	2	-	-	66		2		
	96	2	2	-	-	-	-	-	-	-	4	-	-	80		4		
X	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	-	-	-	-	-	-	-	-	-	-	-	280		14		
Total Plants/Acre (excluding Dead & Seedlings)												'90	99	Dec:	67%			
												'96	180		44%			
<i>Cercocarpus ledifolius</i>																		
S	90	1	-	-	-	-	-	-	-	-	1	-	-	33		1		
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Y	90	-	-	1	-	-	-	-	-	-	1	-	-	33		1		
	96	-	-	2	-	-	-	-	-	-	2	-	-	40		2		
M	90	-	-	-	-	-	-	4	-	-	4	-	-	133	157	152	4	
	96	1	4	3	-	-	-	-	4	-	11	-	-	240	11	24	12	
X	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	-	-	-	-	-	-	-	-	-	-	-	20		1		
Total Plants/Acre (excluding Dead & Seedlings)												'90	166	Dec:	-			
												'96	280		-			
<i>Cercocarpus montanus</i>																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	-	-	1	-	-	-	-	-	-	1	-	-	20	36	54	1	
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	20		-			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	1	-	-	-	-	-	-	-	-	1	-	-	20		1		
M	90	-	-	1	-	-	-	-	-	-	1	-	-	33	10	10	1	
	96	11	1	-	2	-	-	-	-	-	14	-	-	280	14	24	14	
D	90	1	-	-	-	-	-	-	-	-	1	-	-	33		1		
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Total Plants/Acre (excluding Dead & Seedlings)												'90	66	Dec:	50%			
												'96	300		0%			
<i>Eriogonum microthecum</i>																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	21	1	-	1	-	-	-	-	-	23	-	-	460	14	19	23	
D	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	3	1	-	-	-	-	-	-	-	3	-	-	80		4		
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	0%			
												'96	540		15%			

A G E	YR	Form Class (No. of 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	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	90	10	-	-	-	-	-	-	-	-	10	-	-	-	333		10	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	90	54	-	-	-	-	-	-	-	-	54	-	-	-	1800	11 16	54	
	96	49	-	-	1	-	-	-	-	-	50	-	-	-	1000	8 10	50	
D	90	2	-	-	-	-	-	-	-	-	1	-	1	-	66		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)											'90	2199	Dec:	3%				
											'96	1100		0%				
<i>Mahonia repens</i>																		
Y	90	24	2	-	1	-	-	-	-	-	27	-	-	-	900		27	
	96	51	-	-	-	-	-	-	-	-	51	-	-	-	1020		51	
M	90	46	-	-	14	-	-	-	-	-	60	-	-	-	2000	4 4	60	
	96	60	-	-	8	-	-	-	-	-	68	-	-	-	1360	5 6	68	
Total Plants/Acre (excluding Dead & Seedlings)											'90	2900	Dec:	-				
											'96	2380		-				
<i>Purshia tridentata</i>																		
Y	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	90	2	1	-	-	-	-	-	-	-	3	-	-	-	100	11 12	3	
	96	-	4	-	-	-	-	-	-	-	4	-	-	-	80	7 20	4	
Total Plants/Acre (excluding Dead & Seedlings)											'90	133	Dec:	-				
											'96	80		-				
<i>Symphoricarpos oreophilus</i>																		
S	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	90	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	90	15	2	-	3	-	-	-	-	-	17	-	3	-	666	19 17	20	
	96	20	-	-	-	-	-	-	-	-	18	2	-	-	400	14 23	20	
D	90	3	-	-	-	-	-	-	-	-	2	-	1	-	100		3	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)											'90	932	Dec:	11%				
											'96	600		3%				

TREND STUDY 2-22-96 (old 4-1)

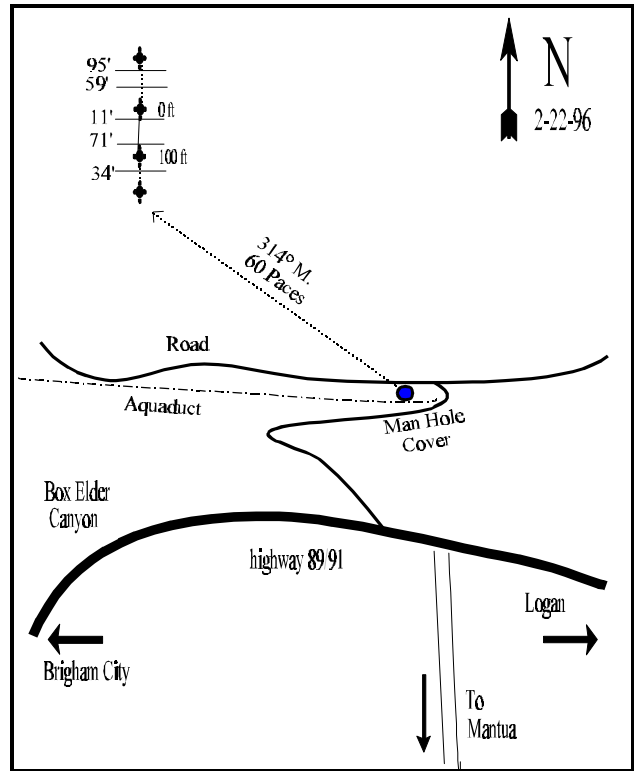
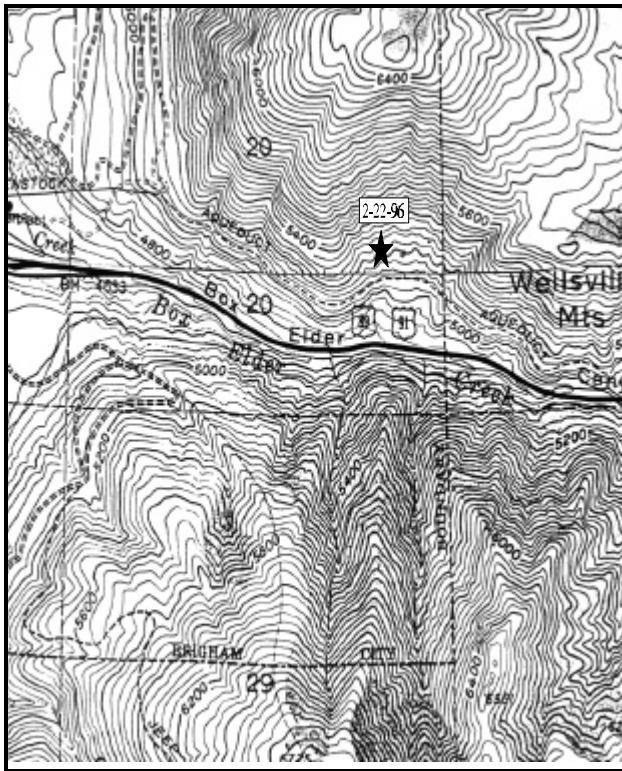
Study site name: Box Elder Canyon. Range type: Mixed mountain brush.

Compass bearing: frequency baseline 165 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 71ft), line 2 (34ft), line 3 (59 & 95ft).

LOCATION DESCRIPTION

From the westernmost Mantua turnoff on U.S. 89 in Box Elder Canyon, travel east for 0.1 miles to a left-hand (i.e., north) turn. Proceed on this road for 1.2 miles in a generally westerly direction. Stop. From the manhole cover on the left hand side of the road, walk 60 paces on an azimuth of 314 degrees magnetic to the 200-foot mark of the baseline. Walk 200 feet to the north to the 0-foot baseline stake. The baseline runs from the 0-foot post to the 100-foot mark on an azimuth of 180 degrees. The 0-foot end of the baseline consists of a green steel fencepost, 12"-18" high and marked by a red browse tag #7992. Line three runs off the 0-foot baseline stake at 345 degrees magnetic.



Map Name: Mount Pisgah, Utah

Diagrammatic Sketch

Township 9N, Range 1W, Section 20, UTM COOR: 4-18-970E 45-94-803N

DISCUSSION

Trend Study No. 2-22 (4-1)

This study samples a moderately steep (65% to 70%), rocky south facing slope in Box Elder Canyon. Deer are known to use this and similar sites on the north side of the canyon throughout the winter. Elevation of the site, about midway up the canyon, is approximately 5,160 feet. The site supports a limited browse resource with deer and elk more likely to move through the area than spend much time on the steep talus covered slope. Some of the few preferred browse species were heavily hedged in the past, but currently browse appear unutilized. Pellet groups of deer and elk were noted in small numbers along trails. This is a poor site that should be moved to a better location with more desirable populations of browse.

The slopes in Box Elder Canyon are classified as "Foxol Rock Outcrop Complex," an excessively drained, shallow, and slightly acid soil. These soils have poor water holding capability and contain large quantities of quartzite rock (Chadwick et al. 1975). This study site is very steep and in most places resembles a "talus" slope because of high rock content. Plant cover is rather poor and the erosion rate appears to be high. Rock cover has ranged from 67% in 1984 to 54% in 1996. No bare ground is exposed. No soil sample was collected from the site due to the lack of soil and no rock index measurements were taken because all rock is right on the surface. Surface soil temperatures are high.

Browse composition is considerably depleted from former times. Historically, this area supported mixed mountain brush and big sagebrush/grass communities. Preferred browse including mountain big sagebrush, bitterbrush, and serviceberry have been replaced by Rocky Mountain smooth sumac, white rubber rabbitbrush, and Oregon hollygrape. Although these shrubs provide a fair amount of forage, it is not of the quality or quantity that mixed mountain brush is normally capable of producing. In future years, we can expect this trend to continue. Currently no mountain big sagebrush occurs on the site and only 60 serviceberry plants/acre were estimated. No reproduction is evident. Utilization of some of the preferred species was moderate to heavy in the past, but current use is light and it appears that deer and elk just pass through the area.

Oregon hollygrape is currently the most abundant browse with an incredible 46,420 plants/acre estimated in 1996. The increase in density from 1984 and 1990 data is due to the larger sample used in 1996. These plants are low growing and unutilized. Rocky Mountain smooth sumac is also abundant with 4,460 plants/acre estimated in 1996. Most plants are unutilized. Mature individuals average just over 2 feet in height. With the extended sample size used in 1996, poison ivy (*Rhus radicans*) was picked up in the sample. Due to classification errors in the field, it was not counted in the shrub density strips. It grew in isolated large clumps of a few hundred low growing plants.

The herbaceous understory is depleted. The only perennial grass on the site is bluebunch wheatgrass. Annual grasses are abundant and account for 78% of the grass cover and 59% of all herbaceous cover. Forbs are depleted. Only three species are abundant. These include Louisiana sage, northern sweetvetch, and dyers woad. It was reported in 1984 that dyers woad was abundant and "in no other area does this plant appear so abundant or so competitive. Although more desirable forbs are present, their abundance will be limited by the continued dominance of dyers woad." For some reason, dyers woad was not included in the sample that year so no data is available. Dyers woad was also abundant in 1990 with a quadrat frequency of 80%. Currently quadrat frequency has declined to 37%. The harsh conditions on the site combined with drought have likely had a negative effect on this herbaceous species.

1984 APPARENT TREND ASSESSMENT

Soil and vegetative trend are down. Accelerated erosion is a fundamental problem whose influence affects not only soil trend but also a reproduction and growth of plants. Another obvious problem is the prevalence of dyers woad.

1990 TREND ASSESSMENT

The very steep, 65%, south-facing slope of Box Elder Canyon has very limited soil and low potential for production of significant quantities of browse forage. Oregon grape is the most frequent species. The sumac is utilized by deer and has a slightly lower population density compared to 1984. The frequency of the only valuable perennial herbaceous species, bluebunch wheatgrass, decreased significantly. Dyers woad dominates the herbaceous understory with a quadrat frequency of 80%. Weeds and other disturbed site species have a competitive advantage on the continually moving, talus-like rocks that make up the ground surface. If there ever was any topsoil on this slope, it is gone now.

TREND ASSESSMENT

soil - down and already poor condition

browse - down and already poor condition

herbaceous understory - down and already poor condition because of loss of much of the bluebunch wheatgrass and dominance of dyers woad

1996 TREND ASSESSMENT

Soil conditions are poor with rock covering most of the ground surface (53%). No bare ground is exposed. Trend is considered stable, yet in poor condition. The browse trend is down with only one preferred species, serviceberry, found on the site. The few shrubs encountered appear unutilized with no reproduction evident. Trend for the herbaceous understory is up slightly due to an increase in sum of nested frequency for bluebunch wheatgrass combined with a 69% decline in nested frequency of dyers woad.

TREND ASSESSMENT

soil - stable but poor condition

browse - down with few preferred species

herbaceous understory - up slightly but depleted

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 22

T Y P e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	a ₁ 154	b ₁ 48	b ₂ 70	62	24	32	3.63
G	Bromus japonicus (a)	-	-	238	-	-	73	9.76
G	Bromus tectorum (a)	-	-	82	-	-	25	2.76
Total for Grasses		154	48	390	62	24	130	16.15
F	Allium spp.	-	3	-	-	3	-	-
F	Artemisia ludoviciana	27	10	24	11	5	10	1.39
F	Astragalus convallarius	-	-	3	-	-	1	.03
F	Cirsium spp.	5	-	3	2	-	1	.38
F	Cymopterus longipes	-	-	-	-	-	-	.00

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	<i>Epilobium brachycarpum</i> (a)	-	-	-	-	-	-	.00
F	<i>Erodium cicutarium</i> (a)	-	-	4	-	-	2	.06
F	<i>Galium aparine</i> (a)	-	-	15	-	-	5	.05
F	<i>Hedysarum boreale</i>	_a 32	_b 6	_{ab} 19	16	3	11	1.20
F	<i>Isatis tinctoria</i>	_a -	_b 218	_c 68	-	80	37	1.40
F	<i>Lactuca serriola</i>	-	14	14	-	6	6	.08
F	<i>Melilotus officinalis</i>	-	-	2	-	-	1	.15
F	<i>Phlox longifolia</i>	-	12	2	-	5	1	.00
F	<i>Tragopogon dubius</i>	_a 33	_b 14	_{ab} 17	17	6	7	.11
Total for Forbs		97	277	171	46	108	82	4.88

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

BROWSE TRENDS --

Herd unit 02 , Study no: 22

T y p e	Species	Strip Frequency '96	Average Cover % '96
B	<i>Amelanchier utahensis</i>	2	.30
B	<i>Chrysothamnus nauseosus consimilis</i>	7	3.75
B	<i>Gutierrezia sarothrae</i>	1	-
B	<i>Mahonia repens</i>	54	10.33
B	<i>Opuntia fragilis</i>	16	.13
B	<i>Prunus virginiana</i>	3	.18
B	<i>Rhus glabra cismontana</i>	62	11.21
B	<i>Rhus radicans</i>	-	1.55
Total for Browse		145	27.47

BASIC COVER --

Herd unit 02 , Study no: 22

Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	316	4.75	11.00	41.72
Rock	352	63.00	58.00	53.36
Pavement	37	3.50	5.00	.73
Litter	376	28.50	26.00	29.24
Cryptogams	4	0	0	.01
Bare Ground	-	.25	0	0

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 22

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

PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 22

Type	Quadrat Frequency '96
Elk	3
Deer	4

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 22

A G E	YR	Form Class (No. of 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>																	
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0
	96	-	2	-	-	-	-	-	-	-	2	-	-	-	40	-	2
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	1	-	-	-	-	-	-	1	-	-	-	66		1
	96	1	-	-	-	-	-	-	-	-	-	-	1	20		1	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	0%		
												'90	132		50%		
												'96	60		33%		
<i>Artemisia tridentata vaseyana</i>																	
D	84	-	-	3	-	-	-	-	-	-	3	-	-	-	200		3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	96	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	200	Dec:	100%		
												'90	0		0%		
												'96	0		0%		

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Chrysothamnus nauseosus consimilis</i>																		
Y	84	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	90	1	-	-	-	-	-	-	-	-	-	-	1	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	5	1	-	-	-	-	-	-	-	6	-	-	-	400	50	33	6
	90	9	-	-	-	-	-	-	-	-	9	-	-	-	600	36	64	9
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180	43	72	9
D	84	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	799	Dec:	17%			
												'90	732		9%			
												'96	180		0%			
<i>Gutierrezia sarothrae</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	15	27	2
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	40		-			
<i>Mahonia repens</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	294	-	-	-	-	-	-	-	-	294	-	-	-	19600		294	
	90	479	-	-	-	-	74	-	-	553	-	-	-	36866		553		
	96	291	-	-	-	-	-	-	-	291	-	-	-	5820		291		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	44	-	-	-	-	-	-	-	44	-	-	-	2933	6	7	44	
	96	2321	-	-	-	-	-	-	-	2321	-	-	-	46420	5	7	2321	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	-	-	-	-	-	-	-	-	-	-	-	240		12		
Total Plants/Acre (excluding Dead & Seedlings)												'84	19600	Dec:	-			
												'90	39799		-			
												'96	52240		-			
<i>Opuntia fragilis</i>																		
Y	84	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8	
	90	11	-	-	-	-	1	-	-	10	-	2	-	800		12		
	96	4	-	-	-	-	-	-	-	4	-	-	-	80		4		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	11	-	-	-	-	5	-	-	13	-	3	-	1066	4	5	16	
	96	22	-	-	1	-	-	-	-	23	-	-	-	460	3	5	23	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	8	-	-	-	-	-	-	-	4	-	3	1	533		8		
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Total Plants/Acre (excluding Dead & Seedlings)												'84	533	Dec:	0%			
												'90	2399		22%			
												'96	540		0%			

A G E	YR	Form Class (No. of 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>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	10	11	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	80		25%			
<i>Rhus glabra cismontana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	10	6	-	-	-	-	-	-	-	16	-	-	-	1066		16	
	90	26	1	1	1	-	-	-	-	-	28	-	1	-	1933		29	
	96	19	-	-	-	-	-	-	-	-	19	-	-	-	380		19	
M	84	1	13	13	-	-	-	-	-	-	27	-	-	-	1800	29	17	27
	90	6	1	1	-	-	-	-	-	-	5	2	1	-	533	31	20	8
	96	183	12	-	-	-	-	-	-	-	195	-	-	-	3900	26	27	195
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	4	-	-	-	-	-	-	-	7	-	-	2	180		9	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	480		24	
Total Plants/Acre (excluding Dead & Seedlings)												'84	2866	Dec:	0%			
												'90	2466		0%			
												'96	4460		4%			

TREND STUDY 2-23-96 (old 4-2)

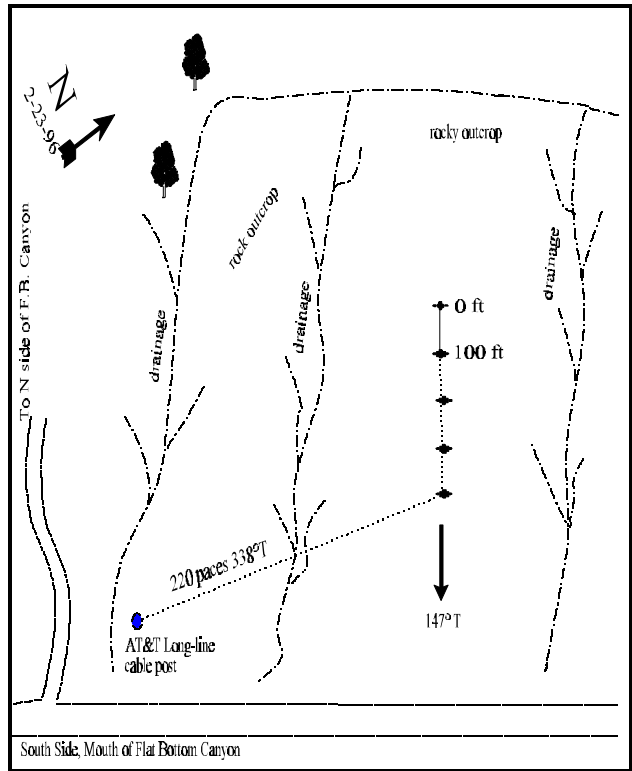
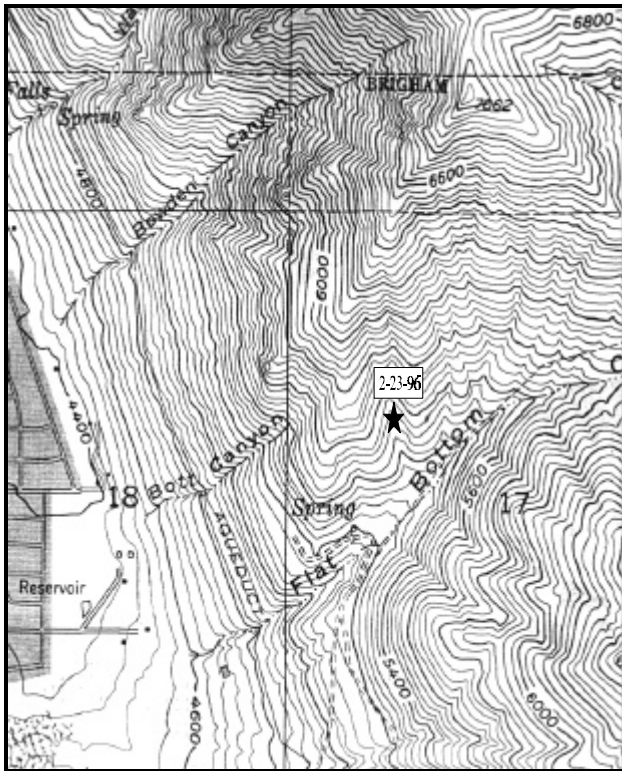
Study site name: Flat Bottom Canyon. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 147 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Proceed to the mouth of Flat Bottom Canyon (route is through DOT, Brigham Gravel Pit and motorcycle area). Four-wheel drive is needed! From mouth of canyon proceed 0.1 miles to AT&T long-line post (#2759) on north side of canyon. From the post walk 220 paces at 338 degrees true to the 400-foot baseline stake. The 0-foot baseline stake is 352 feet at a bearing of 327 degrees. The 0-foot stake is marked with browse tag #7919. Road description above may no longer be passable by truck. Site can be reached by following aqueduct road in Box Elder Canyon (see directions to #4-1) and around bench to Flat Bottom Canyon.



Map Name: Mount Pisgah

Diagrammatic Sketch

Township 9N, Range 1W, Section 17, UTM COOR: 4-17-964E 45-96-925N

DISCUSSION

Trend Study No. 2-23 (4-2)

This study site is on a moderately steep (50%) south facing slope in Flat Bottom Canyon, located east of Brigham City. Utilized by deer in winter and cattle in summer, the study area produces relatively little forage. A very shallow soil almost certainly limits plant growth and plant densities.

The soil is shallow and very rocky with a loam texture and a moderately acid pH of 5.9. Effective rooting depth (see methods) was estimated at only 7.1 inches in 1996. Depth measurements are likely an underestimate due to the difficulty sampling with the soil penetrometer in the extremely rocky soil. Parent material is quartzite. Effective moisture on the site is limited by the convex steep and rocky slope. In addition, soil temperature is relatively high averaging 69°F at 9 inches. Soil erosion is inevitable but not currently serious due to the abundant rock and herbaceous vegetation cover.

This site currently is dominated by annual grasses and weedy forbs. Browse is a minor component, consisting chiefly of a low-growing population of mountain big sagebrush. Density was estimated at 2,232 plants/acre in 1984, nearly half of which were young plants. The average mature plant measured only 6 inches in height, obviously stunted by the harsh conditions of the site. By 1990, density was determined to be 566 plants/acre and by 1996, only 200 plants/acre were estimated. This most recent drop in density cannot be explained by heavy use for there were very few dead plants found on the site. Therefore, this last downward change in the population could mostly be due to the larger sample size giving a more accurate estimate for populations that are discontinuous and/or clumped. Utilization was moderate to heavy in 1984 and more moderate in 1990. Current use is light. The only abundant browse species on the site consist of broom snakeweed which has increased in density from 1,065 plants/acre in 1984 to 3,240 by 1996. The current age class distribution suggests an expanding population with 30% of the population consisting of young plants.

Annual grasses and weedy forbs are very abundant, especially lower on the slope. Cheatgrass, rattlesnake brome, and rattail fescue dominate the herbaceous understory by producing 75% of the grass cover and 57% of the herbaceous cover. Perennial grasses, bluebunch wheatgrass, red threeawn and Sandberg bluegrass, are moderately abundant. Bluebunch wheatgrass and Sandberg bluegrass have declined significantly in their sum of nested frequency values since 1990, while red threeawn has increased significantly. Forbs are dominated by common ragweed, storksbill, yellow salsify, and dyers woad.

1984 APPARENT TREND ASSESSMENT

Soil trend is definitely down. The study area has a very shallow soil that has very low growth potential. Ongoing erosion creates a situation favorable to annuals and weeds that are able to complete their growth cycle early in the season. Vegetative trend is also declining. Our subjective opinion is that big sagebrush is slowly going out.

1990 TREND ASSESSMENT

The many heavily hedged sagebrush encountered in 1984 are now mostly dead. Density is significantly lower, down by 75%. The small remaining sagebrush are vigorous, showing light to moderate use. The population of big sagebrush appears to be stable now at low levels. However, this severe winter range can receive concentrated use and considering the low amount of forage produced, the heavy ant and aphid infestation and aggressive potential invaders, there appears little chance for reversal of the downward trends. There is continuous soil loss, and

the potential for severe soil erosion and gullies on the steep face. There is extensive rock and pavement cover values.

TREND ASSESSMENT

soil - down and already poor condition

browse - down and already poor condition

herbaceous understory - stable but in poor condition

1996 TREND ASSESSMENT

Trend for soil is up due to a decline in percent bare ground and an increase in litter cover. Unfortunately, the improvement in ground cover comes primarily from annual grasses and forbs. Some erosion is inevitable but currently does not appear excessive. Soil condition is poor however. The browse trend is down due to a 65% decline in the density of mountain big sagebrush. Currently there are only 200 sagebrush plants/acre on the site. Mature plants number only 60 plants/acre. Drought combined with the low water holding capacity of the rocky soil, high surface temperatures and competition with winter annuals are eliminating sagebrush from the site. Trend for the herbaceous understory is down slightly due to a significant decline in the sum nested frequency of perennial grasses. Both bluebunch wheatgrass and Sandberg bluegrass declined significantly in nested frequency. Sum of nested frequency for forbs increased due primarily to a 91% increase in sum of nested frequency for ragweed (13 to 152). The site is in poor condition and supports a poor composition of perennial grasses and forbs.

TREND ASSESSMENT

soil - up but in poor condition

browse - down with very few browse on the site

herbaceous understory - down slightly and in poor condition

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 23

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	a184	ab182	b126	68	75	59	4.07
G	Aristida longiseta longiseta	a9	b38	b48	4	18	24	1.17
G	Bromus brizaeformis (a)	-	-	152	-	-	63	1.00
G	Bromus tectorum (a)	-	-	387	-	-	99	16.60
G	Festuca myuros (a)	-	-	87	-	-	32	.91
G	Poa bulbosa	-	-	10	-	-	4	.02
G	Poa secunda	a162	b234	c70	67	94	35	1.00
Total for Grasses		355	454	880	139	187	316	24.79
F	Achillea millefolium	-	-	2	-	-	1	.03
F	Agoseris glauca	-	6	10	-	2	4	.05
F	Alyssum alyssoides (a)	-	-	127	-	-	52	.38
F	Ambrosia psilostachya	a83	b13	c152	31	7	56	4.23
F	Artemisia ludoviciana	a39	b10	b9	14	3	5	.22
F	Astragalus utahensis	a2	a1	b21	1	1	11	.49

T y p e	Species	Nestled Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	Balsamorhiza hookeri	-	4	-	-	1	-	-
F	Cymopterus spp.	_a -	_b 33	_b 24	-	19	12	.08
F	Epilobium brachycarpum (a)	-	-	6	-	-	3	.02
F	Erodium cicutarium (a)	-	-	140	-	-	55	1.21
F	Erigeron spp	-	-	2	-	-	1	.15
F	Eriogonum umbellatum	-	-	4	-	-	3	.09
F	Helianthus annuus (a)	-	2	-	-	1	-	-
F	Holosteum umbellatum (a)	-	-	21	-	-	9	.04
F	Isatis tinctoria	_a 13	_{ab} 16	_b 25	7	8	16	.13
F	Lactuca serriola	-	-	3	-	-	1	.00
F	Tragopogon dubius	30	18	33	13	8	14	.36
F	Unknown forb-perennial	1	-	-	1	-	-	-
Total for Forbs		168	103	579	67	50	243	7.53

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

BROWSE TRENDS --

Herd unit 02 , Study no: 23

T y p e	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	7	.18
B	Chrysothamnus nauseosus albicaulis	3	.53
B	Gutierrezia sarothrae	54	1.46
B	Opuntia fragilis	1	-
Total for Browse		65	2.17

BASIC COVER --

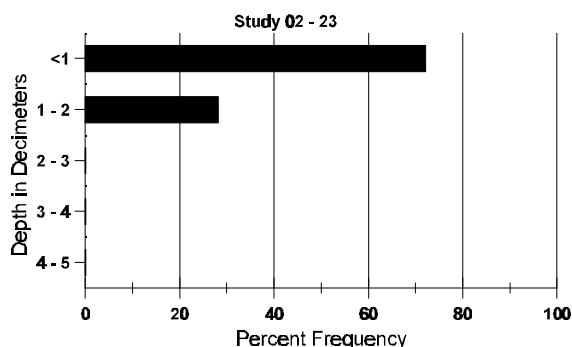
Herd unit 02 , Study no: 23

Cover Type	Nestled Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	397	2.25	9.50	42.44
Rock	311	16.50	18.00	18.50
Pavement	275	18.25	33.25	10.93
Litter	397	40.00	22.50	41.72
Cryptogams	147	6.00	4.25	1.90
Bare Ground	110	17.00	12.50	1.45

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 23

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
7.1	69.2 (9.0)	5.9	48.2	29.4	22.4	1.8	10.7	140.8	.3

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 23

Type	Quadrat Frequency '96
Deer	7

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 23

A G E	YR	Form Class (No. of 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	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	20	9	3	-	-	-	-	-	-	28	2	2	-	1066		32	
	90	2	-	1	-	-	-	-	-	-	1	2	-	-	100		3	
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	84	9	6	6	-	-	-	-	-	-	20	1	-	-	700	6	6	21
	90	5	4	1	-	-	-	-	-	-	4	6	-	-	333	8	10	10
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	13	22	3
D	84	-	1	13	-	-	-	-	-	-	7	6	1	-	466		14	
	90	3	1	-	-	-	-	-	-	-	1	3	-	-	133		4	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	2232	Dec:	21%			
												'90	566		23%			
												'96	200		0%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Chrysothamnus nauseosus albicaulis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	32	54	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	60		-			
<i>Gutierrezia sarothrae</i>																		
S	84	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	90	6	-	-	1	-	-	-	-	-	7	-	-	-	233		7	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	90	19	-	-	-	-	-	-	-	-	18	-	1	-	633		19	
	96	48	-	-	-	-	-	-	-	-	48	-	-	-	960		48	
M	84	26	-	-	-	-	-	-	-	-	26	-	-	-	866	9	12	26
	90	52	1	-	-	-	-	-	-	-	52	1	-	-	1766	7	8	53
	96	100	-	-	1	-	-	-	-	-	101	-	-	-	2020	9	13	101
D	84	4	-	-	-	-	-	-	-	-	4	-	-	-	133		4	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	13	-	-	-	-	-	-	-	-	13	-	-	-	260		13	
Total Plants/Acre (excluding Dead & Seedlings)												'84	1065	Dec:	12%			
												'90	2432		1%			
												'96	3240		8%			
<i>Opuntia fragilis</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	1	-	-	-	-	-	2	-	-	-	66		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66	7	11	2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	3	10	1
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	0%			
												'90	99		33%			
												'96	20		0%			

TREND STUDY 2-24-96 (old 4-3)

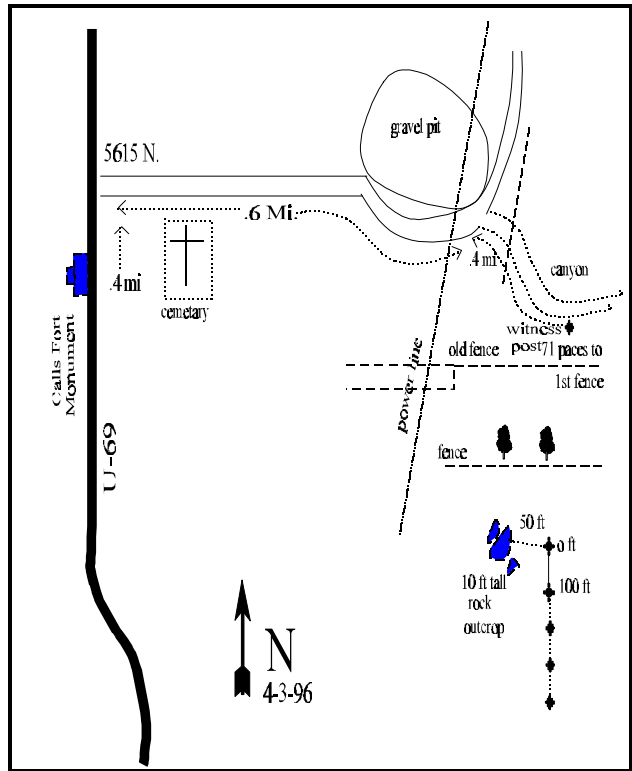
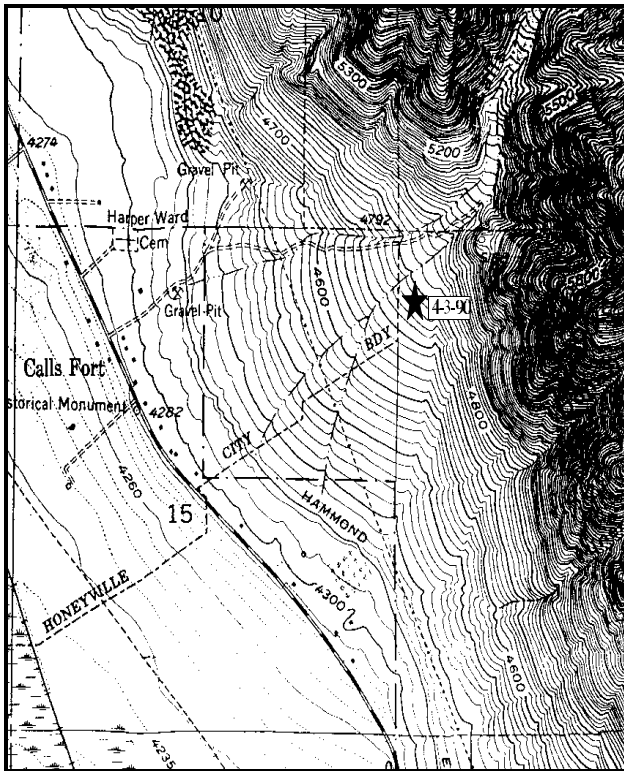
Study site name: Calls Fort Canyon. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 170 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Brigham City, proceed north to Calls Fort Monument near Honeyville. Go 0.4 miles north to a gravel pit road, 5615 North. From U-69 go east up the gravel pit road 0.6 miles to an old jeep road heading towards Calls Fort Canyon. The old jeep road crosses a laid down fence line which can be found at the base of a slightly talus slope. Bear right on the jeep road an additional 0.4 miles. From this point, walk south 195 paces across two old fences to an outcropping of large rocks. The 0-foot baseline stake is 50 feet southeast of the largest rock.



Map Name: Brigham City

Diagrammatic Sketch

Township 10N, Range 2W, Section 14, UTM COOR: 4-13-145E 46-06-912N

DISCUSSION

Trend Study No. 2-24 (4-3)

This study samples a moderate slope (25%) that is an extremely rocky, west facing bench land located immediately south of Calls Fort Canyon on the west side of the Wellsville mountains. Elevation of the site is 4,820 feet, which is well within severe deer winter range limits. The range type is a rather sparse and decadent mountain big sagebrush type with a dominant annual and weedy understory. Deer use was moderate to heavy in 1984, but currently there is little sign of wildlife. Deer and elk pellet groups are infrequent and have quadrat frequencies of only 2%.

Soil is classified as "Sterling Gravelly Loam or Very Stony Loam." Both of these are exceptionally well drained calcareous soils derived from limestone, quartzite and sandstone. Rate of water intake is very rapid but so also is the rate of loss. As a result, complete soil drying in the upper 24 inches is common in summer which would be an advantage to annuals. Roots seldom penetrate below this depth because of a calcareous hardpan at about 16 inches and the extreme cobbly nature of the profile below 24 inches. This soil erodes very easily (Chadwick et al. 1975). The site is located just south of the mouth of Calls Fort Canyon. This location has been spared from the periodic and extremely heavy runoff originating from the canyon as evidenced by extensive spread of the alluvial fan. Nonetheless, erosion on the study site although not as serious, is still noticeable. Soil texture is a clay loam with a slightly alkaline pH of 7.7. Rocks are common on or just below the surface (see rock profile). Soil temperature is very high on this site averaging 78°F at 14 inches in depth.

The principle browse species is mountain big sagebrush. This species had a mostly decadent age structure (53%) and was subjected to heavy use in 1984. Reproductive success has been lacking due to strong competition for moisture from a dense understory dominated by common ragweed and annual grasses and excessively high soil temperatures. Sagebrush density declined from 498 to 133 plants/acre by 1990, but the number of mature plants in the population remained comparable (166 to 133). Percent decadency declined from 53% to 0% as all the decadent shrubs appear to have died out. Utilization in 1990 was light. During the 1996 reading, total density of sagebrush was estimated at 740 plants/acre. Density of mature plants remained similar to 1990 estimates but the number of young plants increased from 0 to 560 plants/acre. Plants appear unutilized. Dead plants, included in the 1996 count, are as numerous as live plants at 740 plants/acre.

The most numerous browse is broom snakeweed which has increased dramatically (by 85%) since 1990. Other browse species occur rarely. They include black chokecherry, woods rose, and Rocky Mountain smooth sumac. The latter shrub is extremely abundant on the alluvial fan north of the study site. Apparently it responds positively to the type of erosion and sedimentation disturbance so prevalent in that area with its strongly rhizomatous habit.

The herbaceous understory is dominated by annual grasses, consisting mainly of Japanese brome and cheatgrass which account for 70% of the grass cover and 51% of the herbaceous cover. It was noted in 1996 that much of the cheatgrass and Japanese brome was infested with a smut which effected seed production. Perennial grasses are represented by bluebunch wheatgrass, sand dropseed, purple threeawn, and Sandberg bluegrass. Forbs are dominated by common ragweed which alone accounts for 51% of the forb cover. Other common perennial forbs include western yarrow, Louisiana sage, thistle, and dyers woad. Overall herbaceous composition is poor.

1984 APPARENT TREND ASSESSMENT

Overall trend from both soil and vegetative parameters, is almost undeniably down. Erosion is unacceptably high and undesirable plants threaten to dominate the site.

1990 TREND ASSESSMENT

Changes in mountain big sagebrush growth form classification from heavily hedged in 1984 to lightly hedged in 1990 and the reduction in the percentage of decadent plants in the population are positive signs. However, no reproduction was found for there is significant competition from the dense annual grass understory. Sagebrush canopy cover is about 2%. In addition, estimated density declined 73% from 498 plants/acre to only 133. The frequency of bluebunch wheatgrass increased as did the frequency of Dyers woad. Common ragweed is still very common with a quadrat frequency of 71%. The soil is rocky, but well protected by vegetative and litter cover.

TREND ASSESSMENT

soil - stable, but poor condition

browse - downward, for the key species, mountain big sagebrush decreased in density 73%

herbaceous understory - stable but poor composition

1996 TREND ASSESSMENT

Trend for soil has improved slightly due to an increase in litter cover and a decline in percent bare ground from 3% to <1%. Unfortunately, much of this increase is due to the thick stand of annual brome grasses which creates a substantial fire hazard. Erosion is not currently a problem. Preferred browse is limited on the site but trend for the one key species, mountain big sagebrush, is up. Density of mature plants remained similar to 1990 estimates but the proportion of young plants increased from 0 to 560 plants/acre. Utilization is light and vigor normal for most plants. Conversely, broom snakeweed increased 85% to a density of over 4,000 plants/acre. The herbaceous understory is dominated by annual grasses and weedy forbs. Sum of nested frequency for grasses declined slightly while for forbs it increased. Sum of nested frequency for sand dropseed increased significantly, while sum of nested frequency for Sandberg bluegrass declined significantly. Overall trend for the herbaceous understory is stable, by with a poor composition.

TREND ASSESSMENT

soil - improved slightly

browse - up but still at a relatively low density

herbaceous understory - stable but dominated by annuals and weedy species

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 24

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	_a 10	_b 66	_b 65	4	25	26	3.67
G	Aristida purpurea	20	16	9	10	6	6	.78
G	Bromus brizaeformis (a)	-	-	24	-	-	12	.28
G	Bromus japonicus (a)	-	-	307	-	-	91	11.85

Type	Species	Nestled Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	<i>Bromus tectorum</i> (a)	-	-	306	-	-	89	11.59
G	<i>Festuca myuros</i> (a)	-	-	9	-	-	3	.01
G	<i>Poa pratensis</i>	a-	b9	a-	-	5	-	-
G	<i>Poa secunda</i>	a-	b74	c36	-	33	17	.29
G	<i>Sporobolus cryptandrus</i>	a114	b81	ab107	54	29	41	5.01
Total for Grasses		144	246	863	68	98	285	33.51
F	<i>Achillea millefolium</i>	32	28	34	16	11	19	.85
F	<i>Alyssum alyssoides</i> (a)	-	-	14	-	-	7	.03
F	<i>Ambrosia psilostachya</i>	a214	b165	b160	75	71	69	6.31
F	<i>Artemisia ludoviciana</i>	40	32	28	17	14	14	.77
F	<i>Calochortus nuttallii</i>	-	-	6	-	-	4	.02
F	<i>Cirsium</i> spp.	a-	a2	b21	-	1	11	1.14
F	<i>Comandra pallida</i>	-	2	-	-	1	-	-
F	<i>Cryptantha</i> spp.	-	-	4	-	-	2	.41
F	<i>Epilobium brachycarpum</i> (a)	-	-	75	-	-	36	.52
F	<i>Erodium cicutarium</i> (a)	-	-	32	-	-	13	.36
F	<i>Erigeron pumilus</i>	-	-	3	-	-	1	.00
F	<i>Euphorbia</i> spp.	-	-	15	-	-	5	.46
F	<i>Helianthus annuus</i> (a)	-	-	5	-	-	3	.04
F	<i>Heterotheca villosa</i>	-	-	2	-	-	1	.53
F	<i>Isatis tinctoria</i>	a-	b41	b32	-	16	14	.29
F	<i>Lactuca serriola</i>	-	-	14	-	-	8	.09
F	<i>Lithospermum ruderales</i>	a31	b2	b8	16	1	4	.18
F	<i>Machaeranthera canescens</i>	a-	b14	b11	-	8	6	.15
F	<i>Machaeranthera grindelioides</i>	-	-	5	-	-	4	.07
F	<i>Plantago patagonica</i> (a)	-	-	3	-	-	2	.01
F	<i>Solidago</i> spp.	3	4	-	1	1	-	-
F	<i>Tragopogon dubius</i>	1	-	9	1	-	4	.07
Total for Forbs		321	290	481	126	124	227	12.37

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

BROWSE TRENDS --

Herd unit 02 , Study no: 24

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	24	.93
B	Gutierrezia sarothrae	50	3.23
B	Rosa woodsii	1	.38
Total for Browse		75	4.55

BASIC COVER --

Herd unit 02 , Study no: 24

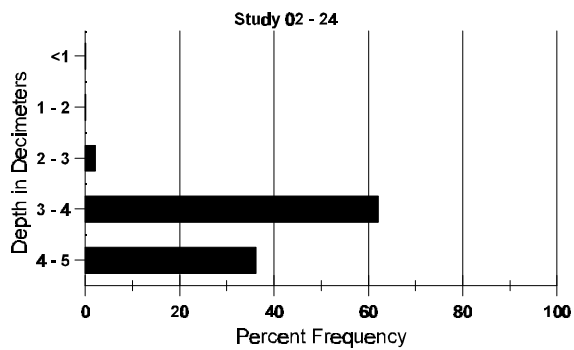
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	382	1.50	16.00	54.32
Rock	176	14.25	16.75	9.64
Pavement	58	10.50	6.50	1.75
Litter	386	64.00	57.25	68.01
Cryptogams	3	0	.50	.00
Bare Ground	35	9.75	3.00	.65

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 24

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.4	77.8 (13.9)	7.7	41.7	31.0	27.3	3.8	7.3	195.2	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 24

Type	Quadrat Frequency '96
Rabbit	1
Elk	2
Deer	2

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 24

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	2	-	-	-	-	-	-	2	-	-	-	66		2	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	28	-	-	-	-	-	-	-	-	28	-	-	-	560		28	
M	84	-	-	5	-	-	-	-	-	-	5	-	-	-	166	23	18	5
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	133	21	19	4
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140	28	38	7
D	84	-	-	8	-	-	-	-	-	-	6	-	2	-	266		8	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	1	-	-	1	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	740		37	
Total Plants/Acre (excluding Dead & Seedlings)												'84	498	Dec:	53%			
												'90	133		0%			
												'96	740		5%			
<i>Gutierrezia sarothrae</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	96	21	-	-	-	-	-	-	-	-	21	-	-	-	420		21	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	13	-	-	-	-	-	-	-	-	13	-	-	-	433	19	28	13
	96	181	-	-	-	-	-	-	-	-	181	-	-	-	3620	16	19	181
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	599		-			
												'96	4040		-			
<i>Rosa woodsii</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	64	72	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			

TREND STUDY 2-25-96 (old 4-4)

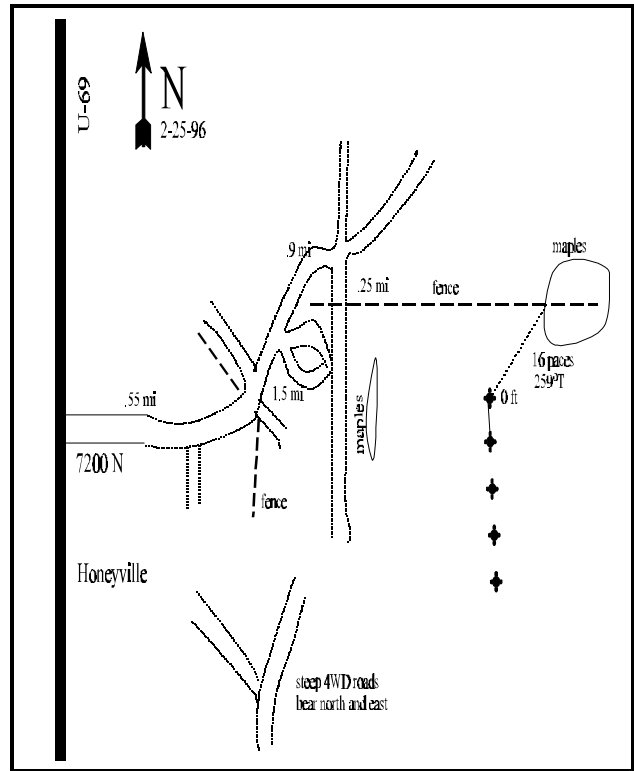
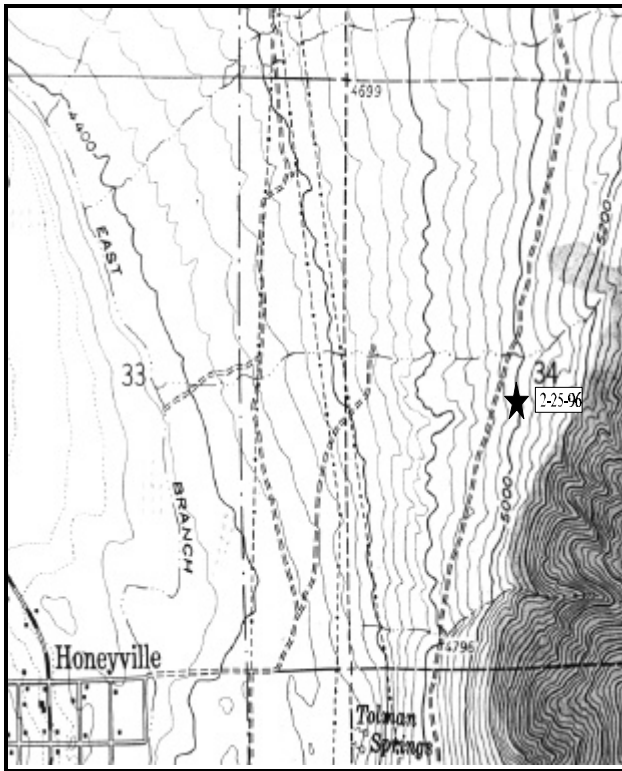
Study site name: Mouth of Two Jump Canyon. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

From the junction of 7200 North and U-69 in Honeyville, proceed east and north for 0.55 miles. Turn right at the fork, and proceed 0.15 miles. Turn left at this fork, and proceed 0.9 miles to a "T" intersection. Turn right (south) and travel 0.25 miles to a fence running east and west. Walk east along the fence (approximately 200 yards) past one maple stand, and stopping at the second which the fence passes through. From where the fence enters the maples walk 16 paces at 259 degrees true to the 0-foot stake of the baseline marked with browse tag #7923.



Map Name: Honeyville

Diagrammatic Sketch

Township 11N, Range 2W, Section 34, UTM COOR: 4-12-127E 46-11-208N

DISCUSSION

Trend Study No. 2-25 (4-4)

This site samples one of the better mountain big sagebrush types in the unit. Located just south of Two Jump Canyon, the site slopes gently (30%) to the west at 5,060 feet elevation. Judging from pellet group frequency, deer use appears light. There is, however, moderate hedging on the mountain big sagebrush population, which consists primarily of plants averaging about three feet in height. Cattle also utilize the area, but were not present at the time of study establishment.

Soil, like Study Number 4-3, is "Sterling Gravelly Loam" (Chadwick et al. 1975). This area, however, is less rocky and not nearly so eroded or depleted of perennial cover. Overall soil condition is better and potential rooting depth appears greater than on study number three. Effective rooting depth (see methods) was estimated at nearly 15 inches. The soil is extremely rocky through out the profile with a strong calcareous layer at a depth of 6 to 8 inches. Parent material is limestone. Soil texture is a loam with a moderately alkaline pH of 7.9. Vegetation and litter cover are abundant and well dispersed effectively limiting erosion.

Browse composition consists of a dominant population of mountain big sagebrush in association with a less conspicuous but more numerous population of broom snakeweed. Mountain big sagebrush had a population of 2,065 plants/acre in 1984, 71% were categorized as large mature plants averaging 3½ feet in height. Most of these shrubs (77%) were heavily utilized, yet vigor was generally good. During the 1990 reading, utilization was mostly moderate with poor vigor on nearly half of the population (45%). Percent decadence rose from 25% to 72% and 44% of the decadent shrubs appeared to be dying. Recruitment was poor with few seedling and young plants sampled. During the 1996 reading, population density increased to 1,860 plants/acre. Currently there are equal numbers of mature and decadent plants (760 plants/acre). Utilization is light to moderate. Some of the decadent plants sampled in 1990 appear to have regained their vigor and are now healthy mature plants. Dead plants, first sampled in 1996, number 960 plants/acre. Recruitment has improved with 200 seedling and 340 young plants/acre estimated.

The most numerous shrub on the site is broom snakeweed which has an estimated density of 5,580 plants/acre. Age class analysis indicates an expanding population with a biotic potential (percent of seedlings to total density) of 68% and 25% classified as young plants. A few other shrub species occur rarely in clumps or patches. They include blueberry elder, Rocky Mountain maple, Rocky Mountain smooth sumac, and a few Utah junipers. Rocky Mountain smooth sumac appears to be increasing.

Currently annual grasses, rattlesnake brome, Japanese brome, and cheatgrass dominate the herbaceous understory. They combine to produce nearly 30% cover which accounts for 77% of the grass cover. Cheatgrass is the most abundant of the annual grasses with a quadrat frequency of 100% and a very high nested frequency value of 373 out of a possible 400. This would indicate that cheatgrass is evenly distributed over the whole site. Perennial grasses are represented by moderate amounts of bluebunch wheatgrass and Sandberg bluegrass. Forbs are diverse and contain some desirable species including arrowleaf balsamroot, paintbrush, Utah sweetvetch, lomatium, and sulfur erigonum.

1984 APPARENT TREND ASSESSMENT

Soil trend is stable to slightly down. Some erosion is apparent but is being

controlled by moderately to good shrub cover. Basal vegetative and litter cover are more marginal. Erosion pavement and rock are important cover categories that tend to enhance runoff. Vegetative trend is mainly characterized by a stable big sagebrush population. Apart from big sagebrush, the most sensitive parameters to monitor in the future will be the abundance of Indian hemp, common ragweed, and broom snakeweed.

1990 TREND ASSESSMENT

This study samples an area of suitable winter range, with an adequate amount of browse forage production. The mountain big sagebrush plants on the site are generally moderately hedged and have fair vigor. Seventy percent of the population was classified as decadent, and sagebrush decreased in density. There is an average of 18% sagebrush canopy cover. Snakeweed is abundant in the understory, along with a moderate diversity of forbs and an increase in bluebunch wheatgrass. Considering the shallow, rocky soil, sheet erosion is normal and there is generally adequate vegetative and litter cover.

TREND ASSESSMENT

soil - stable but poor condition

browse - downward, loss of 29% of the sagebrush

herbaceous understory - up

1996 TREND ASSESSMENT

Trend for soil appears up with an increase in litter cover and a decline in percent bare ground from 7% to less than 1%. This improved soil protection comes primarily from cheatgrass. Trend for the key browse, mountain big sagebrush, appears stable. Utilization is lighter, vigor improved, and percent decadency down from 72% to 40%. Total density has increased slightly and recruitment is improved. The high proportion of dead plants sampled and the decline in decadency suggests that the sagebrush population is in a process of changing from an old, over mature population to a younger more vigorous stand. If reproduction remains good in the future and utilization remains light to moderate, the sagebrush stand will maintain itself. One negative aspect of the browse trend is the abundance and dynamic reproductive potential of broom snakeweed. Trend for the herbaceous understory is stable. Sum of nested frequency for grasses increased slightly while that of forbs declined. Bluebunch wheatgrass declined significantly in its sum of nested frequency value, while Sandberg bluegrass increased slightly.

TREND ASSESSMENT

soil - improved

browse - stable

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 25

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	43	65	39	19	29	17	3.73
G	Bromus brizaeformis (a)	-	-	267	-	-	87	4.28
G	Bromus japonicus (a)	-	-	67	-	-	26	1.12
G	Bromus tectorum (a)	-	-	373	-	-	100	20.85

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	<i>Festuca myuros</i> (a)	-	-	47	-	-	16	1.13
G	<i>Koeleria cristata</i>	-	-	5	-	-	3	.09
G	<i>Poa bulbosa</i>	-	-	6	-	-	3	.04
G	<i>Poa secunda</i>	_a 24	_b 100	_b 136	16	49	54	4.36
Total for Grasses		67	165	940	35	78	306	35.63
F	<i>Achillea millefolium</i>	12	16	11	5	6	4	.33
F	<i>Alyssum alyssoides</i> (a)	-	-	152	-	-	66	1.00
F	<i>Allium</i> spp.	-	2	7	-	2	4	.07
F	<i>Ambrosia psilostachya</i>	27	39	31	10	19	15	.62
F	<i>Apocynum androsaemifolium pumilum</i>	-	10	-	-	8	-	-
F	<i>Arabis</i> spp.	-	1	1	-	1	1	.00
F	<i>Artemisia ludoviciana</i>	22	24	16	9	12	6	.52
F	<i>Astragalus</i> spp.	1	-	5	1	-	3	.04
F	<i>Astragalus utahensis</i>	-	-	5	-	-	2	.18
F	<i>Balsamorhiza sagittata</i>	_a 33	_b 73	_b 64	16	38	35	5.22
F	<i>Castilleja linariaefolia</i>	-	-	3	-	-	1	.03
F	<i>Cirsium</i> spp.	-	1	1	-	1	1	.04
F	<i>Comandra pallida</i>	-	2	6	-	2	3	.09
F	<i>Cryptantha</i> spp.	-	5	3	-	3	1	.03
F	<i>Epilobium brachycarpum</i> (a)	-	-	1	-	-	1	.00
F	<i>Erodium cicutarium</i> (a)	-	-	2	-	-	2	.06
F	<i>Eriogonum umbellatum</i>	5	6	16	2	3	6	.40
F	<i>Hackelia patens</i>	_a -	_b 18	_b 11	-	8	6	.25
F	<i>Hedysarum boreale</i>	_a -	_b 12	_a -	-	6	-	.06
F	<i>Holosteum umbellatum</i> (a)	-	-	17	-	-	7	.03
F	<i>Lactuca serriola</i>	-	-	1	-	-	1	.00
F	<i>Lithospermum ruderale</i>	_a 4	_{ab} 4	_b 19	3	4	10	.64
F	<i>Lomatium grayi</i>	_a -	_b 64	_c 8	-	31	4	.07
F	<i>Penstemon</i> spp.	_a 7	_{ab} 1	_b -	5	1	-	.00
F	<i>Phacelia</i> spp.	_a 32	_b 3	_b 7	17	2	5	.12
F	<i>Phlox longifolia</i>	-	6	2	-	3	1	.03
F	<i>Polygonum douglasii</i> (a)	-	-	2	-	-	1	.00
F	<i>Tragopogon dubius</i>	1	7	7	1	3	4	.10
Total for Forbs		144	294	398	69	153	190	10.01

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

BROWSE TRENDS --

Herd unit 02 , Study no: 25

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	63	12.42
B	Eriogonum microthecum	1	-
B	Gutierrezia sarothrae	75	3.33
B	Rhus glabra cismontana	0	1.37
Total for Browse		139	17.13

BASIC COVER --

Herd unit 02 , Study no: 25

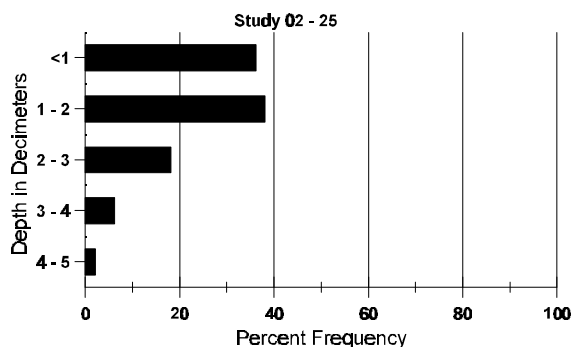
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	387	1.50	7.00	56.31
Rock	210	18.00	16.75	14.04
Pavement	90	21.25	13.75	3.66
Litter	392	57.50	55.75	65.69
Cryptogams	68	.50	.25	.70
Bare Ground	26	1.25	6.50	.44

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 25

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.8	73.4 (14.7)	7.9	43.4	33.4	23.3	3.5	13.3	70.4	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 25

Type	Quadrat Frequency '96
Rabbit	1
Deer	7
Cattle	2

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 25

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
S	84	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10	
Y	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	14	3	-	-	-	-	-	-	-	17	-	-	-	340		17	
M	84	-	5	17	-	-	-	-	-	-	22	-	-	-	1466	42 43	22	
	90	2	3	-	-	-	-	-	-	-	4	-	1	-	333	27 33	5	
	96	27	10	1	-	-	-	-	-	-	36	-	1	1	760	27 41	38	
D	84	-	1	7	-	-	-	-	-	-	6	-	1	1	533		8	
	90	5	6	5	-	-	-	-	-	-	7	-	2	7	1066		16	
	96	18	17	1	2	-	-	-	-	-	25	1	-	12	760		38	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	960		48	
Total Plants/Acre (excluding Dead & Seedlings)												'84	2065	Dec:	26%			
												'90	1465		73%			
												'96	1860		41%			
<i>Eriogonum microthecum</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	18 22	2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	40		-			

A G E	YR	Form Class (No. of 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	191	-	-	-	-	-	-	-	-	191	-	-	-	3820		191	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	80	-	-	-	-	-	-	-	-	80	-	-	-	5333		80	
	96	67	-	-	2	-	-	-	-	-	69	-	-	-	1380		69	
M	84	46	-	-	-	-	-	-	-	-	46	-	-	-	3066	13 10	46	
	90	56	-	-	2	-	-	-	-	-	58	-	-	-	3866	11 12	58	
	96	210	-	-	-	-	-	-	-	-	210	-	-	-	4200	11 14	210	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	7	-	-	-	-	-	-	-	-	4	-	-	3	466		7	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	3066	Dec:	0%			
												'90	9665		5%			
												'96	5580		0%			
<i>Rhus glabra cismontana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	21	-	-	-	-	-	-	-	-	21	-	-	-	420		21	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	70 107	0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			

TREND STUDY 2-26-96 (old 4-5)

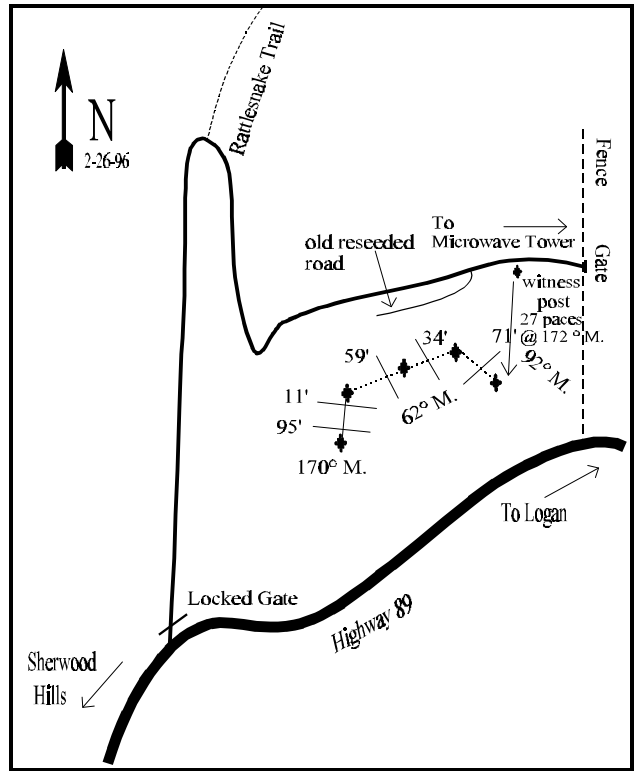
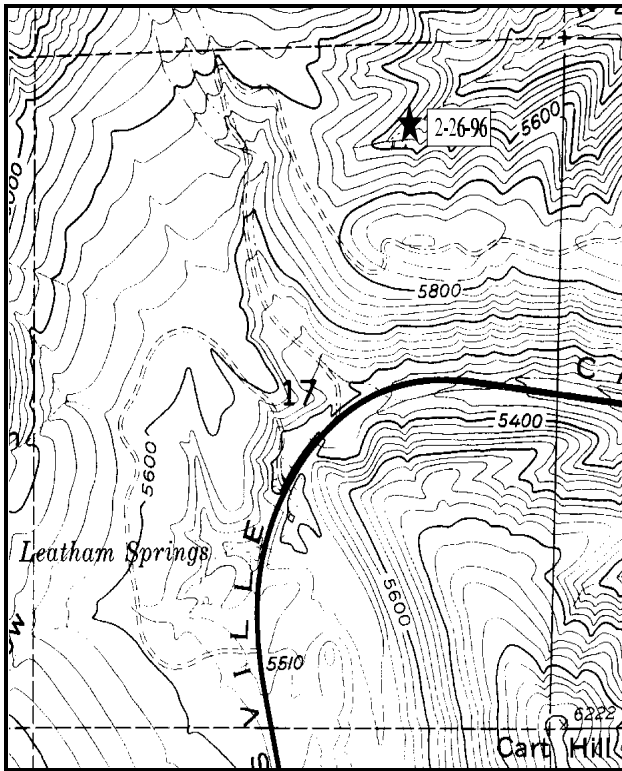
Study site name: Wellsville Canyon. Range type: Mountain brush.

Compass bearing: frequency baseline 170 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft).

LOCATION DESCRIPTION

From the Sherwood Hills turnoff on U-89, proceed north towards Wellsville Canyon for 1.4 miles to a dirt road and locked gate. Walk up the road approximately ½ mile to a small meadow where an old road (no longer open to vehicle traffic) turns off to the east. Follow the old road approximately ½ mile to near the top of the mountain. Look for another old road coming in from the right. The witness post is just off the fork. The 400-foot baseline stake (a steel fencepost with a white top) is located 27 paces away bearing 172° magnetic. The 0-foot baseline stake is 300 feet to the west. The 100-foot baseline runs 170 degrees magnetic. The rest of the baseline runs off the 0-foot baseline stake. Line 2 and 3 run 62 degrees magnetic. Line 4 runs 92 degrees magnetic.



Map Name: Mount Pisgah

Diagrammatic Sketch

Township 10N, Range 1W, Section 17, UTM COOR: 4-19-068E 46-06-717N

DISCUSSION

Trend Study No. 2-26 (4-5)

A new trend study was located on an upper south-facing slope of Wellsville Canyon in 1990 to sample a mixed community of sagebrush and mountain brush. This slope reportedly receives a large amount of deer winter use. The slope is dominated by scattered stands of maple, with openings of sagebrush and grass. The study is on a 45% south-facing slope at an elevation of 5,800 feet. It is on Forest Service property with limited vehicular access. The road to the site is used for maintaining a microwave tower. To avoid a long hike to the site, a key will have to be obtained for the gate. Currently, sign of deer or elk is rare with a pellet group quadrat frequencies of only 1%.

The soil is a shallow, stony clay loam with an effective rooting depth (see methods) estimated at 8.6 inches. Parent material is limestone. The soil is slightly acid with a pH of 6.1. The surface has 14% rock cover, along with a high percentage of vegetation (61%) and litter (61%) cover. Erosion is not a concern for this site.

Mountain big sagebrush occurs in low densities across the whole south face. On the study site, density may be slightly higher than average. Currently, sagebrush canopy cover averages about 7%. Density was estimated at 1,466 plants/acre in 1990. The population was 68% mature, 22% decadent with 9% classified as young. Utilization was light and normal vigor. Sagebrush density remained similar in 1996, but with a noticeable increase in the proportion of young plants (9% to 25%) and a decline in percent decadence (22% to 5%). Utilization continues to be light.

Other preferred browse include small numbers of snowbrush ceanothus and widely scattered bitterbrush. A few bitterbrush seen near the site were heavily hedged, but should be expected when they occur in such low numbers. The most numerous species include Oregon hollygrape and woods rose. Both species have shown large declines in density, but most of the change is due to the much larger sample size used in 1996 which give more accurate estimates of species that occur in clumped and/or discontinuous distributions.

There is a very abundant herbaceous understory comprised of a large diversity of grass and forb species. Introduced grasses have spread from where they were seeded on the old road, down the slope and onto the site. Grasses are dominated by bluebunch wheatgrass and Kentucky bluegrass, both of which have increased significantly in their sum of nested frequency values since 1990. Annual grasses, Japanese brome and cheatgrass, are also found on the site. Cheatgrass is more abundant and accounts for 25% of the grass cover. The forb composition is very diverse, yet contains several weedy species including, common ragweed, dog bane, pacific aster, hounds tongue, curly cup gumweed, dyers woad, prickly lettuce, tarweed, curly dock, and yellow salsify.

1990 APPARENT TREND ASSESSMENT

The diverse, vigorous and productive vegetation on the study site illustrates a stable trend. Other sites on the slope, especially the steeper areas, are not in as good of condition and have a limited browse component. This site is representative of the more productive areas. The soil trend is stable as a result of adequate protection by vegetation and litter.

1996 TREND ASSESSMENT

Ground cover characteristics have improved slightly due to an increase in litter cover and a decline in percent bare ground. Vegetation and litter cover are

abundant and erosion is not a problem on this site. The browse trend appears stable for the key browse species, mountain big sagebrush. The herbaceous understory is abundant and diverse. Sum of nested frequency for perennial grasses has increased by 33% with sum of nested frequency for bluebunch wheatgrass and Kentucky bluegrass increasing significantly. Perennial forbs declined in their sum of nested frequency value. Overall, trend for the herbaceous understory is considered stable.

TREND ASSESSMENT

soil - improved

browse - stable

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 26

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover % '96
		'90	'96	'90	'96	
G	Agropyron intermedium	-	*24	-	8	1.66
G	Agropyron spicatum	124	*177	48	58	10.84
G	Bromus japonicus (a)	-	263	-	78	7.65
G	Bromus tectorum (a)	-	36	-	14	1.24
G	Poa pratensis	120	*171	44	59	7.84
G	Poa secunda	25	*3	11	2	.06
G	Unknown grass - perennial	-	25	-	12	.92
Total for Grasses		269	699	103	231	30.23
F	Achillea millefolium	31	34	13	14	.65
F	Agoseris glauca	15	-	7	-	-
F	Allium spp.	6	-	3	-	-
F	Ambrosia artemisifolia	61	*101	28	44	2.56
F	Apocynum medium	107	*49	46	22	2.58
F	Artemisia ludoviciana	36	33	14	13	.93
F	Aster chilensis	85	*121	37	44	3.41
F	Cirsium spp.	5	2	3	2	.09
F	Convolvulus arvensis	-	*12	-	6	.15
F	Collomia linearis (a)	-	4	-	2	.01
F	Crepis acuminata	2	-	1	-	-
F	Cynoglossum officinale	13	*3	5	1	.03
F	Dipsacus sylvestris	-	*20	-	9	.81
F	Epilobium brachycarpum (a)	-	115	-	44	2.33
F	Eriogonum umbellatum	3	3	1	1	.15
F	Galium aparine (a)	-	12	-	5	.10
F	Grindelia squarrosa	-	1	-	1	.03
F	Hackelia patens	-	2	-	2	.03
F	Isatis tinctoria	44	*25	20	12	.66

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover % '96
		'90	'96	'90	'96	
F	Lappula occidentalis (a)	-	3	-	1	.00
F	Lactuca serriola	80	*27	37	13	.14
F	Lithospermum ruderales	-	3	-	1	.00
F	Lomatium grayi	6	2	3	1	.15
F	Lupinus caudatus	5	1	3	1	.03
F	Madia glomerata (a)	-	2	-	1	.03
F	Melilotus alba	7	3	5	1	.03
F	Melilotus officinalis	8	3	3	1	.00
F	Phacelia spp.	21	*3	7	2	.18
F	Polygonum douglasii (a)	-	3	-	1	.03
F	Rumex crispus	-	6	-	2	.18
F	Taraxacum officinale	-	1	-	1	.00
F	Tragopogon dubius	225	*64	83	26	.61
F	Trifolium gymnocarpon	-	2	-	1	.03
F	Zigadenus paniculatus	3	9	1	5	.15
Total for Forbs		763	669	320	280	16.17

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

BROWSE TRENDS --

Herd unit 02 , Study no: 26

T y p e	Species	Strip Frequency	Average Cover %
		'96	'96
B	Acer grandidentatum	1	.00
B	Artemisia tridentata vaseyana	62	7.13
B	Ceanothus velutinus	2	2.22
B	Mahonia repens	21	2.38
B	Rosa woodsii	24	.93
Total for Browse		110	12.68

BASIC COVER --

Herd unit 02 , Study no: 26

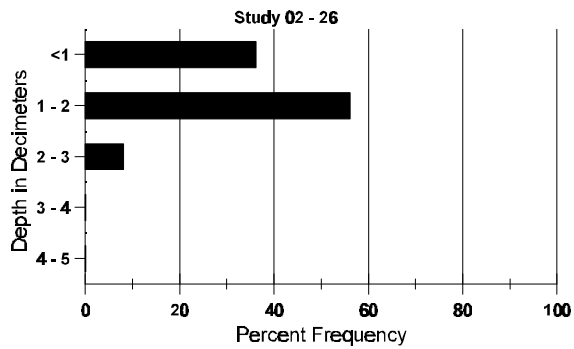
Cover Type	Nested Frequency '96	Average Cover %	
		'90	'96
Vegetation	386	21.25	60.94
Rock	230	18.50	14.07
Pavement	45	3.75	.23
Litter	394	51.50	60.87
Cryptogams	-	0	0
Bare Ground	49	5.00	.75

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 26

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
8.6	60.6 (10.1)	6.1	32.6	36.1	31.4	6.2	10.7	390.4	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 26

Type	Quadrat Frequency '96
Elk	1
Deer	1

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 26

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Acer grandidentatum</i>																		
Y	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	20		-			
<i>Artemisia tridentata vaseyana</i>																		
S	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	90	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	25	-	-	-	-	-	-	-	-	25	-	-	-	500		25	
M	90	15	-	-	-	-	-	-	-	-	15	-	-	-	1000	32 30	15	
	96	58	10	-	-	-	-	2	-	-	69	-	1	-	1400	24 46	70	
D	90	3	1	-	1	-	-	-	-	-	5	-	-	-	333		5	
	96	3	2	-	-	-	-	-	-	-	5	-	-	-	100		5	
X	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	220		11	
Total Plants/Acre (excluding Dead & Seedlings)												'90	1466	Dec:	23%			
												'96	2000		5%			
<i>Ceanothus velutinus</i>																		
M	90	-	3	-	-	-	-	-	-	-	3	-	-	-	200	30 20	3	
	96	1	-	-	1	-	-	-	-	-	2	-	-	-	40	45 164	2	
Total Plants/Acre (excluding Dead & Seedlings)												'90	200	Dec:	-			
												'96	40		-			
<i>Gutierrezia sarothrae</i>																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	13 28	0	
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	0		-			
<i>Mahonia repens</i>																		
Y	90	460	-	-	55	-	-	-	-	-	515	-	-	-	34333		515	
	96	52	-	-	4	-	-	-	-	-	56	-	-	-	1120		56	
M	90	153	-	-	40	-	-	-	-	-	193	-	-	-	12866	6 6	193	
	96	210	-	-	10	-	-	-	-	-	220	-	-	-	4400	7 8	220	
Total Plants/Acre (excluding Dead & Seedlings)												'90	47199	Dec:	-			
												'96	5520		-			
<i>Purshia tridentata</i>																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	26 38	0	
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	-			
												'96	0		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Rosa woodsii																		
S	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	90	140	-	-	47	-	-	-	-	-	187	-	-	-	12466		187	
	96	29	-	-	-	-	-	-	-	-	29	-	-	-	580		29	
M	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	4	2	1
	96	24	-	-	11	-	-	-	-	-	35	-	-	-	700	17	12	35
Total Plants/Acre (excluding Dead & Seedlings)												'90	12532	Dec:	-			
												'96	1280		-			

TREND STUDY 2-27-96 (old 5-1)

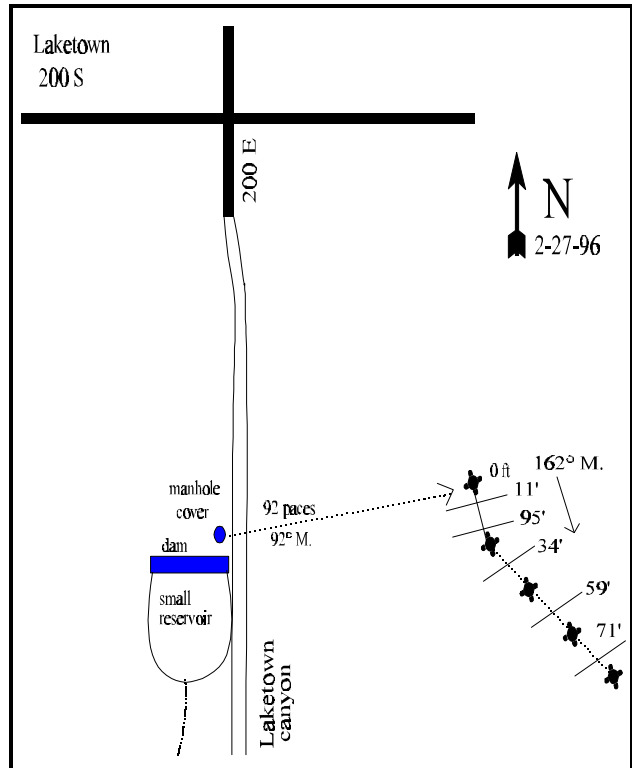
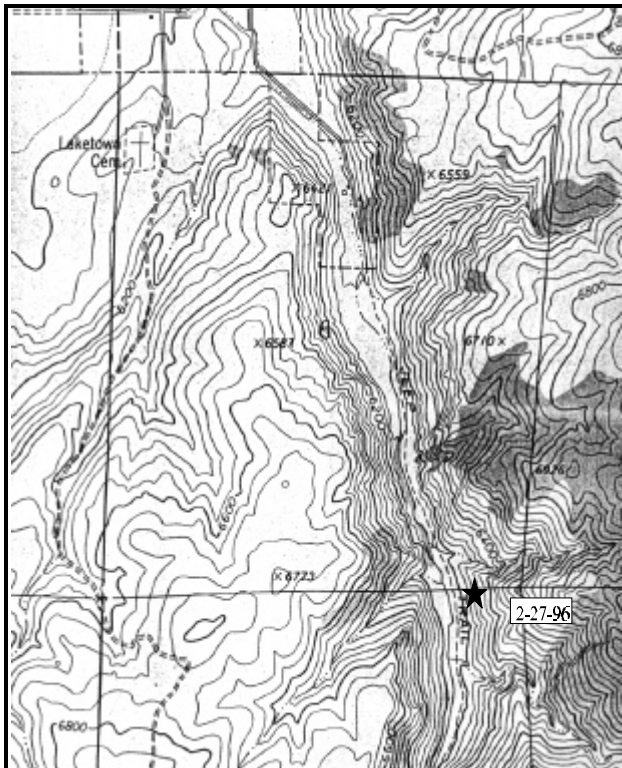
Study site name: Old Laketown Canyon. Range type: True mountain mahogany.

Compass bearing: frequency baseline 162 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From 200 East 200 South in Laketown, proceed south into Laketown Canyon 1.5 miles stopping at a stockpond dam. Walk to the manhole cover on the northeast corner of the dam. Take an azimuth of 92 degrees magnetic and walk 92 paces up the ridge to the 0-foot baseline stake. Baseline 0-foot stake is marked with browse tag #7937.



Map Name: Laketown

Diagrammatic Sketch

Township 12N, Range 6E, Section 7, UTM COOR: 4-74-617E 46-27-821N

DISCUSSION

Trend Study No. 2-27 (5-1)

This study is located on a moderately steep (55%) west facing slope in Old Laketown Canyon. At 6,300 feet elevation, the study site is within critical deer winter range limits. Although elk are known to inhabit this general area, there is little elk sign on this particular site. In contrast, deer and domestic sheep pellet groups, tracks, and other signs were very common and the more preferred browse species closely hedged in 1984. Currently, deer pellet groups have a quadrat frequency of only 9%. Cattle sign occurs at the bottom of the slope around a nearby stock pond but not on the slopes of the site itself. The range type is mixed mountain brush.

Soil is within a mapping unit known as the "Lundy Dry-Rock Outcrop Complex." Soils in this unit are all very gravelly loams that are excessively drained and moderately permeable to water. Formed residually or colluvially from limestone, these soils normally possess only a 16 inch profile before fractured limestone bedrock is encountered. Strongly calcareous and moderately alkaline, the Lundy soil usually dries completely in mid-summer. Erosion is moderate or high (Campbell and Lacey 1982). Soil at the site has a loam texture with a slightly alkaline pH of 7.6. Effective rooting depth (see methods) is estimated at just under 12 inches. Some bare ground is exposed on the site mainly along trails which follow on contour. Soil movement is evident and consists of pedestaled soil on the uphill side of shrubs. There are no active gullies.

Browse composition includes several co-dominant shrubs of which the most important are black sagebrush, true mountain mahogany, and mountain big sagebrush. Black sagebrush is the most abundant preferred species with a current (1996) density of 1,460 plants/acre. Utilization is mostly light and percent decadence is 34%. All currently measured parameters are improvements over all earlier measurements in 1984 and 1990. Mountain big sagebrush occurs in scattered clumps where the soil is significantly deeper. These shrubs are moderately hedged but with 80% with poor vigor. Percent decadency has been high on each reading ranging from 70% to 100%. No reproduction has been noted and now dead plants outnumber live ones by a ratio of more than 2 to 1. True mountain mahogany currently numbers only 200 plants/acre. The average mature shrub measures just over 3 feet in height, but some plants on the site are tall enough to be partly unavailable. Utilization was extremely heavy in 1984, when 92% of the mahogany was heavily hedged (>60% of twigs browsed). Current use is more moderate.

Less desirable shrubs found on the site include green rubber rabbitbrush, narrowleaf low rabbitbrush, broom snakeweed, gray horsebrush, snowberry, and Utah juniper. Juniper number approximately 40 trees/acre with an average diameter of 6 inches. Broom snakeweed is the most abundant shrub with a current density of 3,420 plants/acre. It has varied considerably in density since 1984 when 4,766 plants/acre were estimated. During the 1990 reading, population density declined 58% to 1,999 plants/acre.

Herbaceous understory plants are limited to a moderately dense stand of cheatgrass intermixed with Sandberg bluegrass and occasional clumps of bluebunch wheatgrass and Indian ricegrass. Cheatgrass accounts for 34% of the grass cover. Forbs occur infrequently and combine to produce just under 2% total cover or 7% of the herbaceous cover.

1984 APPARENT TREND ASSESSMENT

Soil trend is slightly down because of moderately high erosion resulting from a lack of perennial herbaceous cover. An improvement in this cover category would

do much to stabilize this soil. vegetative trend is variable but must be judged down from an overall standpoint because of the apparent decline in mountain big sagebrush and black sagebrush.

1990 TREND ASSESSMENT

The key browse species on this heavily used winter range, display downward trend indications in the lack of reproduction and severely hedged growth forms. However, on the plants classified, recent hedging has been more moderate and growth and vigor are normal. The numbers of true mountain mahogany remain low. The population declined 54% while 94% of the population was classified as decadent. Broom snakeweed remains the most common species, but it did decrease by 58%. Sandberg bluegrass increased greatly in frequency and forms a dense understory. However, the cover value for bare soil increased to 13% and there is slight soil movement.

TREND ASSESSMENT

soil - slightly downward

browse - down

herbaceous understory - up slightly

1996 TREND ASSESSMENT

The soil trend is up due to a decline in bare ground from 13% to 7% and an increase in litter cover from 25% to 31%. Some soil movement is inevitable due to the steep slope but current erosion is minimal. Trend for browse is stable for true mountain mahogany and black sagebrush, but declining for mountain big sagebrush. This site is obviously harsh for many shrubs. Mountain big sagebrush shows no reproduction, moderate use, poor vigor and high decadency. Without some recruitment, mountain big sagebrush will eventually die out, but is only a minor component of browse as it only makes up 2% of the browse cover. Black sagebrush is lightly utilized with similar vigor as noted in 1990, yet percent decadence has declined from 94% to 34%. The density change from 1990 to 1996 may be partly due to the much larger sample used in 1996 which effectively tripled the sample size. There are high numbers of dead plants for both sagebrush species. Overall browse trend is considered stable. Trend for the herbaceous understory is up with an increase in sum of nested frequency for both perennial grasses and forbs. Sum of nested frequency for bluebunch wheatgrass doubled since 1990. Forbs are still limited, however sum of nested frequency for perennial species increased 70%.

TREND ASSESSMENT

soil - up

browse - stable for mahogany and black sagebrush but down for mountain big sagebrush which is a minor component

herbaceous understory - up

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 27

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	_a 30	_a 37	_b 80	15	15	35	6.01
G	Bromus brizaeformis (a)	-	-	9	-	-	3	.04
G	Bromus japonicus (a)	-	-	3	-	-	1	.00

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	<i>Bromus tectorum</i> (a)	-	-	315	-	-	95	8.50
G	<i>Koeleria cristata</i>	-	-	2	-	-	2	.06
G	<i>Oryzopsis hymenoides</i>	37	40	40	20	17	20	2.66
G	<i>Poa secunda</i>	_a 136	_b 270	_b 276	55	92	89	6.79
G	<i>Stipa comata</i>	_{ab} 13	_a 3	_b 21	5	3	9	.85
Total for Grasses		216	350	746	95	127	254	24.93
F	<i>Alyssum alyssoides</i> (a)	-	-	28	-	-	11	.10
F	<i>Arabis</i> spp.	4	-	4	2	-	2	.01
F	<i>Astragalus convallarius</i>	-	-	3	-	-	2	.01
F	<i>Camelina microcarpa</i> (a)	-	-	1	-	-	1	.00
F	<i>Chaenactis douglasii</i>	3	3	4	1	2	3	.01
F	<i>Cirsium</i> spp.	_a 19	_{ab} 5	_b 4	8	4	2	.06
F	<i>Cryptantha</i> spp.	_a 4	_a 15	_b 44	2	8	24	.93
F	<i>Epilobium brachycarpum</i> (a)	-	-	8	-	-	4	.02
F	<i>Hackelia patens</i>	-	17	12	-	7	7	.14
F	<i>Machaeranthera grindelioides</i>	-	-	3	-	-	1	.03
F	<i>Penstemon humilis</i>	_a -	_a -	_b 15	-	-	6	.27
F	<i>Phlox hoodii</i>	-	-	4	-	-	3	.04
F	<i>Senecio multilobatus</i>	_a 12	_b -	_a 28	8	-	13	.18
F	<i>Tragopogon dubius</i>	_a 14	_b -	_b 1	6	-	1	.00
F	<i>Verbascum thapsus</i>	_a 8	_b -	_a 10	4	-	5	.10
Total for Forbs		64	40	169	31	21	85	1.94

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

BROWSE TRENDS --

Herd unit 02 , Study no: 27

T y p e	Species	Strip Frequency '96	Average Cover % '96
B	<i>Artemisia nova</i>	30	3.37
B	<i>Artemisia tridentata</i> <i>vaseyana</i>	9	.18
B	<i>Cercocarpus montanus</i>	8	1.20
B	<i>Chrysothamnus</i> <i>nauseosus consimilis</i>	19	3.09
B	<i>Chrysothamnus</i> <i>viscidiflorus</i> <i>stenophyllus</i>	12	.72
B	<i>Eriogonum microthecum</i>	0	.00
B	<i>Gutierrezia sarothrae</i>	57	1.58

Type	Species	Strip Frequency '96	Average Cover % '96
B	Juniperus osteosperma	1	.00
B	Symphoricarpos oreophilus	2	-
B	Tetradymia canescens	10	.39
Total for Browse		148	10.56

BASIC COVER --

Herd unit 02 , Study no: 27

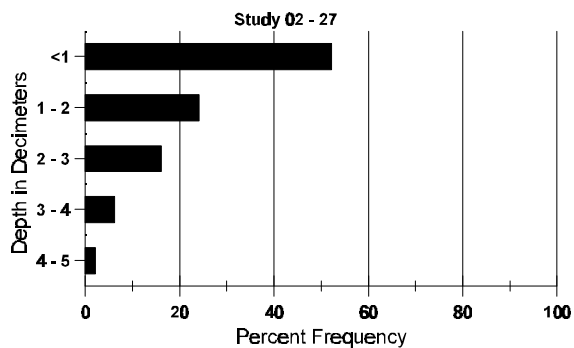
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	364	2.75	9.50	37.45
Rock	309	33.25	30.75	26.56
Pavement	229	7.00	11.25	6.03
Litter	384	38.00	25.25	30.82
Cryptogams	164	13.75	10.75	2.84
Bare Ground	200	5.25	12.50	7.39

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 27

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.8	58.0 (11.9)	7.6	39.2	37.4	23.4	2.4	5.6	153.6	.8

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 02 , Study no: 27

Type	Quadrat Frequency '96
Rabbit	6
Elk	1
Deer	9

BROWSE CHARACTERISTICS --
 Herd unit 02 , Study no: 27

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia nova</i>																		
S	84	7	-	-	-	-	-	-	-	-	7	-	-	-	233		7	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	2	1	-	-	-	-	-	-	3	-	-	-	100		3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2	
M	84	-	-	10	-	-	-	-	-	-	10	-	-	-	333	7	8	10
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	10	16	1
	96	44	1	-	1	-	-	-	-	-	45	-	1	-	920	15	28	46
D	84	-	-	26	-	-	-	-	-	-	26	-	-	-	866		26	
	90	9	8	-	-	-	-	-	-	-	14	-	-	3	566		17	
	96	24	1	-	-	-	-	-	-	-	14	-	1	10	500		25	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	360		18	
Total Plants/Acre (excluding Dead & Seedlings)												'84	1299	Dec:	67%			
												'90	599		94%			
												'96	1460		34%			
<i>Artemisia tridentata vaseyana</i>																		
M	84	-	-	1	-	-	-	-	-	-	-	-	1	-	33	16	18	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	1	-	-	-	-	-	-	2	-	1	-	60	18	31	3
D	84	-	2	6	-	-	-	-	-	-	6	-	-	2	266		8	
	90	1	-	-	-	-	-	-	-	-	1	-	-	33		1		
	96	1	5	1	-	-	-	-	-	-	-	-	6	1	140		7	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	480		24	
Total Plants/Acre (excluding Dead & Seedlings)												'84	299	Dec:	89%			
												'90	33		100%			
												'96	200		70%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Cercocarpus montanus</i>																		
S	84	9	1	-	-	-	-	-	-	-	10	-	-	-	333		10	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	1	2	-	-	-	-	-	-	3	-	-	-	100		3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	2	-	-	-	-	2	-	-	-	40		2	
M	84	-	-	10	-	-	-	-	-	-	10	-	-	-	333	48 59	10	
	90	2	3	-	-	-	-	-	-	-	5	-	-	-	166	40 45	5	
	96	-	4	2	-	2	-	-	-	-	6	2	-	-	160	38 56	8	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	2	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	433	Dec:	0%			
												'90	299		44%			
												'96	200		0%			
<i>Chrysothamnus nauseosus consimilis</i>																		
Y	84	-	2	-	-	-	-	-	-	-	2	-	-	-	66		2	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	90	5	-	-	-	-	-	-	-	-	4	1	-	-	333	32 26	5	
	96	25	-	-	-	-	-	-	-	-	22	-	3	-	500	26 41	25	
D	84	3	5	-	-	-	-	-	-	-	8	-	-	-	266		8	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	96	5	-	-	-	-	-	-	-	-	1	-	4	-	100		5	
Total Plants/Acre (excluding Dead & Seedlings)												'84	332	Dec:	80%			
												'90	399		17%			
												'96	620		16%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	84	6	-	-	-	-	-	-	-	-	6	-	-	-	200		6	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	9	-	-	-	-	-	-	-	-	9	-	-	-	300	13 27	9	
	90	6	-	-	-	-	-	-	-	-	6	-	-	-	200	10 14	6	
	96	14	-	-	2	-	-	-	-	-	13	-	3	-	320	14 22	16	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	500	Dec:	0%			
												'90	200		0%			
												'96	400		15%			

A G E	YR	Form Class (No. of 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	11	-	-	-	-	-	-	-	-	11	-	-	-	733		11	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	84	63	-	-	-	-	-	-	-	-	63	-	-	-	2100		63	
	90	35	-	-	-	-	-	-	-	-	35	-	-	-	1166		35	
	96	34	-	-	-	-	-	-	-	-	34	-	-	-	680		34	
M	84	80	-	-	-	-	-	-	-	-	80	-	-	-	2666	8	9	80
	90	15	-	-	-	-	-	-	-	-	15	-	-	-	500	13	12	15
	96	137	-	-	-	-	-	-	-	-	137	-	-	-	2740	10	11	137
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	5	-	-	-	-	-	-	-	-	3	-	-	2	333		5	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	4766	Dec:	0%			
												'90	1999		17%			
												'96	3420		0%			
<i>Juniperus scopulorum</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
<i>Leptodactylon pungens</i>																		
M	84	2	-	-	-	-	-	-	-	-	2	-	-	-	66	4	4	2
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Symphoricarpos oreophilus</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	-	-	2	-	40		2	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	2	-	-	-	-	-	-	-	-	-	2	-	40	17	28	2
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	80		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Tetradymia canescens																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33	9	10	1
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	100	7	7	3
	96	11	-	-	-	-	-	-	-	-	6	-	5	-	220	11	20	11
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	-	-	2	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	0%			
												'90	100		0%			
												'96	280		14%			

TREND STUDY 2-28-96 (old 5-2)

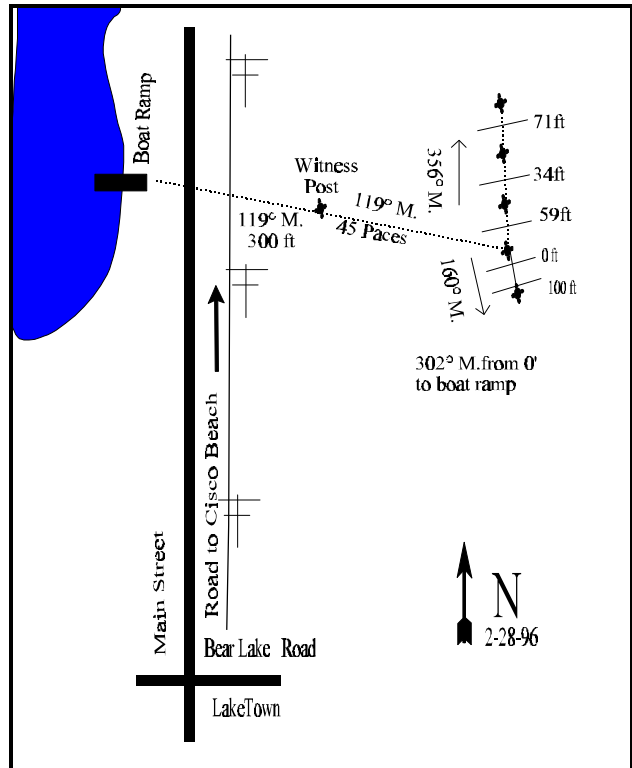
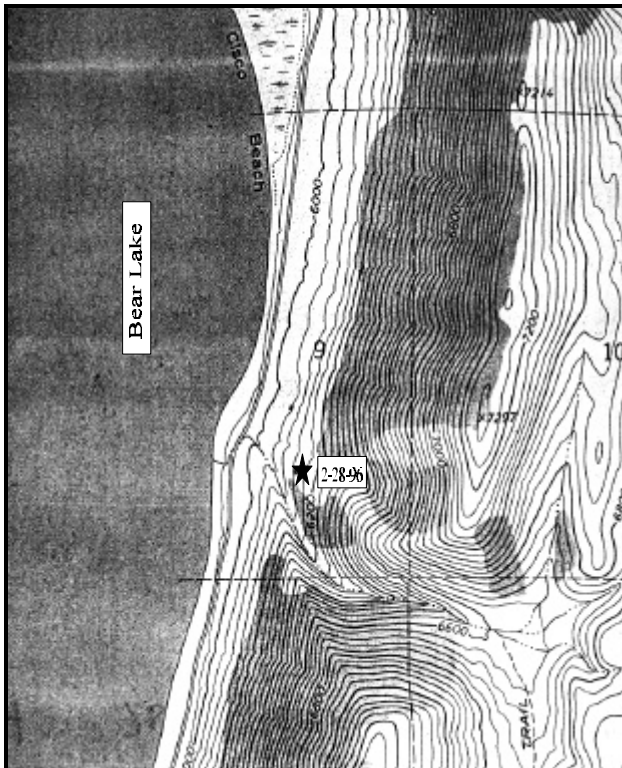
Study site name: North Eden. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 160 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft).

LOCATION DESCRIPTION

From Bear Lake road and Main Street in Laketown, proceed north on Main Street 10.75 miles along east shore. Turn right onto a dirt road proceeding to a power line. From the power line, walk up the slope on a bearing of 119 degrees magnetic for 300 feet to a witness post. From the witness post, walk 45 paces at 119 degrees magnetic to the 0-foot stake of the baseline, marked with browse tag #7979. The first 100 feet of the baseline runs 160 degrees magnetic. The rest of the baseline runs off the 0-foot baseline stake and runs in a direction of 356 degrees magnetic.



Map Name: Bear Lake South

Diagrammatic Sketch

Township 14N, Range 6E, Section 9, UTM COOR: 4-77-621E 46-45-978N

DISCUSSION

Trend Study No. 2-28 (5-2)

The North Eden study is located on the east side of Bear Lake between north and South Eden Canyons. This area typically faces west and is characterized by steep slopes that gradually level off as they get to the lake. The study site is a moderate sloping (25%) bench at 6,120 feet elevation. The range type is mixture of mountain big sagebrush/black sagebrush/grass interrupted by scattered Utah juniper. Animal use is moderate to heavy and divided between deer, cattle and possibly sheep. Quadrat frequency for deer pellet groups is currently (1996) high at 39%. Rabbit sign is also fairly abundant.

According to SCS maps, soil at the site is "Dagan Gravelly Silt Loam," a moderately deep, well drained soil derived from quartzite-sandstone conglomerate. This is a moderately calcareous, mildly alkaline soil with low water holding capability. Potential rooting depth is not significantly impaired even though there is sometimes a slight calcium carbonate accumulation at about 28 inches in depth. All the Dagan soils are subject to rapid runoff and have high erosion hazards (Campbell and Lacey 1982). Soil analysis of the site shows it has a clay loam texture, a neutral pH, and an estimated effective rooting depth (see methods) of nearly 12 inches. There is little rock on the surface or in the profile and no evidence of a hardpan. Bare ground isn't abundant, but where protective vegetation and litter cover are limited, erosion is occurring.

The key browse species are Wyoming big sagebrush and black sagebrush. Density of black sagebrush declined from 2,065 to 440 plants/acre between 1990 and 1996. Due to the low number of dead plants and low decadency rate, this change in density is the result of the much larger sample used in 1996 which lengthened the base line from 100 feet to 400 feet. This new estimate would be more representative of the whole area. In contrast, Wyoming big sagebrush shows a continual declining density from 5,332 plants/acre in 1984 to 2,800 by 1996. Currently dead plants are nearly as numerous as live ones (1,900 plants/acre), indicating a die off. The ratio of dead to live plants is 1:1.5. Utilization of both sagebrush species was intense in the past (1984), but currently use of black sagebrush is more moderate while use of Wyoming big sagebrush is light to moderate with 10% of the shrubs displaying heavy use. Vigor of Wyoming big sagebrush was depressed in 26% of the population. Percent decadency is moderately high at 46%, yet it has declined since 1990 when it was 59%. Reproduction has been adequate in the past, currently there are no seedlings and few young.

Other shrub species include narrowleaf low rabbitbrush, white rubber rabbitbrush, prickly pear, and Utah juniper. None occur very frequently or sustain much browsing use. They will likely remain secondary in importance. Juniper has an estimated density of 39 trees/acre using point quarter data.

Herbaceous cover consists mainly of grasses, especially cheatgrass, which in places forms a uniform dense cover. Currently cheatgrass accounts for 21% of the grass cover. Perennial grasses are best represented by bluebunch wheatgrass, Sandberg bluegrass, and bottlebrush squirreltail. Forbs are uncommon and produce less than 2% cover or 7% of the herbaceous cover.

1984 APPARENT TREND ASSESSMENT

Soil trend is slightly down. Plant pedestaling and other indications of active sheet and gully erosion are common. Cover is irregular in nature and the many areas of bare soil provide ready erosion pathways. Vegetative trend is stable or slightly down. In the future it will be important to monitor the relative abundance of the two key browse species and Utah juniper.

1990 TREND ASSESSMENT

Data comparisons show a decline in sum of nested frequency and quadrat frequency values for Wyoming big sagebrush and black sagebrush. Both have declined in density (35% and 38% respectively), and many dead and decadent sagebrush are evident. The Wyoming big sagebrush population is 58% decadent, while the black sage population improved from 70% to 30% decadency. As opposed to the heavily hedged growth forms recorded in 1984, the sagebrush appear to be only moderately hedged. There are 38 junipers/acre. Although the grasses have been heavily grazed, the frequency of bluebunch wheatgrass had increased significantly. The percentage of cryptograms and litter cover decreased, leading to an increase in the amount of bare soil. But, this would be expected with the extended drought. Sheet and gully erosion are noticeable.

TREND ASSESSMENT

soil - down

browse - down, with the decreases for both key species, black sagebrush and Wyoming big sagebrush

herbaceous understory - up with increases for key grasses and most forbs

1996 TREND ASSESSMENT

Trend for soil is up with a 57% decline in percent bare ground and a slight increase in litter cover. Erosion is still occurring but it is localized and not severe. The larger sample used in 1996 estimates cover of black sagebrush at only almost 2%, while that of Wyoming big sagebrush produces 14% cover. This new larger sample estimated only 440 black sagebrush plants/acre instead of 2,065 estimated in 1990. The larger sample better estimates shrub populations which sometimes have an aggregated and/or discontinuous distribution. The lack of many dead plants encountered in 1996 (40 plants/acre) would present evidence that no significant die off of black sagebrush has occurred. Black sagebrush displays a stable trend with light to moderate use, generally good vigor and a low decadency rate. Wyoming big sagebrush however, appears to have a slightly downward trend. Total density declined 19% since 1990. Use is more moderate but vigor is still poor on 26% of the population. Percent decadency has declined, while it is still high at 46%. Recruitment is down and 28% of the decadent shrubs were classified as dying. The extremely high number of dead plants (1,900 plants/acre) indicates that the population has declined. Taking all these factors into consideration, the Wyoming big sagebrush population will likely decline further in the future and the remaining plants will be younger and more vigorous. The herbaceous understory trend is slightly down. Sum of nested frequency for bluebunch wheatgrass and Sandberg bluegrass declined significantly since 1990. Sum of nested frequency also declined for forbs by 64%.

TREND ASSESSMENT

soil - up

browse - slightly down for Wyoming big sagebrush which makes up 67% of the browse cover

herbaceous understory - slightly down

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 28

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	_a 161	_b 210	_a 137	71	83	54	7.19
G	Bromus tectorum (a)	-	-	152	-	-	52	4.32
G	Oryzopsis hymenoides	3	-	-	2	-	-	.03
G	Poa secunda	_a 210	_b 303	_b 284	85	95	89	8.09
G	Sitanion hystrix	_a 26	_b 5	_a 47	13	2	18	1.29
Total for Grasses		400	518	620	171	180	213	20.94
F	Astragalus convallarius	_a 9	_b -	_b -	6	-	-	-
F	Astragalus spp.	2	-	-	1	-	-	-
F	Balsamorhiza sagittata	-	-	1	-	-	1	.30
F	Calochortus nuttallii	-	3	-	-	1	-	-
F	Chaenactis douglasii	-	-	3	-	-	1	.00
F	Collinsia parviflora (a)	-	-	7	-	-	2	.18
F	Crepis acuminata	_a 9	_b 33	_a 16	4	17	8	.14
F	Cryptantha spp.	1	2	-	1	2	-	-
F	Erigeron spp	-	5	6	-	2	2	.09
F	Holosteum umbellatum (a)	-	-	1	-	-	1	.00
F	Orthocarpus spp. (a)	-	-	30	-	-	14	.48
F	Phlox hoodii	_a 6	_b 26	_a -	3	12	-	-
F	Phlox longifolia	_a -	_b 149	_c 53	-	58	22	.19
F	Sphaeralcea grossulariaefolia	-	-	3	-	-	1	.15
F	Tragopogon dubius	_a 10	_b -	_b -	6	-	-	-
F	Unknown forb-perennial	_a -	_b 12	_a -	-	6	-	-
Total for Forbs		37	230	120	21	98	52	1.55

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

BROWSE TRENDS --

Herd unit 02 , Study no: 28

T y p e	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia nova	10	1.60
B	Artemisia tridentata wyomingensis	80	14.01
B	Chrysothamnus viscidiflorus stenophyllus	13	1.30
B	Eriogonum microthecum	2	-
B	Juniperus osteosperma	3	3.94

Type	Species	Strip Frequency '96	Average Cover % '96
B	Opuntia fragilis	3	.03
Total for Browse		111	20.89

BASIC COVER --

Herd unit 02 , Study no: 28

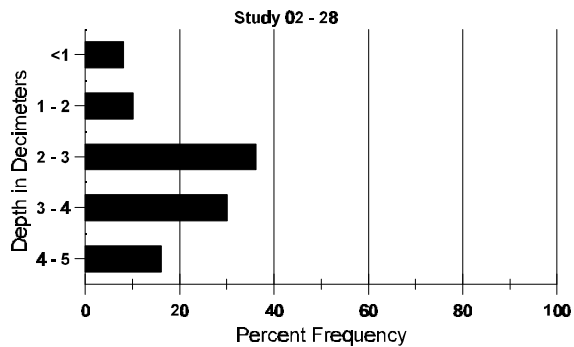
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	366	2.25	10.00	43.52
Rock	59	1.00	1.00	.74
Pavement	68	0	0	.75
Litter	392	54.25	43.25	44.15
Cryptogams	211	20.50	16.00	11.19
Bare Ground	195	22.00	29.75	12.75

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 28

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.8	62.6 (12.7)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 28

Type	Quadrat Frequency '96
Rabbit	25
Deer	39
Cattle	7

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 28

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia nova</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	5	-	-	-	-	-	-	-	-	4	-	1	-	333		5	
	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	4	10	-	-	-	-	-	-	14	-	-	-	933	13	14	14
	90	16	-	-	-	-	-	-	-	-	16	-	-	-	1066	15	19	16
	96	4	14	-	-	-	-	-	-	-	16	-	2	-	360	13	21	18
D	84	-	15	20	-	-	-	-	-	-	29	-	6	-	2333		35	
	90	10	-	-	-	-	-	-	-	-	10	-	-	-	666		10	
	96	-	3	-	-	-	-	-	-	-	3	-	-	-	60		3	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	3332	Dec:	70%			
												'90	2065		32%			
												'96	440		14%			
<i>Artemisia tridentata wyomingensis</i>																		
S	84	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	3	1	-	-	-	-	-	-	-	4	-	-	-	266		4	
	90	4	-	1	-	-	-	-	-	-	5	-	-	-	333		5	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	84	-	11	23	-	-	-	-	-	-	33	-	1	-	2266	24	25	34
	90	11	4	1	-	-	-	-	-	-	16	-	-	-	1066	22	20	16
	96	38	26	7	-	-	-	-	-	-	60	-	11	-	1420	29	38	71
D	84	1	12	29	-	-	-	-	-	-	35	-	7	-	2800		42	
	90	16	8	7	-	-	-	-	-	-	11	3	11	6	2066		31	
	96	26	30	7	2	-	-	-	-	-	39	-	8	18	1300		65	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1900		95	
Total Plants/Acre (excluding Dead & Seedlings)												'84	5332	Dec:	53%			
												'90	3465		60%			
												'96	2800		46%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66	21	11	1
	90	-	-	1	-	-	-	-	-	-	1	-	-	-	66	6	7	1
	96	14	3	-	-	-	-	-	-	-	9	-	8	-	340	15	23	17
D	84	2	-	-	-	-	-	-	-	-	-	-	2	-	133		2	
	90	-	1	-	1	-	-	-	-	-	1	-	1	-	133		2	
	96	1	1	-	-	-	-	-	-	-	1	-	1	-	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	199	Dec:	67%			
												'90	199		67%			
												'96	400		10%			
<i>Eriogonum microthecum</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	8	9	2
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	40		-			
<i>Juniperus osteosperma</i>																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	1	-	-	1	-	-	-	-	-	2	-	-	-	133	69	49	2
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	93	63	1
	96	-	-	-	-	-	-	2	-	-	2	-	-	-	40	-	-	2
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	-			
												'90	132		-			
												'96	60		-			
<i>Opuntia fragilis</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200	6	7	3
	90	6	-	-	-	-	-	-	-	-	6	-	-	-	400	4	7	6
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80	6	20	4
Total Plants/Acre (excluding Dead & Seedlings)												'84	200	Dec:	-			
												'90	400		-			
												'96	80		-			

TREND STUDY 2-29-96 (old 5-3)

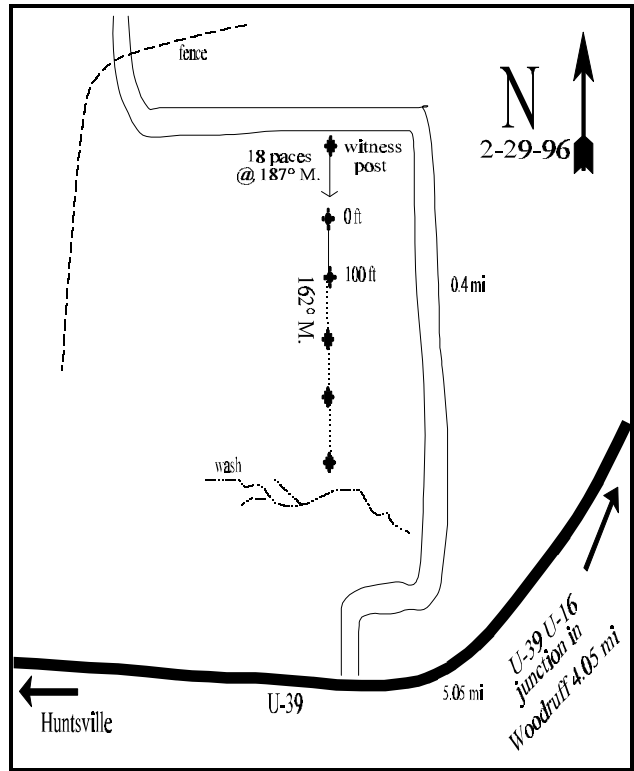
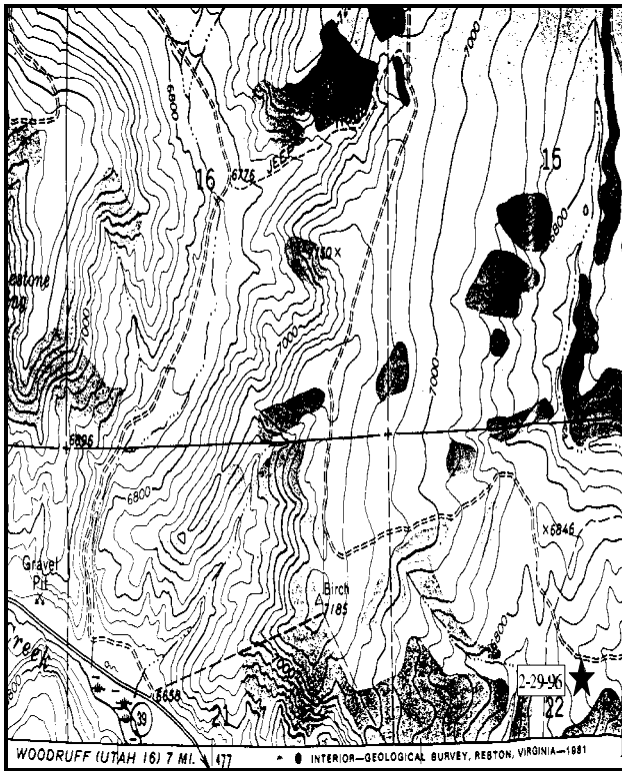
Study site name: Woodruff Creek. Range type: Juniper.

Compass bearing: frequency baseline 162 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the junction of U-39 and U-16 in Woodruff, proceed west on U-39 for 5.05 miles, and turn right onto a dirt road. This road should be 0.05 miles past marker 63. Proceed north on this road stopping after 0.4 miles at a witness post on the left (south). From the witness post, walk 18 paces at 187 degrees magnetic to the 0-foot stake of the baseline marked by browse tag #7989.



Map Name: Birch Creek Reservoirs

Diagrammatic Sketch

Township 9N, Range 6E, Section 22, UTM COOR: 4-78-697E 45-94-511N

DISCUSSION

Trend Study No. 2-29 (5-3)

This study samples critical winter range on the north side of Woodruff Creek. The site is located on gentle, rolling terrain at approximately 6,720 feet elevation. The range type is scattered juniper-pinyon woodland of about 200 trees/acre, intermixed with Wyoming big sagebrush which has a fair herbaceous association. The area also sustains heavy use from deer and livestock. Wildlife use may have intensified in recent years because surrounding habitat has been chained and seeded to provide livestock forage. Design of the chaining project has resulted in extremely large open areas that are devoid of cover and have minimum "edge" and contain little browse forage. Wildlife habitat needs were obviously not a consideration. Quadrat frequency of deer pellet groups was moderately high at 38% in 1996. Rabbit pellet groups are also fairly common. Some cattle pats were seen in the area but none were encountered within the quadrats for they are more in the chained areas.

Soil is moderately shallow with effective rooting depth (see methods) is estimated at 12 inches. Soil texture is a clay loam with some gravel in the profile and pavement concentrated on the surface. Combined rock and pavement cover is at 11%. Soil on the site has a neutral pH (7.3). Chemical analysis of the soil indicates a low level of phosphorus in the soil (6.2 PPM) which could be a limiting factor to the sites productivity. Productive ground cover is poor with large unprotected interspaces. Soil pedestaling is evident and sheet erosion is occurring, yet no gullies have formed on the site due to the gentle terrain.

Available browse forage comes primarily from Wyoming big sagebrush which accounts for 34% of the shrub cover. The moderately dense stand had an estimated density of 6,465 plants/acre in 1984. Utilization was heavy at that time (>60% of twigs browsed) on 78% of the shrubs with 56% classified as decadent. Population density was estimated at 5,065 plants/acre in 1990. Utilization was still heavy on nearly half (42%) of the sagebrush and vigor was poor on 33% of the plants. Percent decadency increased slightly to 57%, with coincidentally 57% of the decadent sagebrush classified as dying. No seedlings were encountered during either of the previous readings, but young plants accounted for 5% of the population during both years. During the 1996 reading, the base line was lengthened to greatly increase the sampled area. The longer baseline extends into a denser stand of juniper trees than the original 100 foot baseline, therefore density estimates for 1996 may be lower as a result. Juniper canopy cover is variable on the site ranging from 2% to as high as 43%. The average canopy cover is 14% for the site. Wyoming big sagebrush density was estimated at 2,260 plants/acre. Mature plants are somewhat stunted and measure only 16 inches in height. Utilization is light to moderate with 11% of the plants displaying heavy use.

Other browse species found on the site include serviceberry, narrowleaf low rabbitbrush, snowberry, and gray horsebrush. All occur in small numbers except narrowleaf low rabbitbrush which accounts for 31% of the browse cover with an estimated density of 4,900 plants/acre in 1996. Density has increased since 1984, with the current population classified as mostly mature (95%) with no seedlings and few young plants. The stand does not appear to be expanding further at this time.

The herbaceous understory is diverse, while not particularly abundant. Eight perennial and one annual grass combine to produce about 10% cover. The most common species include muttongrass, and Sandberg bluegrass. The accompanying data summary is indicative of forb diversity on this site. The number of species considerably exceeds that normally encountered on juniper-pinyon sites. However,

in spite of the apparent diversity, forage production and cover from forbs is quite low. Even annual forbs are unimportant. Only owl clover (*Orthocarpus spp.*) and hood's phlox are present in more than occasional numbers.

1984 APPARENT TREND ASSESSMENT

Soil trend appears to be declining. Almost every trend parameter suggests that erosion losses far exceed the rate of soil formation. Vegetative trends are more difficult to assess. Our best estimate is that Wyoming big sagebrush is slowly declining in density due to excessive use and inadequate reproduction. At the same time, the Utah juniper overstory may be expanding. The herbaceous understory is a remarkably good one for this range type but still likely to decline if the juniper canopy increases.

1990 TREND ASSESSMENT

The Wyoming big sagebrush stand on the Woodruff Creek study site has remained stable in frequency and density since 1984. However, the relatively small shrubs display heavy hedging and poor vigor. There is an overly high percentage of decadent plants (57%), but not much different than 1984 (56%). The density of juniper has not increased since 1984. The point-centered quarter method estimate is 182 juniper/acre, mostly young trees. There have been some changes in composition of the herbaceous understory, but total frequency and diversity remain high for the type of site. The increase in the percentage of pavement cover is a result of continued soil loss.

TREND ASSESSMENT

soil - down

browse - stable to slight decline

herbaceous understory - slight improvement, good increases for most grasses, with declines for many forbs which is expected with the extended drought

1996 TREND ASSESSMENT

Trend for soil is slightly down due to an increase in bare ground from 21% to 28%. This increase in bare ground cover comes primarily from a reduction in pavement cover which declined from 22% to 9%. This would indicate possible recent soil movement. Trend for the key browse species, Wyoming big sagebrush is down and appears to have been declining in density since 1984. Dead plants, first counted in 1996, number 1,260 plants/acre. Utilization has been heavy in the past but current use is mostly light to moderate. Vigor is poor on 25% of the shrubs and 40% of the population is decadent. Of the plants that are classified as decadent, 50% appear to be dying. Reproduction is poor with only a few seedlings encountered. This downward trend will continue as juniper cover increases. Trend for the herbaceous understory is down slightly due to a decline in the sum of nested frequency for perennial grasses. Four of the eight perennial grasses inventoried in 1996, declined significantly in their sum of nested frequency values. Sum of nested frequency for forbs remained similar to 1990, but forbs only make up 29% of the herbaceous cover.

TREND ASSESSMENT

soil - down slightly

browse - down

herbaceous understory - down for perennial grasses, stable for forbs, slightly down overall

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 29

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	<i>Agropyron cristatum</i>	-	-	1	-	-	1	.03
G	<i>Agropyron dasystachyum</i>	a195	a201	b101	70	75	39	.54
G	<i>Agropyron spicatum</i>	a1	a7	b24	1	4	10	.36
G	<i>Bromus tectorum</i> (a)	-	-	11	-	-	4	.16
G	<i>Oryzopsis hymenoides</i>	a1	b20	ab11	1	8	4	.61
G	<i>Poa fendleriana</i>	a46	b141	b133	20	60	56	5.24
G	<i>Poa pratensis</i>	-	-	1	-	-	1	.03
G	<i>Poa secunda</i>	ab123	a161	b102	56	62	42	2.53
G	<i>Sitanion hystrix</i>	22	22	27	13	12	15	.57
Total for Grasses		388	552	411	161	221	172	10.10
F	<i>Achillea millefolium</i>	-	-	1	-	-	1	.00
F	<i>Allium acuminatum</i>	a14	b-	b-	7	-	-	-
F	<i>Antennaria rosea</i>	7	10	3	3	5	1	.00
F	<i>Arabis holboellii</i>	2	-	4	1	-	2	.01
F	<i>Astragalus beckwithii</i>	a13	b-	b-	6	-	-	-
F	<i>Astragalus convallarius</i>	a13	b-	a12	6	-	5	.05
F	<i>Asclepias speciosa</i>	-	-	12	-	-	5	.36
F	<i>Astragalus utahensis</i>	a18	b6	b2	11	3	1	.00
F	<i>Calochortus nuttallii</i>	1	-	-	1	-	-	-
F	<i>Chaenactis douglasii</i>	a34	b2	b6	18	1	3	.01
F	<i>Comandra pallida</i>	a35	b21	ab23	19	8	11	.13
F	<i>Crepis acuminata</i>	3	-	4	2	-	1	.00
F	<i>Cryptantha</i> spp.	26	22	26	16	12	17	.46
F	<i>Cymopterus</i> spp.	a-	a-	b10	-	-	5	.02
F	<i>Descurainia</i> spp. (a)	-	-	3	-	-	1	.00
F	<i>Erigeron pumilus</i>	a11	b-	b-	7	-	-	-
F	<i>Eriogonum umbellatum</i>	4	-	5	2	-	4	.04
F	<i>Halogeton glomeratus</i> (a)	-	-	1	-	-	1	.00
F	<i>Ipomopsis aggregata</i>	7	-	4	3	-	2	.01
F	<i>Lithospermum ruderale</i>	3	-	-	1	-	-	-
F	<i>Orthocarpus</i> spp. (a)	-	-	12	-	-	8	.07
F	<i>Penstemon humilis</i>	a86	a85	b46	40	43	19	.58
F	<i>Phlox hoodii</i>	88	103	80	39	42	37	1.41
F	<i>Phlox longifolia</i>	a62	ab48	b33	26	19	16	.08

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	Ranunculus testiculatus (a)	-	-	1	-	-	1	.00
F	Senecio multilobatus	_a 61	_b 10	_a 75	29	6	31	.89
Total for Forbs		488	307	363	237	139	172	4.19

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

BROWSE TRENDS --

Herd unit 02 , Study no: 29

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata wyomingensis	60	5.53
B	Chrysothamnus viscidiflorus stenophyllus	77	4.97
B	Juniperus osteosperma	8	4.42
B	Symphoricarpos oreophilus	3	.15
B	Tetradymia canescens	19	1.01
Total for Browse		167	16.11

BASIC COVER --

Herd unit 02 , Study no: 29

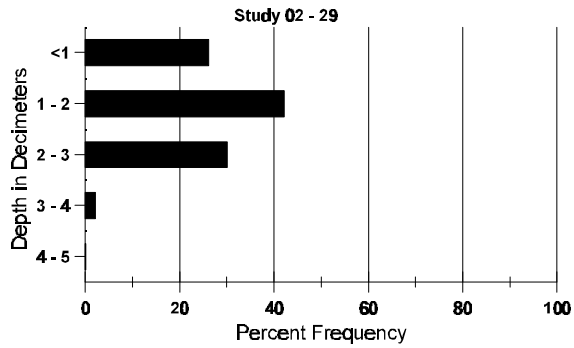
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	306	4.75	7.50	30.55
Rock	105	1.75	2.50	1.46
Pavement	273	10.50	21.75	9.37
Litter	390	47.25	33.50	38.38
Cryptogams	88	3.00	13.75	2.05
Bare Ground	306	32.75	21.00	27.75

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 29

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.2	55.8 (13.7)	7.3	34.6	32.1	33.4	2.5	6.2	25.6	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 29

Type	Quadrat Frequency '96
Rabbit	21
Elk	6
Deer	38

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 29

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Amelanchier utahensis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	16	24	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Artemisia nova</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	4	6	-	-	-	-	-	-	9	-	-	1	666	14	21	10
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	9	2	-	-	-	-	-	-	10	-	-	1	733			11
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	1399		52%			
												'96	0		0%			

A G E	YR	Form Class (No. of 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	90	3	1	-	-	-	-	-	-	-	4	-	-	-	266		4	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	5	8	24	-	-	-	-	-	-	36	1	-	-	2466	13 16	37	
	90	2	12	11	1	2	-	-	-	-	28	-	-	-	1866	20 21	28	
	96	37	26	3	1	-	-	-	-	-	61	1	-	5	1340	16 27	67	
D	84	-	3	52	-	-	-	-	-	-	49	-	3	3	3666		55	
	90	2	21	21	-	-	-	-	-	-	19	-	-	25	2933		44	
	96	17	20	9	-	-	-	-	-	-	23	-	-	23	920		46	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1260		63	
Total Plants/Acre (excluding Dead & Seedlings)												'84	6465	Dec:	57%			
												'90	5065		58%			
												'96	2260		41%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	9	4	-	2	-	-	-	-	-	15	-	-	-	1000		15	
	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
M	84	36	-	-	-	-	-	-	-	-	36	-	-	-	2400	7 10	36	
	90	11	12	-	6	-	-	-	-	-	29	-	-	-	1933	7 12	29	
	96	218	-	-	15	-	-	-	-	-	233	-	-	-	4660	9 15	233	
D	84	7	-	-	-	-	-	-	-	-	6	-	1	-	466		7	
	90	2	6	1	-	1	-	-	-	-	10	-	-	-	666		10	
	96	4	-	-	-	-	-	-	-	-	2	-	-	2	80		4	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	2999	Dec:	16%			
												'90	3599		19%			
												'96	4900		2%			

A G E	YR	Form Class (No. of 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>																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	2	2	-	-	-	-	-	-	-	4	-	-	-	266		4	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	1	-	-	-	-	1	-	-	-	2	-	-	-	133	57 22	2	
	90	-	-	-	-	-	1	-	-	-	1	-	-	-	66	89 51	1	
	96	6	2	-	-	-	-	-	-	-	8	-	-	-	160	- -	8	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	266	Dec:	-			
												'90	332		-			
												'96	160		-			
<i>Symphoricarpos oreophilus</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	96	2	-	-	2	-	-	-	-	-	3	-	1	-	80	11 21	4	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	80		-			
<i>Tetradymia canescens</i>																		
M	84	-	1	1	-	-	-	-	-	-	2	-	-	-	133	9 16	2	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	96	18	2	-	-	-	-	-	-	-	20	-	-	-	400	12 20	20	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	2	1	-	-	-	-	-	-	3	-	-	-	200		3	
	96	2	-	-	-	-	-	-	-	-	1	-	-	1	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	133	Dec:	0%			
												'90	200		100%			
												'96	440		9%			

TREND STUDY 2-30-96 (old 5-5)

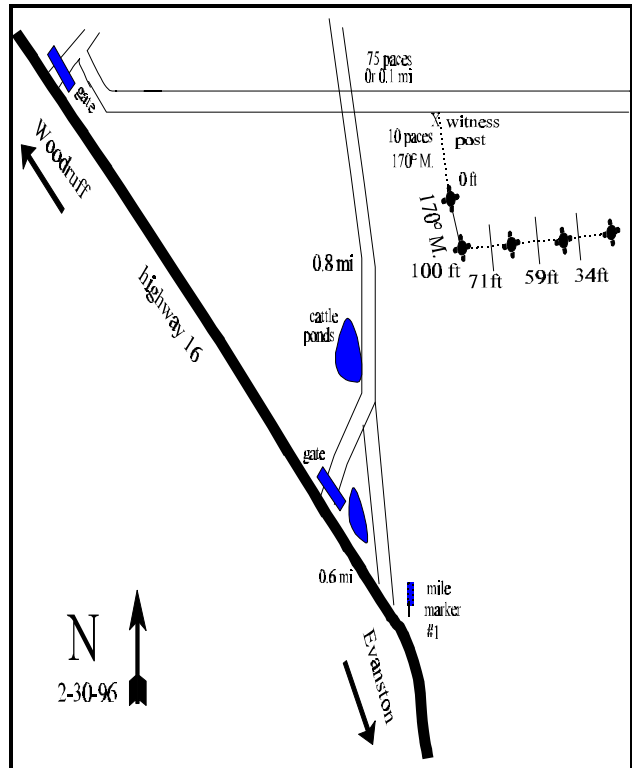
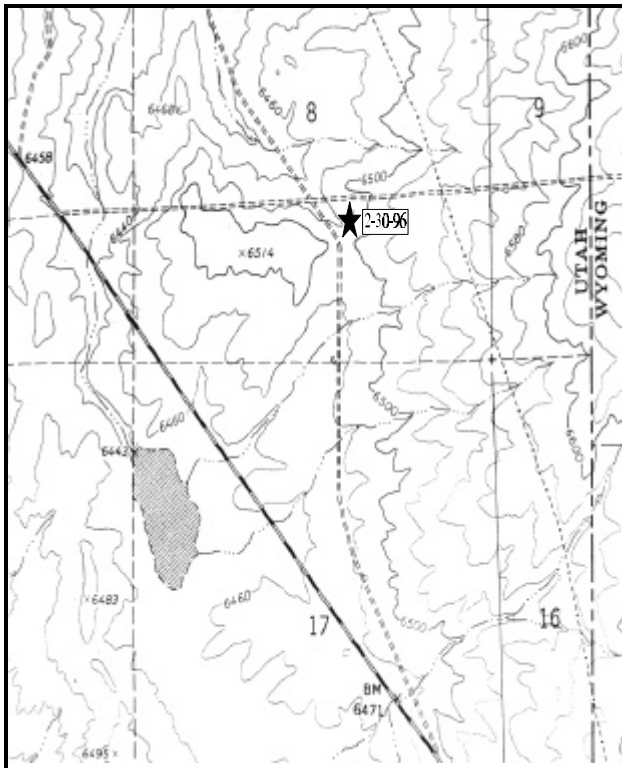
Study site name: State Line. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 170 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (71ft), line 3 (59ft), line 4 (34ft).

LOCATION DESCRIPTION

From the Utah/Wyoming border, proceed north on Highway 16-89 for 0.6 miles past miles marker one. Turn right proceeding through gate, and travel 0.8 miles north to an intersection in a wash. Turn right, and drive 0.1 miles east to a witness post. At the prescribed distance take a bearing of 146 degrees true, and walk 13 paces to the 0-foot stake of the baseline. The 0-foot stake is wired with a browse tag # 7991



Map Name: Neponset Reservoir NE

Diagrammatic Sketch

Township 8N, Range 8E, Section 8, UTM COOR: 4-95-030E 45-87-878N

DISCUSSION

Trend Study No. 2-30 (5-5)

This study is located near the Utah-Wyoming state line east and south of Woodruff on gentle to nearly level terrain with an elevation of 6,490 feet. This area is dominated by Wyoming big sagebrush where it provides 70% of the total plant cover. The site is used by deer, antelope, and rabbits. Quadrat frequency of deer pellet groups is currently (1996) moderately high at 26%. Forage utilization is moderate.

Soil is "Neponset Sandy Loam," a moderately deep, well drained soil residually formed from sandstone and siltstone. Total soil depth ranges from 20 to 40 inches and is moderately to strongly alkaline and calcareous throughout. Neponset soil is moderately permeable to water and has low available water capacity. It is moderately susceptible to water erosion and highly susceptible to wind erosion and dune formation (Campbell and Lacey 1982). Soil on the site varies slightly from this description with soil analysis showing a texture that is a clay loam with a pH of 7.8 which can almost be classified as moderately alkaline. Effective rooting depth (see methods) is more than 10 inches. Soil temperature is low, averaging only 55°F at a depth of 9 inches. The surface is nearly free of rock cover with a layer of calcareous rock about 10 inches below the surface. Current or actual soil condition is fair. Although moderately high amounts of bare ground are exposed, terrain is nearly level so water erosion is not excessive, however soil pedestaling is evident around plants. A dense stand of Wyoming big sagebrush helps stabilize the area and prevent formation of dunes and "blowouts."

Vegetatively, the landscape is dominated by Wyoming big sagebrush which provides 91% of the browse cover and 70% of the total vegetative cover. Its density has fluctuated between 8,066 plants/acre in 1990 to 6,500 in 1996. Density of mature plants has increased, while the number of decadent plants has remained somewhat similar between readings. The change in density is largely the result in the changes in the number of young plants which accounted for 15% of the population density in 1984 and 17% in 1990. Due to the drought, seedlings and young are scarce in 1996 with few mature plants producing seed. Utilization is moderate and vigor good on most plants. Percent decadency is 32%. It should be noted that the only negative trend in the sagebrush population was in 1996, when the sampling design had been greatly increased. This was done to get better estimates for shrub populations that are characteristically clumped and/or discontinuous in their distributions. The number of dead plants cannot explain all of the losses, therefore some of the loss would have to be because of the better design giving more accurate population estimates, which are lower.

Other fairly common browse species include Gardner saltbush (*Atriplex tridentata*), and narrowleaf low rabbitbrush. Gardner saltbush is a very small, low-growing saltbush that is strongly rhizomatous and sprouts profusely. It is an important browse, especially on disturbed sites where it seems to perform exceptionally well. The density plot data from 1984 and 1990 almost certainly present a biased picture of this species importance with 3,866 and 5,532 plants/acre estimated respectively. The much larger sample used in 1996 gives a better picture of the shrubs true density (1,840 plants/acre). Narrowleaf low rabbitbrush has a mostly mature population with few seedlings or young.

Herbaceous composition produces little forage and lacks diversity. Grass production is poor and many acres are required to support a single AUM. The only common grass is Sandberg bluegrass which accounts for 87% of the grass cover, but only 12% of the total vegetative cover. This area also has an occasional crested wheatgrass. Forbs are even less productive and few species have any significant value. The only fairly common species include hoods phlox and stemless

goldenweed (*Hymenoxys acaulis*).

1984 APPARENT TREND ASSESSMENT

Soil and vegetation trend are closely related and interdependent factors. Currently, both are stable but any significant disturbance will bring considerable change. This soil is highly susceptible to wind erosion and depends on the dominant sagebrush for stabilization. Disturbed sites blow easily and are favorable places for saltbush and stemless hymenoxys to become established.

1990 TREND ASSESSMENT

The Wyoming big sagebrush on the State Line site is moderately to heavily hedged with fair vigor (this would be unusual considering the drought conditions) and a well-balanced age class structure. The herbaceous understory is in poor condition on this lightly grazed site. The frequency of bluebunch wheatgrass declined significantly. As with the previous sites, the percentage of litter cover is lower and the amount of bare soil increased. Soil erosion is not excessive due to the mild slope.

TREND ASSESSMENT

soil - stable

browse - stable, with increases for Gardner saltbush

herbaceous understory - stable to slight decline

1996 TREND ASSESSMENT

Ground cover characteristics have remained similar to 1990, indicating a stable soil trend. Conditions are still poor however due to the abundance of bare ground. Trend for Wyoming big sagebrush is stable. The number of seedlings and young plants have declined since 1990, even though utilization is more moderate, vigor improved, and percent decadency has declined slightly. Grasses and forbs are severely lacking on this site and sum of nested frequency for perennial grasses and forbs declined slightly. Sum of nested frequency for bluebunch wheatgrass and Sandberg bluegrass have declined significantly. Trend for the herbaceous understory is down slightly.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - slightly down with extended drought

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 30

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	_a 140	_b 94	_b 51	56	39	22	.36
G	Oryzopsis hymenoides	5	9	8	3	3	4	.19
G	Poa secunda	235	248	232	90	84	89	4.11
G	Sitanion hystrix	_a -	_b 9	_b 23	-	4	10	.07
G	Stipa comata	_a 39	_b -	_b -	19	-	-	-
	Total for Grasses	419	360	314	168	130	125	4.73

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	<i>Alyssum alyssoides</i> (a)	-	-	2	-	-	1	.00
F	<i>Antennaria</i> spp.	6	9	2	3	3	1	.15
F	<i>Arabis</i> spp.	_a 19	_b -	_b -	9	-	-	-
F	<i>Astragalus convallarius</i>	_a 20	_b 6	_b 2	9	2	1	.00
F	<i>Astragalus utahensis</i>	-	2	1	-	2	1	.00
F	<i>Draba</i> spp. (a)	-	-	3	-	-	1	.00
F	<i>Eriogonum caespitosum</i>	-	2	-	-	2	-	-
F	<i>Erigeron pumilus</i>	3	5	-	1	2	-	-
F	<i>Haplopappus acaulis</i>	_a 69	_a 64	_b 30	27	27	12	.74
F	<i>Phlox hoodii</i>	125	128	133	57	58	60	2.08
F	<i>Phlox longifolia</i>	_a 3	_b 25	_b 39	1	10	17	.11
F	<i>Trifolium</i> spp.	7	4	-	3	1	-	-
F	Unknown forb-perennial	1	-	-	1	-	-	-
Total for Forbs		253	245	212	111	107	94	3.10

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

BROWSE TRENDS --

Herd unit 02 , Study no: 30

Type	Species	Strip Frequency '96	Average Cover % '96
B	<i>Artemisia tridentata wyomingensis</i>	98	23.38
B	<i>Atriplex tridentata</i>	14	.56
B	<i>Chrysothamnus viscidiflorus stenophyllus</i>	56	1.41
B	<i>Opuntia fragilis</i>	9	.21
B	<i>Tetradymia canescens</i>	6	.01
Total for Browse		183	25.57

BASIC COVER --

Herd unit 02 , Study no: 30

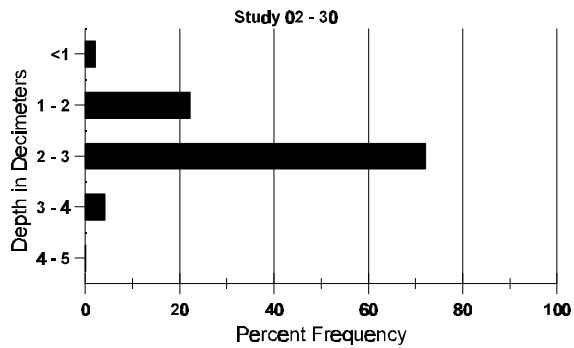
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	311	6.25	12.00	31.88
Rock	58	.75	.25	.33
Pavement	141	7.00	7.00	1.16
Litter	386	42.75	24.00	26.83
Cryptogams	242	5.50	14.00	8.70
Bare Ground	341	37.75	42.75	39.54

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 30

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.4	54.8 (9.3)	7.8	41.9	28.1	30.0	2.0	8.4	99.2	.8

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 30

Type	Quadrat Frequency '96
Rabbit	4
Deer	26
Antelope	1

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 30

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata wyomingensis</i>																		
S	84	23	-	-	-	-	-	-	-	-	23	-	-	-	1533		23	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	84	12	5	-	-	-	-	-	-	-	17	-	-	-	1133		17	
	90	18	-	-	2	-	1	-	-	-	20	1	-	-	1400		21	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	84	10	29	13	-	-	-	-	-	-	52	-	-	-	3466	14	19	52
	90	4	28	22	-	-	-	-	-	-	45	1	8	-	3600	15	16	54
	96	103	105	8	-	-	-	-	-	-	216	-	-	-	4320	15	31	216
D	84	9	17	18	-	-	-	-	-	-	41	-	3	-	2933		44	
	90	1	23	22	-	-	-	-	-	-	31	-	5	10	3066		46	
	96	31	44	29	-	-	-	-	-	-	77	-	-	27	2080		104	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	800		40	
Total Plants/Acre (excluding Dead & Seedlings)												'84	7532	Dec:	39%			
												'90	8066		38%			
												'96	6500		32%			
<i>Atriplex tridentata</i>																		
S	84	81	-	-	-	-	-	-	-	-	81	-	-	-	5400		81	
	90	53	-	-	-	-	-	1	-	-	54	-	-	-	3600		54	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	24	9	-	-	-	-	-	-	-	24	9	-	-	2200		33	
	90	63	3	-	1	-	-	-	-	-	67	-	-	-	4466		67	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	12	13	-	-	-	-	-	-	-	18	7	-	-	1666	7	11	25
	90	10	1	3	1	-	1	-	-	-	16	-	-	-	1066	5	7	16
	96	89	-	-	1	-	-	-	-	-	90	-	-	-	1800	3	7	90
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	3866	Dec:	0%			
												'90	5532		0%			
												'96	1840		2%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	1	-	-	1	-	-	-	-	-	2	-	-	-	133		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	24	-	-	-	-	-	-	-	-	24	-	-	-	1600	11 14	24	
	90	10	5	1	-	-	-	-	-	-	15	-	1	-	1066	6 10	16	
	96	71	-	-	12	-	-	-	-	-	83	-	-	-	1660	8 13	83	
D	84	1	-	-	-	-	-	-	-	-	-	-	1	-	66		1	
	90	6	7	-	-	-	-	-	-	-	12	-	1	-	866		13	
	96	16	-	-	2	-	-	-	-	-	8	-	-	10	360		18	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	1732	Dec:	4%			
												'90	2065		42%			
												'96	2020		18%			
<i>Eriogonum microthecum</i>																		
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66	1 2	1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Opuntia fragilis</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	1	-	-	-	-	-	2	-	-	-	133		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	84	9	-	-	-	-	-	-	-	-	9	-	-	-	600	5 13	9	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133	4 6	2	
	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340	3 11	17	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	4	-	-	-	-	-	-	-	-	2	-	1	1	266		4	
	96	3	-	-	-	-	-	-	-	-	2	-	-	1	60		3	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	600	Dec:	0%			
												'90	932		29%			
												'96	500		12%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Tetradymia canescens																		
M	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66	4	5	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200	4	9	10
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	5	-	3	-	-	-	-	-	-	6	-	-	2	160			8
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	0%			
												'90	0		0%			
												'96	360		44%			

TREND STUDY 2-31-96 (old 5-7)

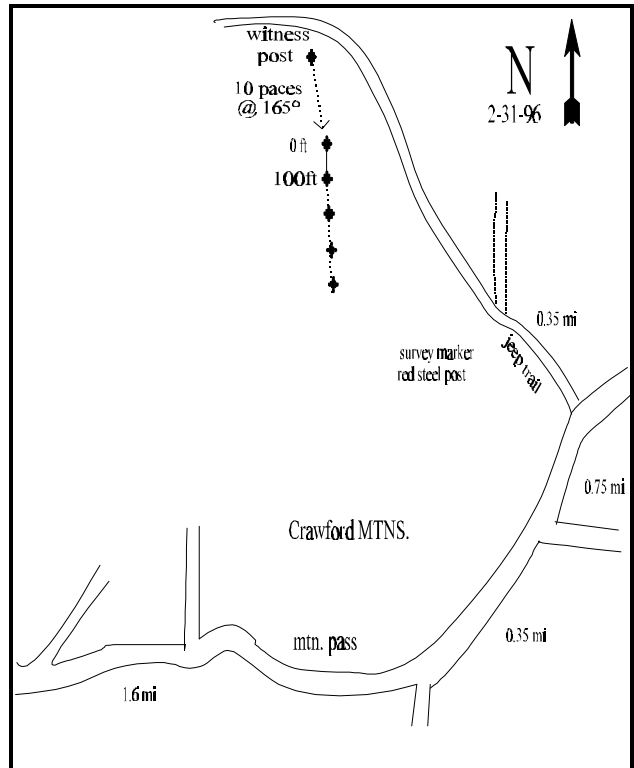
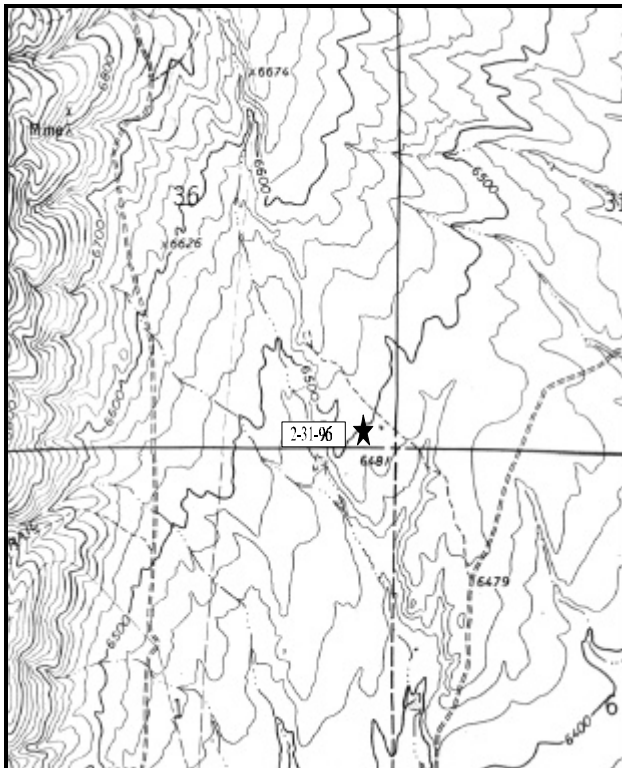
Study site name: South Crawford Mountains. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the intersection of Wilson Lane and Little Crawford Road east of Woodruff proceed east 1.6 miles. Take the left fork and travel northeast for 0.35 miles. Turn left here and proceed northeast for 0.75 miles. At this point, turn left onto a lightly used jeep trail and travel northwest for an additional 0.35 miles to a witness post on the left hand side of the road. From the witness post walk 10 paces at 165 degrees magnetic to the 0-foot baseline stake of the baseline. The baseline is marked by browse tag #7940.



Map Name: Woodruff Narrows

Diagrammatic Sketch

Township 10N, Range 7E, Section 36, UTM COOR: 4-92-457E 46-00-454N

DISCUSSION

Trend Study No. 2-31 (5-7)

This study samples the Wyoming big sagebrush type located immediately east of the Crawford Mountains. An important wildlife area, this locale helps sustain deer and elk in winter and is used intermittently year-round by pronghorn and sage grouse. Cattle were present during the 1996 reading. They graze the area in spring and summer. Quadrat frequency of deer pellet groups is currently moderately high at 31%, with elk pellet group frequencies being rare. An antler drop was found on site. The study site is nearly level and is at an elevation of 6,500 feet with an east aspect.

Soil is "Woodpass Loam," a widely distributed category in this area. This is a deep, well drained soil that forms in alluvial deposits derived from sandstone and limestone. Permeability is slow and available water capacity is high. Erosion hazard is moderate. Although the Woodpass soil is moderately to strongly alkaline and calcareous, root penetration is not inhibited (Campbell and Lacey 1982). Soil tests from the site show a sandy clay loam texture with a neutral pH (7.1) in the upper horizons. Effective rooting depth (see methods) was estimated at just over 12 inches with a rocky calcium carbonate layer starting at about 12 inches. This layer appears to limit rooting depth at the end of the base line where black sagebrush was encountered. Potassium is low at 51.2 ppm which could be a limiting factor for the site. Exposed bare ground is common on the site, averaging 31% since 1984. Wind and water erosion are not severe due to the gentle terrain and a uniform sagebrush cover.

The dominant browse is a somewhat dense and vigorous stand of Wyoming big sagebrush that receives moderate to occasionally heavy use. The age structure contains all age classes and is indicative of a stable, self-sustaining population. Heavy use, poor vigor, and high decadence (71%) was found during the 1990 reading. During the 1996 reading, many of the decadent plants apparently regained their vigor and percent decadence declined to 29%, which is good for a typical Wyoming big sagebrush site in this area. Dead plants, first sampled in 1996, numbered 1,300 for a ratio of dead to live plants of 1:5. Seedling and young plants were extremely common in 1984 with a biotic potential of 28% (number of seedlings to the population) and 16% of the population consisted of young plants. Currently biotic potential is only 1%, but young plants are fairly common (6%). Few shrubs appeared to be producing seed this year ('96).

Other shrubs consisting of black sagebrush, narrowleaf low rabbitbrush, slenderbush eriogonum, prickly phlox, pricklypear, and gray horsebrush are of secondary importance and none appear to be increasing or decreasing in density.

Grasses and forbs are sparsely distributed and include a mix of species which looks about average for the Wyoming big sagebrush type in Rich County. Six perennial grass species provide the bulk of forage, which is supplemented by low-growing, low value forbs. Annual plants are rare. Sandberg bluegrass is the most common perennial grass which accounts for 65% of the grass cover. Forbs are fairly diverse for this type, yet only hoods phlox is abundant. Trend studies located within this unit on the Wyoming big sagebrush type have shown remarkable similarity in plant composition.

1984 APPARENT TREND ASSESSMENT

Our best estimate is that soil and vegetative trends are both stable. No imminent changes in soil condition, vegetative composition or productivity are expected.

1990 TREND ASSESSMENT

The Wyoming big sagebrush has declined in all measurements on this heavily used winter range. Density is lower than in 1984. The percentage of decadent sagebrush increased to 71% of the population, and very few young plants were counted. The sagebrush is moderately to heavily hedged and has poor vigor and low growth. Sagebrush canopy cover averages 16%. Low rabbitbrush is unchanged. Sandberg bluegrass is still very abundant, while bluebunch wheatgrass decreased significantly in nested frequency. The percentage of litter cover has concurrently declined, but there was a significant increase in the amount of cryptogamic soil. Sheet erosion and plant pedestaling are still evident.

TREND ASSESSMENT

soil - down

browse - slightly downward, some Wyoming sagebrush loss and almost three times more decadent plants

herbaceous understory - downward, declining values for grasses and especially forbs with continuing drought

1996 TREND ASSESSMENT

Trend for soil is stable. Percent bare ground is similar to 1990 estimates. Litter cover increased, but cryptogamic cover declined 62%. Erosion is not severe due to the gentle terrain. Trend for Wyoming big sagebrush appears up for total density declined 18% since 1990, but utilization is more moderate, vigor improved, and percent decadency has declined from 71% to 29%. Young plants are more abundant this year, however seedlings are limited. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses has increased slightly while frequency of forbs has declined slightly.

TREND ASSESSMENT

soil - stable

browse - slightly up and stabilizing after the extended drought

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 31

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	_a 140	_b 53	_b 81	60	23	33	.84
G	Bromus tectorum (a)	-	-	1	-	-	1	.00
G	Oryzopsis hymenoides	_a 60	_a 45	_b 21	27	24	10	.21
G	Poa fendleriana	_a -	_a -	_b 30	-	-	12	.50
G	Poa secunda	_a 231	_b 275	_{ab} 246	90	95	87	5.18
G	Sitanion hystrix	_a 107	_b 3	_c 29	53	1	14	.22
G	Stipa comata	_a 16	_b 98	_b 79	10	45	35	1.06
Total for Grasses		554	474	487	240	188	192	8.03
F	Agoseris glauca	1	-	-	1	-	-	-
F	Antennaria rosea	_a -	_{ab} 12	_b 3	-	5	3	.04
F	Arabis spp.	-	-	4	-	-	2	.03

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	Arabis drummondi	_a 31	_b -	_b 2	17	-	1	.03
F	Astragalus convallarius	_a 60	_b 1	_b 8	30	1	4	.04
F	Astragalus utahensis	10	8	13	5	4	5	.19
F	Cryptantha spp.	_a 80	_b 40	_b 24	41	16	13	.19
F	Erigeron pumilus	8	-	6	4	-	3	.01
F	Eriogonum umbellatum	-	-	1	-	-	1	.00
F	Haplopappus acaulis	3	-	1	1	-	1	.03
F	Orthocarpus spp. (a)	-	-	2	-	-	2	.01
F	Phlox hoodii	_a 220	_a 200	_b 153	87	84	65	3.00
F	Phlox longifolia	-	-	8	-	-	3	.01
F	Tragopogon dubius	4	-	-	2	-	-	-
F	Trifolium spp.	_a 26	_b 2	_b -	13	1	-	-
Total for Forbs		443	263	225	201	111	103	3.62

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

BROWSE TRENDS --

Herd unit 02 , Study no: 31

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia nova	7	.19
B	Artemisia tridentata wyomingensis	98	16.34
B	Chrysothamnus viscidiflorus stenophyllus	70	1.77
B	Eriogonum microthecum	23	.29
B	Leptodactylon pungens	14	.24
B	Opuntia fragilis	4	.03
B	Tetradymia canescens	1	-
Total for Browse		217	18.87

BASIC COVER --

Herd unit 02 , Study no: 31

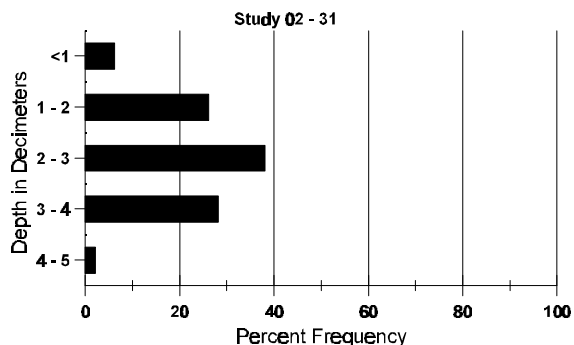
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	325	9.25	9.75	29.03
Rock	68	.25	.75	1.10
Pavement	275	8.00	3.00	7.37
Litter	391	52.25	26.00	30.34
Cryptogams	241	5.00	25.25	9.66
Bare Ground	316	25.25	35.25	32.97

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 31

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.5	57.8 (13.0)	7.1	55.3	17.4	27.4	1.9	160.3	51.2	.6

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 31

Type	Quadrat Frequency '96
Rabbit	3
Elk	2
Deer	31
Cattle	1

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 31

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia nova</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	13	1	-	-	-	-	-	-	-	14	-	-	-	280	9	14	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	320		6%			
<i>Artemisia tridentata wyomingensis</i>																		
S	84	35	-	-	-	-	-	-	-	-	35	-	-	-	2333		35	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	84	8	10	2	-	-	-	-	-	-	20	-	-	-	1333		20	
	90	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	14	4	-	-	-	-	-	-	-	17	-	-	1	360		18	
M	84	-	60	18	-	-	-	-	-	-	78	-	-	-	5200	14	21	
	90	4	10	17	-	-	-	-	-	-	19	-	12	-	2066	12	19	
	96	68	140	-	-	-	-	-	-	-	208	-	-	-	4160	15	27	
D	84	-	14	12	-	-	-	-	-	-	20	-	4	2	1733		26	
	90	6	48	30	-	-	-	-	-	-	37	-	29	18	5600		84	
	96	23	58	13	-	1	-	-	-	-	60	-	-	35	1900		95	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1300		65	
Total Plants/Acre (excluding Dead & Seedlings)												'84	8266	Dec:	21%			
												'90	7799		72%			
												'96	6420		30%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	84	10	2	-	-	-	-	-	-	-	12	-	-	-	800		12	
	90	10	-	-	-	-	-	-	-	-	10	-	-	-	666		10	
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	84	51	40	-	-	-	-	-	-	-	91	-	-	-	6066	9	12	91
	90	13	14	8	2	1	-	-	-	-	37	-	1	-	2533	6	6	38
	96	165	3	9	22	-	-	-	-	-	107	-	-	5	3980	9	11	199
D	84	-	2	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	20	19	6	3	1	-	-	-	-	30	-	7	12	3266		49	
	96	15	1	1	-	-	-	-	-	-	9	-	-	8	340		17	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)											'84	6999	Dec:	2%				
											'90	6465		51%				
											'96	4460		8%				
<i>Eriogonum microthecum</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	1	-	-	-	-	-	2	-	-	-	133		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	2	3	-	-	-	-	-	-	-	5	-	-	-	333	5	8	5
	90	5	3	1	-	-	-	-	-	-	9	-	-	-	600	5	7	9
	96	33	-	-	1	-	-	-	-	-	34	-	-	-	680	6	9	34
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)											'84	333	Dec:	0%				
											'90	733		0%				
											'96	700		3%				
<i>Leptodactylon pungens</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	18	-	-	1	-	-	-	-	-	19	-	-	-	380	6	12	19
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	-	-	2	133		2		
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	0%				
											'90	133		100%				
											'96	400		5%				

AGE	YR	Form Class (No. of 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>Opuntia fragilis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	7	-	-	-	-	-	-	-	-	7	-	-	-	466			7
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	4	-	-	-	-	-	-	-	-	4	-	-	-	266	4	5	4
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	66	3	6	1
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4	12	3
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'84	266	Dec:	0%			
												'90	532		0%			
												'96	80		25%			
<i>Tetradymia canescens</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	4	9	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			

TREND STUDY 2-32-96 (old 5-8)

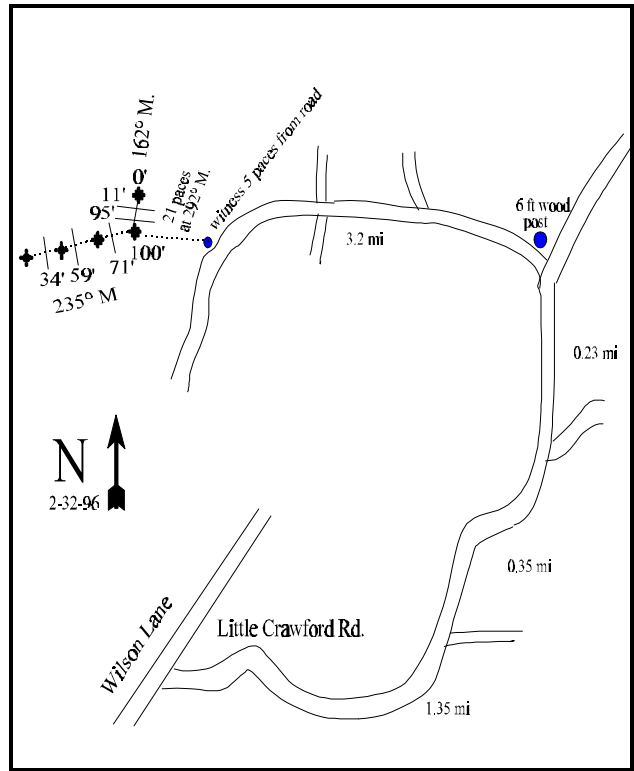
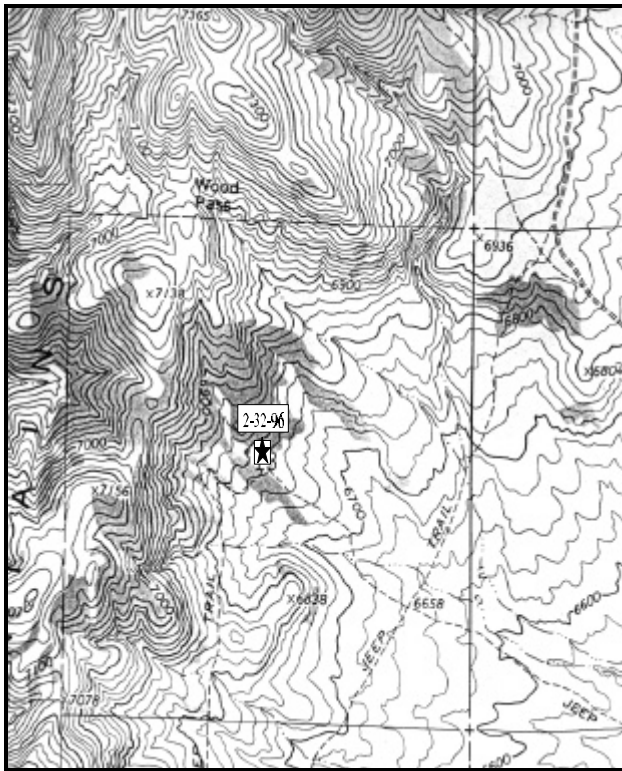
Study site name: Wood Pass. Range type: Juniper.

Compass bearing: frequency baseline 165 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (71ft), line 3 (59ft), line 4 (34ft).

LOCATION DESCRIPTION

From the intersection of Wilson Lane and Little Crawford Road east of Woodruff proceed northeast for 1.35 miles to a fork. Turn left and travel 0.35 miles to another fork. Turn left and proceed 2.6 miles to a third fork marked by a six-foot tall wooden post. Turn left and proceed 3.2 miles staying on the main road, to a witness post just off the right side of road. From the witness post walk 21 paces at 292 degrees magnetic to the 100-foot baseline stake. Walk 100 feet at 342 degrees magnetic from the 100-foot stake to the 0-foot baseline stake. The 0-foot stake is marked by browse tag #7942. The baseline doglegs at 100 feet and runs 235 degrees magnetic.



Map Name: Woodruff Narrows

Diagrammatic Sketch

Township 10N, Range 7E, Section 13, UTM COOR: 4-91-457E 46-06-130N

DISCUSSION

Trend Study No. 2-32 (5-8)

This study is located on the east side of the Crawford Mountains approximately ½ mile south of Wood Pass. Elevation (6,800 feet) is moderately high, yet the area is still considered critical winter range. The study site lies on a gentle (10%) southeast facing slope. The range type is an open juniper woodland with an abundant association of low-growing black sagebrush and Wyoming big sagebrush. Animal use includes cattle in spring and summer and deer and elk in winter. Deer pellet groups are the most abundant. Pronghorn and sage grouse use the area continuously. The intensity of use is moderate to high and is most evident on juniper. Depending on the winter, snow depth could limit mid-winter utilization of the sagebrush.

The NRCS classifies the study site as "Solak Gravelly Loam, Dry." This is a shallow, excessively drained soil formed residually from limestone and sandstone parent material. Total soil depth does not usually exceed 20 inches. Permeability to water is moderate but available water capacity is low and erosion hazard is high. This soil, although occupied by Utah juniper, has a very low site productivity index or capability for producing juniper (Campbell and Lacey 1982). Soils at the site have a clay loam texture and a slightly alkaline pH of 7.4. Effective rooting depth (see methods) is variable, ranging from 10 inches to nearly 14 inches along the base line. Black sagebrush will be found in the more shallow soil, while Wyoming big sagebrush is in the deeper soil. The soil is rocky throughout the profile with a calcareous layer at about 10 to 12 inches. Phosphorus could be a limiting factor at only 4.5 ppm and potassium is marginal at 70.4 ppm.

The important species include Utah juniper, Wyoming big sagebrush, and black sagebrush. Between 1984 and 1990 both Wyoming big sagebrush and black sagebrush had relatively stable populations of about 4,500 and 1,500 plants/acre respectively. Black sagebrush was classified mostly as lightly hedged, but had a high decadency rate of 65% in 1990. Wyoming big sagebrush was light to moderately hedged and generally in good vigor. Decadency was also moderately high at 55% in 1984 and 41% in 1990. During the 1996 reading, the base line was extended from 100 feet to 400 feet. This new larger sample estimates a population density for black sagebrush at 3,800 plants/acre. Due to the lack of large numbers of seedling and young plants on previous readings, this new estimate does not represent an increase in density, but a more accurate estimate of the actual black sagebrush population over the whole area. Utilization of the black sagebrush is currently light to moderate with good vigor and a decadency rate of 24%. Wyoming big sagebrush density declined with the new larger sample size from 4,532 plants/acre to 2,440. The change in density came primarily from a reduction in the density of young and decadent plants. Some of the change may be due to the new, larger sample used in 1996. Density of mature shrubs has remained similar between readings.

The trend for juniper density appears to be increasing with each reading of the shrub plots or strips, but the sample is too small to get a good estimate of its real density. The strip counts can be used to determine trends, yet should not be considered as a reliable way to estimate its density. This strip data also indicates that 28% of the population was classified as young trees. Point-center quarter data gives a much better population estimate which is 235 trees/acre, with an average diameter of just over 5 inches. Canopy cover varies from 8% to 34% with an average of 15% cover for the site. Some of the more mature trees are highlined.

The herbaceous understory is diverse but not abundant. Eight perennial grasses produce less than 6% total cover or 98% of the grass cover. Sandberg bluegrass

is the most abundant species. Forbs are also diverse yet few occur more than occasionally. Hood's phlox is the only common species. This low growing species accounts for 61% of the forb cover.

1984 APPARENT TREND ASSESSMENT

Soil trend is stable in spite of a few small active "rills" and some soil compaction in the immediate vicinity. Ground cover is adequate but certainly not outstanding. Vegetative trend is marginally stable. The greatest potential change will likely concern density and canopy cover of Utah juniper.

1990 TREND ASSESSMENT

Density data indicates a slight increase in juniper on this open site. All age classes are present. The trees are highlined. Sagebrush is common on the density plots where a large number of young sagebrush were classified. The sagebrush currently display a moderately hedged growth form. Rabbits have heavily browsed the low rabbitbrush. The herbaceous understory is typically sparse, but there is a fair diversity of perennial species. Although there are deeper swales dominated by sagebrush, the majority of the site has shallow soil with moderate pavement cover and soil movement.

TREND ASSESSMENT

- soil - stable, but still poor condition
- browse - stable
- herbaceous understory - stable

1996 TREND ASSESSMENT

Ground cover characteristics are similar to 1990, indicating a stable soil trend. The browse trend is up for black sagebrush and Wyoming big sagebrush. Black sagebrush shows improved vigor and a decline in percent decadence from 65% to only 24%. Wyoming big sagebrush is less heavily utilized, displays improved vigor, and a decline in percent decadence. Seedlings and young plants are in sufficient numbers to maintain the population. Total density has declined but the number of mature plants is similar to 1990 estimates. Trend for the herbaceous understory is up slightly but deficient. Sum of nested frequency for grasses increased, however sum of nested frequency for Sandberg bluegrass declined significantly. Sum of nested frequency for forbs remained similar to 1990 estimates.

TREND ASSESSMENT

- soil - stable
- browse - up
- herbaceous understory - up slightly

HERBACEOUS TRENDS --
Herd unit 02 , Study no: 32

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron smithii	a31	b-	c88	13	-	32	.97
G	Agropyron spicatum	a47	b79	a34	24	38	15	.65
G	Bromus tectorum (a)	-	-	25	-	-	10	.10
G	Oryzopsis hymenoides	a8	a17	b32	7	6	16	.52

Type	Species	Nestled Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	<i>Poa fendleriana</i>	a-	a-	b13	-	-	5	.07
G	<i>Poa secunda</i>	a145	b206	b191	63	75	71	3.28
G	<i>Sitanion hystrix</i>	a36	b9	ab26	16	3	9	.11
G	<i>Stipa columbiana</i>	-	-	3	-	-	2	.06
G	<i>Stipa comata</i>	7	5	14	5	3	6	.15
Total for Grasses		274	316	426	128	125	166	5.94
F	<i>Agoseris glauca</i>	-	-	3	-	-	1	.00
F	<i>Antennaria</i> spp.	-	4	8	-	2	4	.31
F	<i>Arabis</i> spp.	a-	a-	b10	-	-	5	.02
F	<i>Arenaria</i> spp.	1	-	-	1	-	-	-
F	<i>Astragalus convallarius</i>	8	-	10	3	-	4	.02
F	<i>Astragalus utahensis</i>	a29	b14	ab21	15	8	9	.12
F	<i>Calochortus nuttallii</i>	4	-	-	2	-	-	-
F	<i>Chaenactis douglasii</i>	7	-	-	3	-	-	-
F	<i>Comandra pallida</i>	6	5	-	3	3	-	-
F	<i>Crepis acuminata</i>	a11	b2	b3	6	2	2	.06
F	<i>Cryptantha</i> spp.	a25	b-	b8	10	-	4	.09
F	<i>Descurainia</i> spp. (a)	-	-	6	-	-	2	.01
F	<i>Gilia aggregata</i>	5	-	-	2	-	-	-
F	<i>Haplopappus acaulis</i>	-	4	-	-	1	-	-
F	<i>Lappula occidentalis</i> (a)	-	-	3	-	-	1	.00
F	<i>Orthocarpus</i> spp. (a)	-	-	15	-	-	10	.10
F	<i>Penstemon humilis</i>	a49	a36	b3	23	15	2	.01
F	<i>Phlox hoodii</i>	115	133	104	53	58	52	2.30
F	<i>Phlox longifolia</i>	11	6	13	4	2	7	.03
F	<i>Senecio multilobatus</i>	a21	b-	b3	9	-	1	.00
F	<i>Trifolium</i> spp.	a45	b6	b3	23	4	1	.00
Total for Forbs		337	210	213	157	95	105	3.12

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

BROWSE TRENDS --

Herd unit 02 , Study no: 32

Type	Species	Strip Frequency '96	Average Cover % '96
B	<i>Artemisia nova</i>	55	6.93
B	<i>Artemisia tridentata wyomingensis</i>	50	6.50

Type	Species	Strip Frequency '96	Average Cover % '96
B	Chrysothamnus viscidiflorus stenophyllus	13	.10
B	Eriogonum microthecum	1	.03
B	Juniperus osteosperma	23	7.63
B	Opuntia fragilis	1	-
Total for Browse		143	21.20

BASIC COVER --

Herd unit 02 , Study no: 32

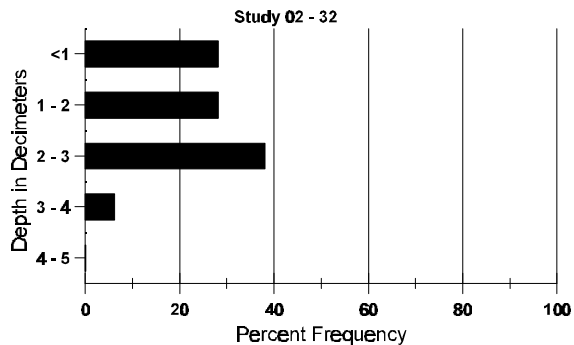
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	311	1.75	6.00	29.52
Rock	114	2.00	3.25	1.21
Pavement	221	14.75	18.00	4.10
Litter	393	55.50	41.00	39.92
Cryptogams	177	3.00	8.75	4.83
Bare Ground	228	23.00	23.00	21.77

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 32

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.7	60.6 (12.7)	7.4	32.9	36.7	30.4	3.3	4.5	70.4	.7

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 02 , Study no: 32

Type	Quadrat Frequency '96
Rabbit	15
Elk	2
Deer	38
Cattle	1

BROWSE CHARACTERISTICS --
 Herd unit 02 , Study no: 32

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Artemisia nova																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	90	1	1	-	-	-	-	-	-	-	2	-	-	-	133			2
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	84	2	5	-	-	-	-	-	-	-	7	-	-	-	466	9	16	7
	90	2	4	-	-	-	-	-	-	-	6	-	-	-	400	10	13	6
	96	113	21	-	4	-	-	-	-	-	138	-	-	-	2760	11	21	138
D	84	-	9	-	-	-	-	-	-	-	9	-	-	-	600			9
	90	11	4	-	-	-	-	-	-	-	9	-	2	4	1000			15
	96	27	17	3	-	-	-	-	-	-	44	-	-	3	940			47
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	460			23
Total Plants/Acre (excluding Dead & Seedlings)												'84	1199	Dec:	50%			
												'90	1533		65%			
												'96	3800		25%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata wyomingensis</i>																		
S	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	84	7	3	-	-	-	-	-	-	-	10	-	-	-	666		10	
	90	14	11	1	-	-	-	-	-	-	18	7	1	-	1733		26	
	96	32	-	-	-	-	-	-	-	-	32	-	-	-	640		32	
M	84	6	13	2	-	-	-	-	-	-	20	-	1	-	1400	18	24	21
	90	2	7	5	-	-	-	-	-	-	13	-	1	-	933	18	20	14
	96	37	15	2	-	-	-	-	-	-	54	-	-	-	1080	17	31	54
D	84	3	34	2	-	-	-	-	-	-	29	1	9	-	2600		39	
	90	6	17	4	-	1	-	-	-	-	19	1	5	3	1866		28	
	96	17	19	-	-	-	-	-	-	-	36	-	-	-	720		36	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	600		30	
Total Plants/Acre (excluding Dead & Seedlings)												'84	4666	Dec:	56%			
												'90	4532		41%			
												'96	2440		30%			
<i>Chrysothamnus nauseosus consimilis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	24	28	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	2	1	-	-	-	-	-	-	6	-	-	-	400		6	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333	10	12	5
	90	5	6	4	-	-	-	-	-	-	13	2	-	-	1000	7	11	15
	96	5	-	-	3	-	-	-	-	-	8	-	-	-	160	8	11	8
D	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	10	3	-	-	-	-	-	-	-	4	-	-	9	260		13	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	466	Dec:	29%			
												'90	1400		0%			
												'96	500		52%			
<i>Eriogonum microthecum</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	9	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Juniperus osteosperma</i>																		
Y	84	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
M	84	-	-	-	2	-	-	-	-	-	2	-	-	-	133	69	43	2
	90	-	2	-	-	-	2	-	-	-	4	-	-	-	266	84	49	4
	96	15	-	-	-	-	-	-	3	-	18	-	-	-	360	-	-	18
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	266	Dec:	-			
												'90	399		-			
												'96	500		-			
<i>Leptodactylon pungens</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	2	3	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	66		-			
												'96	0		-			
<i>Opuntia fragilis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	3	9	1
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	4	8	3
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	66		-			
												'96	60		-			
<i>Symphoricarpos oreophilus</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	14	27	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Tetradymia canescens																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	1	-	-	-	-	-	-	-	-	-	66			1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0	6	8	0	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	90	-	-	-	-	1	-	-	-	-	-	-	-	66			1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	132		50%			
												'96	0		0%			

TREND STUDY 2-33-96 (old 5-9)

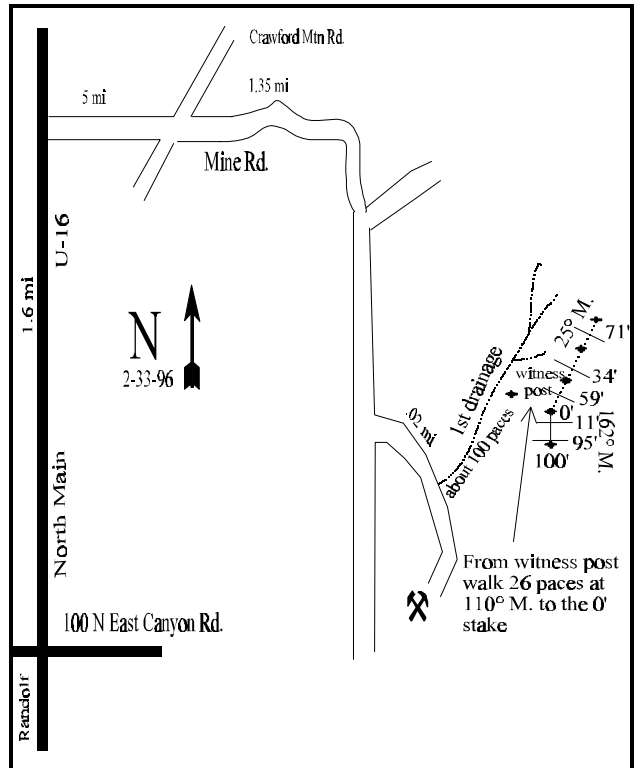
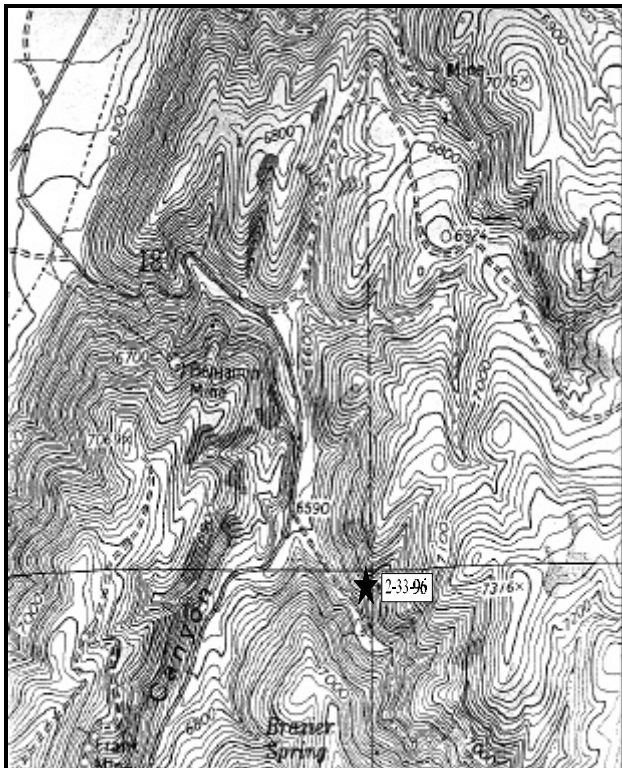
Study site name: Brazier Canyon. Range type: Black Sage.

Compass bearing: frequency baseline 162 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft).

LOCATION DESCRIPTION

From North Main and East Canyon Road (100 North) in Randolph proceed north on U-16 from 1.60 miles, and turn right (east) onto Crawford Mountain Road. continue east for 5.0 miles to a fork. Turn right (i.e. southeast) and proceed 1.35 miles on this road to where there is a small canyon on the left with a road going up it. Turn left (i.e. east) onto this road, and proceed 0.2 miles to the first ravine on the left (i.e., north) side of the road. Walk up ravine 100 paces to a witness post. From the witness post walk 26 paces at a bearing of 110 degrees magnetic to the 0-foot baseline stake. The 0-foot stake is marked by a browse tag, #7978. The rest of the baseline runs off the 0-foot baseline stake at a bearing of 25 degrees magnetic.



Map Name: Rex Peak

Diagrammatic Sketch

Township 11N, Range 8E, Section 20, UTM COOR: 4-94-152E 46-15-041N

DISCUSSION

Trend Study No. 2-33 (5-9)

This study, the last of three on the Crawford Mountains, is located in a tributary of Brazier Canyon at approximately 6,780 feet elevation. The site is a steep (50% to 55%) west facing slope dominated by black sagebrush, but which also contains fair numbers of other shrubs, most notably Wyoming big sagebrush and narrowleaf low rabbitbrush. This area is winter range for deer and available to cattle in spring. However, steep slopes prevent most livestock use. Deer use is moderately high with a quadrat frequency of pellet groups at 33%. In addition, two deer carcasses were found on the study site in 1984 and two antler drops (spike and two point) were seen in 1996.

The soil mapping unit that includes the study site is entitled "Rexmont-Rock Outcrop Complex." Soils in this unit are shallow and excessively drained gravelly loams. They are primarily residual soils derived from limestone and thus are moderately to strongly alkaline and calcareous throughout the 20" soil profile. Permeability is moderate, available water capacity is poor and both runoff and erosion hazard are high (Campbell and Lacey 1982). Soils at the study site have a loam texture and a slightly alkaline pH of 7.7. Effective rooting depth (see methods) was estimated at almost 16 inches in 1996. Rock and pavement are common on the surface. The study site showed evidence of significant sheet erosion and somewhat less serious gully erosion in 1984. Soil pedestaling is evident in 1996, except the abundant vegetation and litter cover prohibits serious erosion on the site.

Two key browse species occupy the area. Most numerous is black sagebrush which forms a moderately dense and uniform stand. Utilization is generally light even though the data indicated a substantially high level of decadence in 1984 and 1990. The much larger sample taken in 1996 estimated a much lower density of black sagebrush, (5,340 plants/acre compared to 11,666). The lack of large numbers of dead plants, about 14% (880 plants/acre), suggests that this new density estimate is more reflective of the actual population over the whole area. Utilization in 1996 is light and percent decadence has declined from 45% to 13%.

Wyoming big sagebrush is less abundant and is hybridizing with black sagebrush. Unlike black sagebrush, density estimates have remained similar between 1990 and 1996. Although more heavily browsed than black sage, it appears to have a stable population. Due to the dry conditions during the summer of 1996, many of the Wyoming big sagebrush plants were dropping their leaves. This is likely a marginal site for Wyoming big sagebrush. Other preferred shrubs found on the site include winterfat and serviceberry which occur in relatively small numbers.

Perennial grasses are the most abundant herbaceous component. Within that category, bluebunch wheatgrass is easily the most productive. Sandberg bluegrass is also abundant. Forb composition is moderately diverse yet relatively unproductive and unpalatable. Long leaf phlox, hood's phlox, and fendler sandwort account for 63% of the forb cover. Nevertheless, forbs that occur in this area are not unusual for this range type or for the Crawford Mountain in general.

1984 APPARENT TREND ASSESSMENT

Soil trend is down because of persistent erosion due to steep slope, highly erodible soil, and incomplete ground cover. Our assessment of vegetative trend can best be described as tentative. Both key sagebrush species appear stable and perhaps even increasing. An increase in total shrub density appears unlikely though, because the area already has what appears to be a maximum shrub density. In the future, changes in relative abundance of species should be monitored. For the moment, trend seems stable.

1990 TREND ASSESSMENT

Allowing for difficulties in separating sagebrush species at the Brazier Canyon site, the total density of sagebrush declined slightly. A dense stand of sagebrush, dominated by black sagebrush, remains. While the black sagebrush decreased in density, improvements were seen in the age class structure, vigor and growth form. The sagebrush appear moderately hedged, though there is evidence of very heavy deer use. Several deer carcasses were found on the site. A density of 89 juniper/acre was calculated from the point-centered quarter method. Sandberg bluegrass remains the most abundant grass. The frequency of bluebunch wheatgrass shows a very large decline. Due to adequate litter and vegetative cover and a significant amount of erosion pavement on the ground surface, current soil erosion is minimal.

TREND ASSESSMENT

soil - slightly declining

browse - stable

herbaceous understory - slight decline, some losses in a key grass and many losses in the forbs

1996 TREND ASSESSMENT

The soil trend appears stable. Percent bare ground declined but this was offset by a decline in litter cover. Herbaceous cover is abundant and well dispersed and erosion is limited. The browse trend appears stable for black sagebrush. Population density declined 54% compared to 1990 data. However, the lack of large numbers of dead shrubs suggests that this new estimate using a much larger sample is a more accurate reflection of black sagebrush density. Utilization of black sagebrush is mostly light to moderate, vigor is good and percent decadence has declined from 45% in 1990 to 13%. Black sagebrush makes up the majority of the browse cover (68%). Wyoming big sagebrush has a similar density to 1990. Utilization is less heavy, yet vigor is poor on 11% of the population, and percent decadence has increased from 21% in 1990 to 30%. There is one dead plant for every two live ones. Trend for Wyoming big sagebrush appears slightly down, but it only contributes 13% of the browse cover. Overall the browse trend is considered stable. Trend for the herbaceous understory is up slightly. Sum of nested frequency for perennial grasses has increased, while sum of nested frequency for perennial forbs has remained stable.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - up slightly

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 33

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	a208	b119	b166	87	58	69	6.76
G	Bromus tectorum (a)	-	-	19	-	-	9	.21
G	Koeleria cristata	a23	ab11	b1	9	5	1	.00
G	Poa fendleriana	a8	a-	b27	2	-	11	.28
G	Poa secunda	a-	b302	b308	75	99	97	8.95

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Sitanion hystrix	-	-	3	-	-	1	.15
Total for Grasses		429	432	524	173	162	188	16.38
F	Antennaria rosea	10	6	5	4	3	2	.06
F	Arabis drummondi	-	-	2	-	-	1	.00
F	Arenaria fendleri	46	44	35	20	19	13	1.61
F	Arabis holboellii	a1	a-	b8	1	-	6	.03
F	Astragalus convallarius	a43	b4	a25	23	2	14	.51
F	Astragalus spp.	a115	b13	b8	51	7	4	.09
F	Astragalus utahensis	1	3	-	1	1	-	-
F	Balsamorhiza sagittata	8	5	2	3	4	1	.15
F	Calochortus nuttallii	1	4	-	1	2	-	-
F	Chaenactis douglasii	3	-	-	1	-	-	-
F	Collinsia parviflora (a)	-	-	6	-	-	3	.01
F	Crepis acuminata	28	23	24	17	10	11	.49
F	Cryptantha spp.	a39	b-	b-	21	-	-	-
F	Descurainia spp. (a)	-	-	3	-	-	1	.03
F	Erigeron divergens	a-	b34	a4	-	17	3	.06
F	Haplopappus acaulis	a4	a-	b14	2	-	7	.21
F	Hackelia patens	-	9	-	-	4	-	-
F	Orthocarpus luteus (a)	-	-	7	-	-	4	.07
F	Penstemon humilis	-	-	3	-	-	3	.01
F	Penstemon spp.	a10	b2	b-	6	1	-	-
F	Phacelia spp.	6	-	-	3	-	-	-
F	Phlox hoodii	a32	a34	b74	16	15	31	.93
F	Phlox longifolia	a29	b83	a60	18	36	26	.52
F	Senecio multilobatus	3	-	-	1	-	-	-
F	Solidago spp.	3	-	-	1	-	-	-
F	Trifolium spp.	-	-	6	-	-	4	.02
Total for Forbs		382	264	286	190	121	134	4.85

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

BROWSE TRENDS --

Herd unit 02 , Study no: 33

Type	Species	Strip Frequency '96	Average Cover % '96
B	Amelanchier alnifolia	4	-
B	Artemisia nova	82	10.04
B	Artemisia tridentata wyomingensis	42	1.89
B	Ceratooides lanata	15	.07
B	Chrysothamnus viscidiflorus stenophyllus	29	1.03
B	Eriogonum microthecum	37	.87
B	Juniperus osteosperma	4	.56
B	Opuntia fragilis	2	-
B	Symphoricarpos oreophilus	5	.38
Total for Browse		220	14.85

BASIC COVER --

Herd unit 02 , Study no: 33

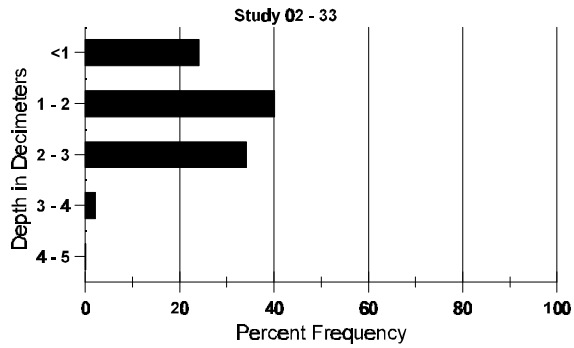
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	346	3.00	14.75	35.12
Rock	323	15.50	6.00	13.34
Pavement	322	16.00	24.50	16.43
Litter	392	49.25	32.50	26.29
Cryptogams	213	6.75	4.75	5.01
Bare Ground	266	9.50	17.50	11.36

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 33

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.5	53.2 (16.8)	7.7	36.7	39.0	24.3	4.0	14.4	105.6	.7

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 33

Type	Quadrat Frequency '96
Rabbit	7
Deer	33
Cattle	1

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 33

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Amelanchier alnifolia</i>																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	1	-	-	1	-	-	-	-	-	2	-	-	-	40		2	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	14	13	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	-	-	2	40		2		
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	20		1		
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	0%			
												'90	133		0%			
												'96	80		50%			

A G E	YR	Form Class (No. of 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	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
Y	84	9	-	-	-	-	-	-	-	-	9	-	-	-	600		9	
	90	9	6	-	-	-	-	-	-	-	15	-	-	-	1000		15	
	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
M	84	56	26	-	-	-	-	-	-	-	82	-	-	-	5466	7 13	82	
	90	30	47	3	-	-	-	-	-	-	79	-	1	-	5333	10 11	80	
	96	160	62	-	-	-	-	-	-	-	222	-	-	-	4440	12 21	222	
D	84	93	27	1	-	-	-	-	-	-	115	2	4	-	8066		121	
	90	21	57	1	-	1	-	-	-	-	73	1	3	3	5333		80	
	96	24	12	1	-	-	-	-	-	-	32	-	-	5	740		37	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	880		44	
Total Plants/Acre (excluding Dead & Seedlings)												'84	14132	Dec:	57%			
												'90	11666		46%			
												'96	5340		14%			
<i>Artemisia tridentata wyomingensis</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	3	-	-	2	-	-	-	-	-	5	-	-	-	100		5	
M	84	3	4	1	-	-	-	-	-	-	8	-	-	-	533	12 12	8	
	90	10	4	2	-	-	-	-	-	-	14	2	-	-	1066	33 26	16	
	96	16	26	4	-	-	-	-	-	-	44	-	-	2	920	14 24	46	
D	84	-	3	1	-	-	-	-	-	-	4	-	-	-	266		4	
	90	-	-	4	-	1	-	-	-	-	3	-	2	-	333		5	
	96	10	12	-	-	-	-	-	-	-	16	-	-	6	440		22	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	620		31	
Total Plants/Acre (excluding Dead & Seedlings)												'84	865	Dec:	31%			
												'90	1532		22%			
												'96	1460		30%			

A G E	YR	Form Class (No. of 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>																		
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	1	4	-	-	-	-	-	-	-	5	-	-	-	333	6	7	5
	90	-	1	1	-	-	-	-	-	-	2	-	-	-	133	6	5	2
	96	13	11	3	-	-	-	-	-	-	27	-	-	-	540	8	10	27
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	399	Dec:	0%			
												'90	465		14%			
												'96	580		0%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	1	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	90	9	-	-	-	-	-	-	1	-	10	-	-	-	666		10	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	19	-	-	-	-	-	-	-	-	19	-	-	-	1266	15	12	19
	90	22	-	1	1	-	-	-	-	-	24	-	-	-	1600	13	11	24
	96	31	1	-	3	-	-	-	-	-	35	-	-	-	700	13	19	35
D	84	14	-	-	-	-	-	-	-	-	14	-	-	-	933		14	
	90	7	-	-	-	-	-	-	-	-	7	-	-	-	466		7	
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
Total Plants/Acre (excluding Dead & Seedlings)												'84	2399	Dec:	39%			
												'90	2732		17%			
												'96	840		14%			
<i>Eriogonum microthecum</i>																		
S	84	6	-	-	-	-	-	-	-	-	6	-	-	-	400		6	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	6	-	-	-	-	-	-	-	-	6	-	-	-	400		6	
	90	11	1	-	-	-	-	-	-	-	12	-	-	-	800		12	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	15	-	-	-	-	-	-	-	-	15	-	-	-	1000	9	8	15
	90	10	-	-	-	-	-	-	-	-	10	-	-	-	666	5	7	10
	96	56	-	-	8	-	-	-	-	-	64	-	-	-	1280	7	9	64
Total Plants/Acre (excluding Dead & Seedlings)												'84	1400	Dec:	-			
												'90	1466		-			
												'96	1300		-			

A G E	YR	Form Class (No. of 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>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	3	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	66		-			
												'96	80		-			
<i>Opuntia fragilis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	3 10	2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	40		-			
<i>Symphoricarpos oreophilus</i>																		
Y	84	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333	16 6	5	
	90	18	5	1	-	-	-	2	-	-	22	-	4	-	1733	22 12	26	
	96	4	-	-	2	-	-	-	-	-	5	-	1	-	120	16 32	6	
Total Plants/Acre (excluding Dead & Seedlings)												'84	599	Dec:	-			
												'90	1799		-			
												'96	140		-			

TREND STUDY 2-34-96 (old 5-10)

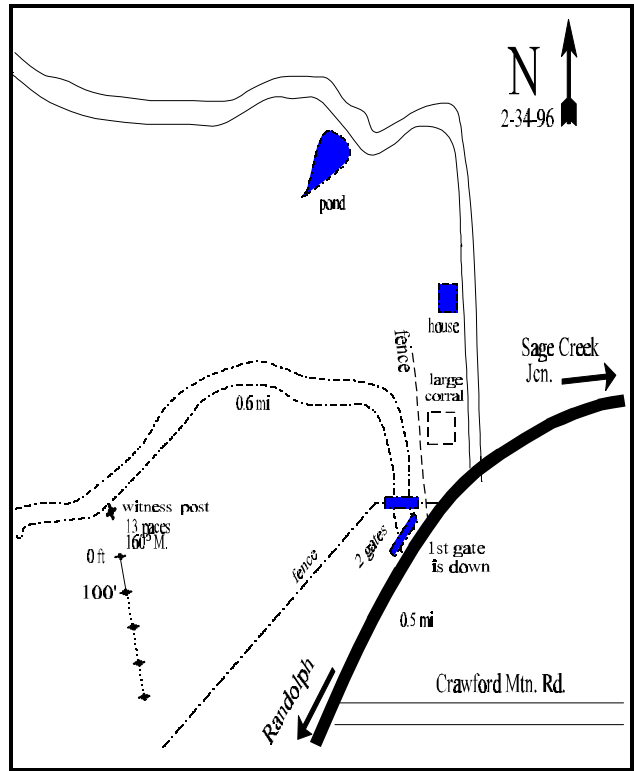
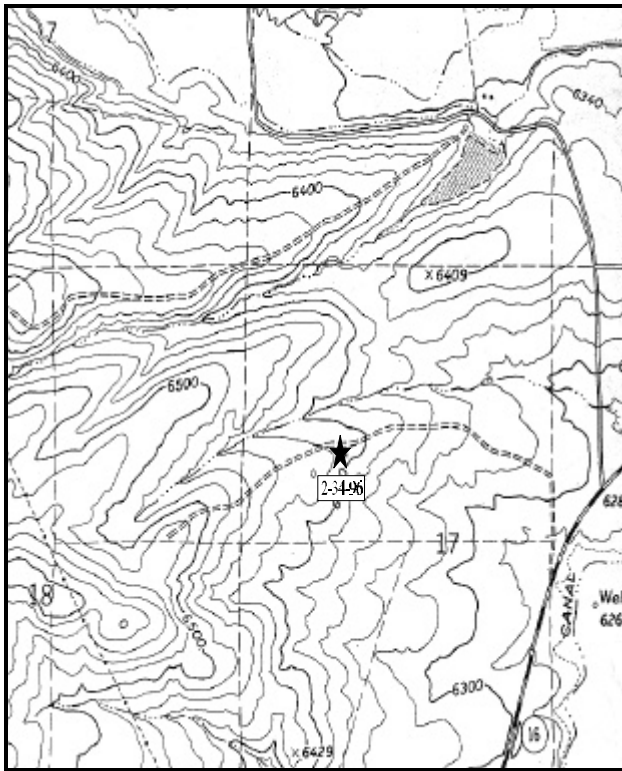
Study site name: Otter Creek. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 146 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Proceed north from Randolph on U-16. Travel 1/2 mile past Nor Gray Lane. Turn left here, and proceed exactly 0.7 miles from the first gate to a witness post on the left hand side of the road. From the witness post walk 15 feet at 160 degrees magnetic to the 0-foot stake of the baseline marked with browse tag #7977.



Map Name: Randolph

Diagrammatic Sketch

Township 11N, Range 7E, Section 17, UTM COOR: 4-84-603E 46-16-326N

DISCUSSION

Trend Study No. 2-34 (5-10)

The Otter creek site is on critical deer winter range located approximately two miles north of Randolph. This is an area that formerly supported a climax Wyoming big sagebrush community so typical of this area. The study area has been treated with herbicide or some kind of mechanical means to control sagebrush. In addition, crested wheatgrass has been seeded by a drill to increase forage production for livestock. This study should provide useful information about potential longevity and effectiveness of such treatments. Current data and observations suggest that Wyoming big sagebrush has a moderately high density (9,620 plants/acre). The study site is at 6,410 feet in elevation on a gentle (5%) east facing slope. Signs of animal use include cattle pats, deer and elk pellet groups, some sage grouse droppings, and sheep droppings.

Soils in the area are described as the "Pancheri Silt Loam". This is a deep, fertile soil with agricultural potential. It also has the capability to produce abundant sagebrush forage. The principal problem is high susceptibility to wind and water erosion. A good plant cover is essential (Campbell and Lacey 1982). Soils at the study site have a loam texture with a neutral pH of 6.9 and limited organic matter (1.4%). Effective rooting depth (see methods) is estimated at almost 16 inches. There is little rock on the surface, but a calcareous layer becomes evident at about 10 inches. The study area is not badly eroded even though the amount of exposed bare ground is greater than on nearby undisturbed big sagebrush types. After the original mechanical treatment and subsequent drill seeding, there has been a minimal spread of crested wheatgrass from the original drill rows.

Browse composition consists almost entirely of Wyoming big sagebrush, which makes up 95% of the browse cover. Density was estimated at 9,566 plants/acre in 1984, consisting largely of young plants, with a biotic potential of 7% (percentage of seedlings to population). Since then the population has been relatively stable and becoming increasingly mature (1996). Utilization is mostly light to moderate and percent decadence low at only 8%. However, vigor is currently poor on 87% of the population due to dry conditions (continuing drought) which have caused the sagebrush to drop leaves. This is likely a temporary condition.

Herbaceous understory consists exclusively of perennial grass, especially seeded crested wheatgrass which accounts for 69% of the grass cover. Sandberg bluegrass is the only other common perennial grass found on the site. Forbs occur rarely and produce just over 1% cover. Grasses showed a moderate level of grazing use in 1984, but current use appears light. If Wyoming big sagebrush increases in density and canopy cover, grass production will decline.

1984 APPARENT TREND ASSESSMENT

Soil trend is stable or even improving. Although little soil was lost during the time crested wheatgrass dominated the site, the species never expanded much beyond the original drill rows. This left a considerable area of bare ground which should be reduced as big sagebrush increases. Vegetative trend depends on one's point of view. In an objective sense, the major trend is an increase in Wyoming big sagebrush and a concurrent decrease in grass productivity, vigor and density.

1990 TREND ASSESSMENT

This seeded Wyoming big sagebrush site shows a slight decrease. Young plants still make up a significant portion of the population, although the percentage of decadent plants has increased. Canopy cover is 14%. The sagebrush have been

moderately hedged and have normal vigor. The crested wheatgrass has been heavily grazed by cattle. It shows a decline in sum of nested frequency, but quadrat frequency is still 100%. There is an excessive amount of bare soil and plant pedestaling is widespread. However, erosion is minimized by the gentle slope.

TREND ASSESSMENT

soil - slightly declining because of increased bare soil

browse - slightly declining, density has decreased and percent decadency has increased

herbaceous understory - stable

1996 TREND ASSESSMENT

The soil trend is stable. Percent bare ground declined by 21%, but percent litter cover also declined by 28%. Soil pedestaling is evident on site yet sum nested frequency of herbaceous vegetation remained similar to 1990 estimates and erosion is minimized due to the gentle terrain. Trend for Wyoming big sagebrush is stable. Utilization is light to moderate and percent decadence low. Recruitment is good with abundant seedlings and young. The poor vigor found on the majority of the population appears to be a temporary condition brought on by prolonged drought conditions. Current cover for sagebrush is 16%. Trend for the herbaceous understory is stable. Sum of nested frequency for grasses has increased slightly, while frequency of forbs has declined slightly. Sum of nested frequency for the native Sandberg bluegrass has increased significantly.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 34

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron cristatum	a341	b309	ab310	100	100	98	11.62
G	Carex spp.	-	4	-	-	2	-	-
G	Poa secunda	a147	b208	c265	76	87	93	5.29
G	Stipa comata	-	3	2	-	1	2	.01
Total for Grasses		488	524	577	176	190	193	16.93
F	Astragalus utahensis	2	6	5	2	5	2	.03
F	Lomatium spp.	-	1	-	-	1	-	-
F	Phlox hoodii	a38	b81	b75	16	35	32	1.16
F	Phlox longifolia	a-	b50	b31	-	19	15	.15
F	Trifolium spp.	a29	b4	b-	13	2	-	-
F	Unknown forb-perennial	1	-	-	1	-	-	-
Total for Forbs		70	142	111	32	62	49	1.35

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

BROWSE TRENDS --

Herd unit 02 , Study no: 34

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata wyomingensis	98	16.12
B	Atriplex gardneri	8	.06
B	Chrysothamnus viscidiflorus stenophyllus	10	.60
B	Eriogonum microthecum	1	.15
B	Opuntia fragilis	2	-
Total for Browse		119	16.93

BASIC COVER --

Herd unit 02 , Study no: 34

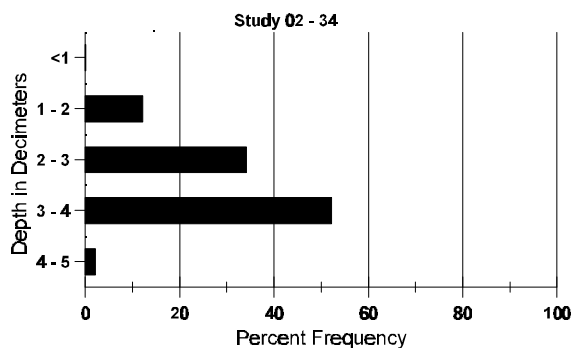
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	362	13.50	5.00	36.29
Rock	3	0	0	.03
Pavement	41	0	0	.22
Litter	392	40.25	40.50	29.26
Cryptogams	161	0	.50	3.84
Bare Ground	348	46.25	54.00	42.42

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 34

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.6	62.0 (13.6)	6.9	40.6	35.1	24.4	1.4	15.2	108.8	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 34

Type	Quadrat Frequency '96
Sheep	3
Rabbit	1
Elk	7
Deer	14
Cattle	5

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 34

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata wyomingensis</i>																		
S	84	21	-	-	-	-	-	-	-	-	21	-	-	-	700		21	
	90	5	-	-	-	-	-	-	-	5	-	-	-	166		5		
	96	18	2	-	-	-	-	-	-	17	-	3	-	400		20		
Y	84	84	71	2	-	-	-	-	-	157	-	-	-	5233		157		
	90	51	13	-	-	-	-	-	-	64	-	-	-	2133		64		
	96	61	14	-	-	-	-	-	-	10	-	65	-	1500		75		
M	84	28	60	15	-	-	-	-	-	101	2	-	-	3433	17	28	103	
	90	45	39	-	1	1	-	-	-	86	-	-	-	2866	15	14	86	
	96	238	116	11	-	-	-	-	-	50	3	312	-	7300	16	23	365	
D	84	6	14	7	-	-	-	-	-	27	-	-	-	900		27		
	90	35	41	-	1	3	-	-	-	58	-	-	22	2666		80		
	96	22	17	2	-	-	-	-	-	-	-	30	11	820		41		
X	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	-	-	-	-	-	-	-	-	-	-	-	-	340		17		
Total Plants/Acre (excluding Dead & Seedlings)												'84	9566	Dec:	9%			
												'90	7665		35%			
												'96	9620		9%			
<i>Atriplex gardneri</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	90	1	-	-	-	-	-	-	-	1	-	-	-	33		1		
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	9	-	-	-	-	-	-	-	9	-	-	-	180	4	10	9	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	33		-			
												'96	180		-			

A G E	YR	Form Class (No. of 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	84	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	4	1	-	-	-	-	-	-	-	5	-	-	-	166	11	25	5
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	8	15	1
	96	16	-	-	-	-	-	-	-	-	1	-	14	1	320	9	15	16
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	20	-	-	-	-	-	-	-	-	2	-	-	18	666		20	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	332	Dec:	0%			
												'90	699		95%			
												'96	340		6%			
<i>Eriogonum microthecum</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	11	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
<i>Opuntia fragilis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33	7	17	1
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	6	17	1
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	4	7	2
Total Plants/Acre (excluding Dead & Seedlings)												'84	33	Dec:	-			
												'90	33		-			
												'96	60		-			

TREND STUDY 2-35-96 (old 5-11)

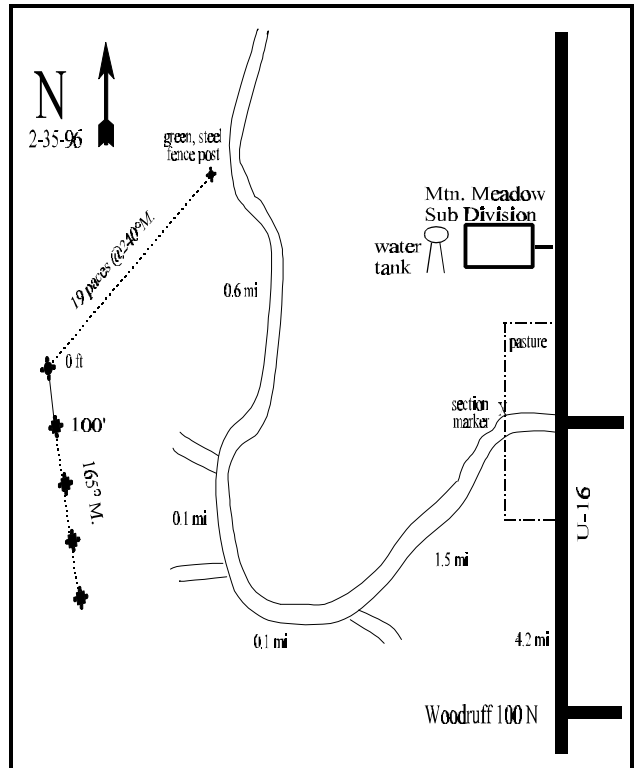
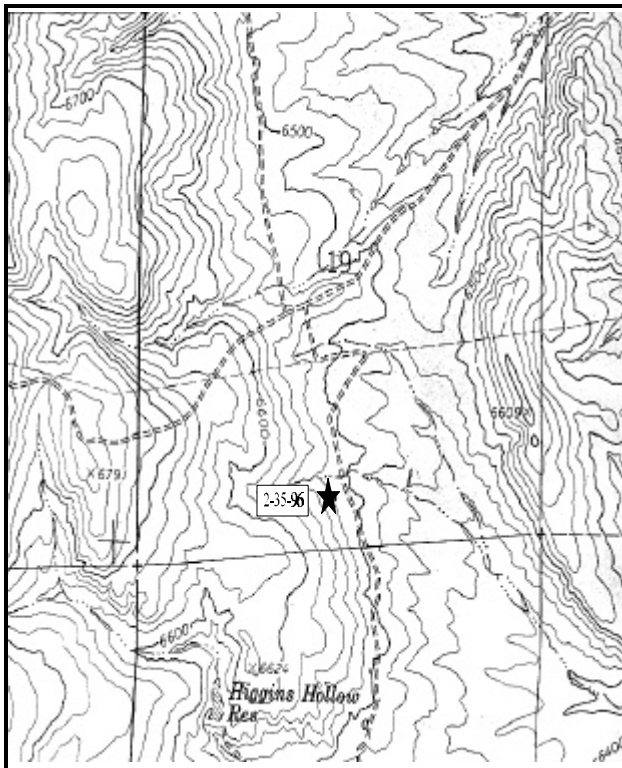
Study site name: Higgin's Hollow. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 165 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From 1st North in Woodruff proceed north on U-16 for 4.2 miles, and turn west to a dirt road. Proceed through pasture passing section marker at west gate. Travel a total of 2.3 miles (on main road) to a witness post on west side of road. From the stake walk 28 paces at 299 degrees true to the 0-foot stake of the baseline.



Map Name: Woodruff

Diagrammatic Sketch

Township 10N, Range 7E, Section 19, UTM COOR: 4-83-434E 46-03-639N

DISCUSSION

Trend Study No. 2-35 (5-11)

This site is physically and edaphically very similar to study number 2-34. Slope is east facing and averages 15% to 20%. Elevation (6,520 feet) is slightly higher but the study area is on the same soil type. Apart from location, the principal difference between these two areas is past management. This study samples a relatively "undisturbed" Wyoming big sagebrush type. Thus, it provides a good comparison to an area that was mechanically treated and seeded. Wildlife use of the study area appears light to moderate. Cattle graze the area and were present during the 1996 reading. They would have a greater impact on soil and vegetation than the wildlife do.

The "Pancheri Silt Loam" that prevails on this site is the same soil type as that described for study number 2-34. This is a moderately deep, fertile soil with few growth limiting factors (Campbell and Lacey 1982). Soil at the site is deep and mostly rock free. It has a clay loam texture and a neutral pH of 7.1. The study site has an irregular ground cover composed primarily of perennial grasses, shrub crowns, and accumulated litter. There is a considerable amount of roots in the top 6 inches of the soil, due mostly to Sandberg bluegrass. Shrub interspaces tend to be bare and remain that way by animal trails and trampling. Some erosion is apparent but is not serious.

The key browse species is Wyoming big sagebrush. It accounts for 94% of the shrub cover and is by far the most abundant, visible, and palatable shrub on the study area. Stickyleaf low rabbitbrush occurs in fair numbers but is much smaller and is seldom utilized. Although this species often acts as an increaser, it shows no such tendency on this site. The Wyoming big sagebrush population is composed of slightly larger than average plants that generally are lightly browsed. Total density has remained nearly 7,000 plants/acre since 1984. Density of mature and decadent plants is probably near optimum level. Abundant reproduction should assure a stable big sagebrush population for the future.

Grasses and forbs provide only small amounts of forage, primarily in springtime. On August 1, 1984 when the study was established, virtually all grass and forb species were completely dried up. Among grasses, Sandberg bluegrass produces 96% of the grass cover and 85% of the total herbaceous cover. Six other perennial grasses occur on the site in quite small numbers. Forbs occur only rarely and primarily are low growing species with little forage value. The only common species is hood's phlox and longleaf phlox.

1984 APPARENT TREND ASSESSMENT

This site is characterized by a fertile soil that is lightly eroded with a dense and vigorous Wyoming big sagebrush stand associated with a rather poor understory. Cattle grazing tends to impact grasses greatly and is allowing vigorous Wyoming big sagebrush reproduction to occur. Grazing is also resulting in some trampling damage detrimental to watershed values. Overall trend, however, is basically stable but could easily change, especially if some disturbance were to occur. One has only to look at roadsides where increaser plants and weeds prevail to see the possibilities.

1990 TREND ASSESSMENT

The Higgins Hollow winter range continues to support a high density stand of Wyoming big sagebrush. At about 20% canopy cover, the sagebrush stand appears about at its maximum. There is a high percentage of seedling and young plants. The sagebrush tends to be moderately hedged, as opposed to the heavily hedged classification of mature plants in 1984. The frequency of bluebunch wheatgrass

has declined dramatically, even if the increase in western wheatgrass is interpreted as a misidentification. However, the most abundant grass, Sandberg bluegrass, increased significantly. A fair percentage of litter cover remains, but the changes in ground cover percentages have resulted in increased soil movement and plant pedestaling.

TREND ASSESSMENT

soil - slight decline, increase in bare ground

browse - stable

herbaceous understory - up slightly

1996 TREND ASSESSMENT

The soil trend is stable but percent litter cover has declined by 30%. Percent bare ground remained similar to 1990 estimates. The browse trend has improved slightly since 1990. Heavy use has declined and percent decadence has gone down from 45% to 18%. The population density appears to be at its limit, but canopy cover may increase slightly in the future. Trend for the herbaceous understory is down slightly even though sum of nested frequency for Sandberg bluegrass increased. Sum of nested frequency for the more preferred forage species, western wheatgrass and bluebunch wheatgrass declined significantly as did bottlebrush squirreltail.

TREND ASSESSMENT

soil - stable

browse - up slightly

herbaceous understory - down slightly

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 35

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron smithii	a-	b105	c14	-	49	5	.07
G	Agropyron spicatum	a217	b14	b9	80	10	3	.04
G	Bromus tectorum (a)	-	-	2	-	-	1	.00
G	Carex geyeri	a29	b55	c4	15	27	4	.02
G	Oryzopsis hymenoides	-	-	1	-	-	1	.00
G	Poa bulbosa	-	-	4	-	-	1	.15
G	Poa fendleriana	-	-	4	-	-	3	.04
G	Poa secunda	a263	b304	c339	93	97	100	15.75
G	Sitanion hystrix	a91	b69	c30	45	31	15	.25
Total for Grasses		600	547	407	233	214	133	16.33
F	Agoseris glauca	4	-	-	2	-	-	-
F	Antennaria spp.	-	8	4	-	4	2	.06
F	Arabis spp.	a2	b13	a3	1	6	1	.00
F	Astragalus convallarius	2	2	-	2	1	-	-
F	Astragalus spp.	-	-	3	-	-	1	.03
F	Calochortus nuttallii	3	4	-	1	2	-	-

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	Cryptantha spp.	a13	b-	b-	8	-	-	-
F	Descurainia spp. (a)	-	-	5	-	-	3	.01
F	Erigeron divergens	14	14	19	6	6	8	.28
F	Erigeron pumilus	12	-	3	5	-	1	.03
F	Lomatium triternatum	-	9	-	-	4	-	-
F	Orthocarpus tolmiei (a)	-	-	8	-	-	4	.04
F	Penstemon humilis	5	1	1	2	1	1	.00
F	Phlox hoodii	a5	a7	b53	2	3	24	1.12
F	Phlox longifolia	a57	b160	c113	30	59	46	.55
F	Trifolium spp.	a25	a12	b-	16	7	-	-
F	Zigadenus paniculatus	a-	b11	a2	-	6	1	.03
Total for Forbs		142	241	214	75	99	92	2.17

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

BROWSE TRENDS --

Herd unit 02 , Study no: 35

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata wyomingensis	96	20.53
B	Chrysothamnus viscidiflorus stenophyllus	39	1.36
B	Eriogonum microthecum	8	.01
B	Opuntia fragilis	3	.00
B	Tetradymia canescens	3	-
Total for Browse		149	21.92

BASIC COVER --

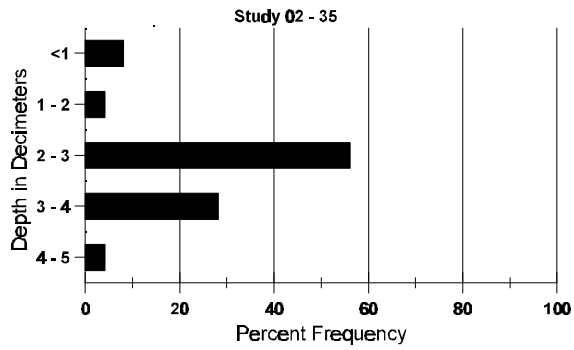
Herd unit 02 , Study no: 35

Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	351	7.75	7.75	39.28
Rock	24	0	0	.10
Pavement	44	.75	.25	.36
Litter	394	76.00	54.25	38.15
Cryptogams	188	2.75	14.25	10.31
Bare Ground	275	12.75	23.50	23.33

SOIL ANALYSIS DATA --
 Herd Unit 02, Study no: 35

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.9	59.0 (13.1)	7.1	42.9	31.1	26.0	1.9	11.8	137.6	.6

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 02 , Study no: 35

Type	Quadrat Frequency '96
Rabbit	12
Deer	13
Cattle	9

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 35

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata wyomingensis</i>																		
S	84	64	-	-	-	-	-	-	-	-	64	-	-	-	4266		64	
	90	21	-	-	-	-	-	-	-	-	21	-	-	-	1400		21	
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	84	24	-	-	-	-	-	-	-	-	24	-	-	-	1600		24	
	90	31	3	-	-	-	-	-	-	-	33	-	-	1	2266		34	
	96	59	6	-	-	-	-	-	-	-	65	-	-	-	1300		65	
M	84	6	20	9	-	-	-	-	-	-	35	-	-	-	2333	17	21	35
	90	4	18	-	-	-	-	-	-	-	21	1	-	-	1466	23	21	22
	96	101	101	7	-	-	-	-	-	-	209	-	-	-	4180	24	33	209
D	84	10	25	8	1	-	-	-	-	-	41	-	1	2	2933		44	
	90	19	14	10	3	-	-	-	-	-	39	-	-	7	3066		46	
	96	14	38	6	5	1	-	-	-	-	56	-	-	8	1280		64	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1500		75	
Total Plants/Acre (excluding Dead & Seedlings)												'84	6866	Dec:	43%			
												'90	6798		45%			
												'96	6760		19%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	13	-	-	-	-	-	-	-	-	13	-	-	-	866		13	
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	55	-	-	-	-	-	-	-	-	55	-	-	-	3666	9	13	55
	90	-	-	-	4	-	-	-	-	-	4	-	-	-	266	8	12	4
	96	78	-	-	-	-	-	-	-	-	74	-	4	-	1560	10	17	78
D	84	15	-	-	-	-	-	-	-	-	15	-	-	-	1000		15	
	90	65	3	-	-	-	-	-	-	-	29	-	38	1	4533		68	
	96	3	-	-	-	-	-	-	-	-	-	-	1	2	60		3	
Total Plants/Acre (excluding Dead & Seedlings)												'84	5532	Dec:	18%			
												'90	4999		91%			
												'96	1620		4%			

A G E	YR	Form Class (No. of 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20		1	
M	84	4	-	-	-	-	-	-	-	-	4	-	-	-	266	4	4	4
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	7	-	-	2	-	-	-	-	-	9	-	-	-	180	7	8	9
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	266	Dec:	0%			
												'90	133		0%			
												'96	220		9%			
<i>Opuntia fragilis</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	6	-	-	-	-	-	-	-	-	6	-	-	-	400	5	7	6
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200	5	1	3
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100	4	11	5
Total Plants/Acre (excluding Dead & Seedlings)												'84	400	Dec:	-			
												'90	200		-			
												'96	100		-			
<i>Tetradymia canescens</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	4	-	-	-	-	-	-	-	4	-	-	-	266	5	4	4
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	5	10	2
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	3	-	-	-	-	-	-	-	-	-	3	200		3	
	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	332	Dec:	0%			
												'90	266		75%			
												'96	60		33%			

TREND STUDY 2-36-96 (old 5-12)

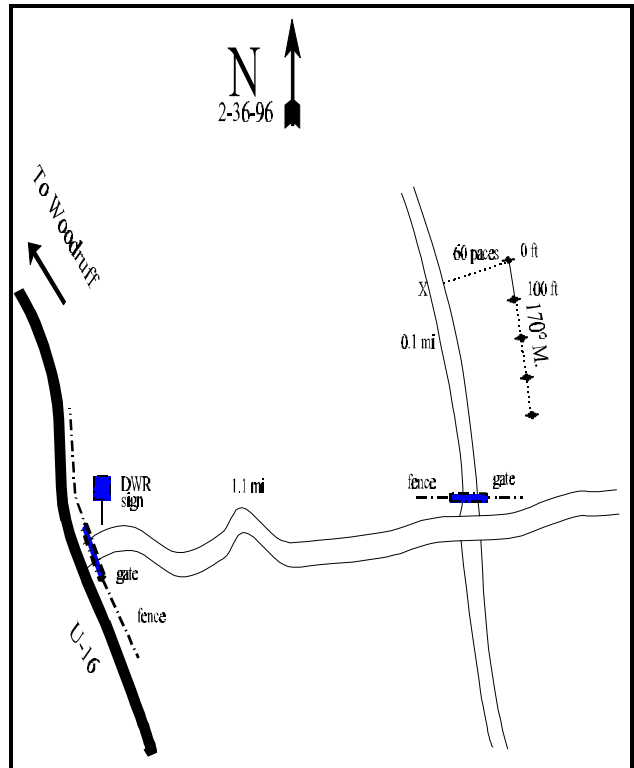
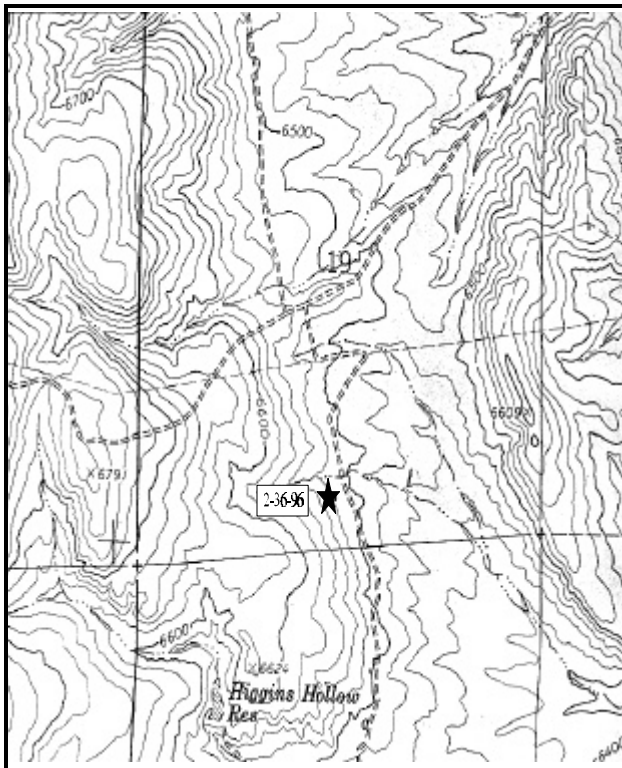
Study site name: Woodruff Co-op. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 170 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the junction of U-39 and U-16 in Woodruff, travel south on U-16 5.9 miles to the Woodruff Co-op Livestock Management Area. Turn left (east) through the gate. Drive 1.1 miles to a fork. Turn left and go north through the gate. From the gate, go 0.1 miles. The study is on the east side of the road, approximately 60 paces to the 0-foot baseline stake. The study stakes are short fenceposts. The baseline stakes are easily seen from the road so no witness posts were needed. The 0-foot baseline stake is marked with browse tag # 55.



Map Name: Neponset Reservoir NE

Diagrammatic Sketch

Township 9N, Range 8E, Section 31, UTM COOR: 4-93-030E 45-90-522N

DISCUSSION

Trend Study No. 2-36 (5-12)

This trend study was established in 1990 on DWR property at the Woodruff Co-op to monitor sagebrush reestablishment on a treated site currently dominated by introduced perennial grasses. The allotment continues to be used for spring cattle grazing. It is also antelope range that is used by deer and elk in the winter. Signs of sage grouse are also common.

The soil is moderately deep with an effective rooting depth (see methods) of 13 inches. Soil texture is a sandy clay loam with a neutral pH of 7.2. Phosphorus could be a limiting factor at only 3.9 ppm. Pavement and rock cover are limited with a combined value of about 5%. The percentage of vegetative cover is moderate due to the dense stand of crested wheatgrass, but there was also a significant amount of bare soil (43%) in 1990. It is now only 27% in 1996.

Few Wyoming big sagebrush were sampled on the site. The majority of the plants encountered were light to moderately hedged, small mature sagebrush. Decadent shrubs outnumbered the young in 1990. Under the current grazing schedule of early spring use, browse species should increase but they do not appear to be doing so at this time. To meet management objectives, the increase should include Wyoming big sagebrush and winterfat and not exclusively low rabbitbrush. Sagebrush density was estimated at less than 1,000 plants/acre in 1990. During the 1996 reading, sagebrush canopy cover was less than 1% with a density of only 320 plants/acre. Some of the change in density is due to the much larger sample used in 1996 which gives considerably greater accuracy for species that are clumped and/or discontinuous in their respective distributions.

The herbaceous understory is totally dominated by crested wheatgrass which accounts for 94% of the grass cover and 84% of the total vegetative cover. It has a very high sum of nested frequency value of 360 out of a possible 400 with a quadrat frequency of 100%. Sandberg bluegrass is also fairly common. Other perennial herbaceous species are relatively insignificant, although the longleaf phlox may provide some spring forage.

1990 APPARENT TREND ASSESSMENT

Under the current livestock grazing regime, Wyoming big sagebrush would be expected to increase. This would be an upward trend for deer and antelope winter range. The study is in a good location to monitor changes in relative composition and to indicate when and if adjustments should be made in livestock grazing. Soil condition is also an important aspect to monitor. The dense herbaceous cover currently provides fair protection and the trend is stable to slightly downward.

1996 TREND ASSESSMENT

Trend for soil is up due to a 38% decline in percent bare ground. Herbaceous vegetation is abundant and well dispersed, effectively limiting erosion. Density of Wyoming big sagebrush is still low and does not show signs of increasing. The new larger sample used in 1996, estimated only 320 plants/acre. No seedlings or young were encountered. The lack of dead plants would suggest that the 1990 population density was over estimated with the smaller sample size. The only positive aspect of the browse trend is an improvement in percent decadency which declined from 31% to 6%. Trend for browse is considered stable. Trend for the herbaceous understory is stable. Sum of nested frequency for crested wheatgrass increased, with the sum of nested frequency for all perennial grasses remaining similar to 1990. Sum of nested frequency for perennial forbs declined, however forbs are rare and produce just only barely 1% total cover.

TREND ASSESSMENT

soil - up

browse - stable but very limited population

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 36

T y p e	Species	Nested Frequency		Quadrat Frequency		Average Cover % '96
		'90	'96	'90	'96	
G	Agropyron cristatum	348	*360	100	100	22.46
G	Oryzopsis hymenoides	5	-	3	-	-
G	Poa secunda	89	90	46	35	1.38
G	Stipa comata	11	1	5	1	.03
Total for Grasses		453	451	154	136	23.88
F	Alyssum alyssoides (a)	-	41	-	16	.10
F	Antennaria spp.	-	2	-	1	.00
F	Astragalus utahensis	7	*-	5	-	-
F	Phlox hoodii	83	*43	40	20	1.10
F	Phlox longifolia	81	*37	34	16	.08
F	Schoenocrambe linifolia	-	3	-	1	.00
F	Tragopogon dubius	-	3	-	1	.00
F	Trifolium spp.	11	*-	5	-	-
Total for Forbs		182	129	84	55	1.30

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

BROWSE TRENDS --

Herd unit 02 , Study no: 36

T y p e	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata wyomingensis	14	.28
B	Ceratoides lanata	40	.59
B	Chrysothamnus viscidiflorus stenophyllus	33	.26
B	Gutierrezia sarothrae	5	.03
B	Opuntia fragilis	12	.18
B	Tetradymia canescens	8	.06
Total for Browse		112	1.41

BASIC COVER --

Herd unit 02 , Study no: 36

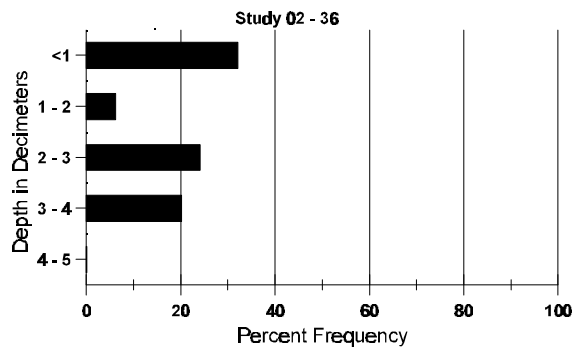
Cover Type	Nested Frequency '96	Average Cover %	
		'90	'96
Vegetation	364	16.75	28.00
Rock	225	1.75	2.09
Pavement	251	1.25	3.02
Litter	397	36.50	34.31
Cryptogams	51	.50	.28
Bare Ground	339	43.25	26.78

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 36

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.2	63.0 (14.1)	7.2	56.6	14.1	29.4	2.1	3.9	108.8	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 36

Type	Quadrat Frequency '96
Rabbit	10
Deer	8
Cattle	15
Antelope	6

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 36

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata wyomingensis</i>																		
Y	90	2	1	-	-	-	-	-	-	-	3	-	-	-	100		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	90	7	9	1	-	-	-	-	-	16	1	-	-	566	10	16	17	
	96	10	4	-	-	-	-	1	-	15	-	-	-	300	14	24	15	
D	90	1	7	-	-	1	-	-	-	8	1	-	-	300			9	
	96	-	1	-	-	-	-	-	-	1	-	-	-	20			1	
X	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	60			3	
Total Plants/Acre (excluding Dead & Seedlings)											'90	966	Dec:	31%				
											'96	320		6%				
<i>Atriplex tridentata</i>																		
M	90	1	-	-	-	-	-	-	-	1	-	-	-	33	5	5	1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
Total Plants/Acre (excluding Dead & Seedlings)											'90	33	Dec:	-				
											'96	0		-				
<i>Ceratoides lanata</i>																		
Y	90	3	-	-	-	-	-	-	-	3	-	-	-	100			3	
	96	3	2	-	9	-	-	-	-	14	-	-	-	280			14	
M	90	3	4	-	-	-	-	-	-	7	-	-	-	233	7	5	7	
	96	9	60	46	1	-	-	-	-	116	-	-	-	2320	7	9	116	
D	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	-	2	1	-	-	-	-	-	3	-	-	-	60			3	
X	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	20			1	
Total Plants/Acre (excluding Dead & Seedlings)											'90	333	Dec:	0%				
											'96	2660		2%				
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	90	2	9	-	-	-	-	-	-	10	1	-	-	366			11	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
M	90	12	15	-	-	-	-	-	-	27	-	-	-	900	4	6	27	
	96	38	-	-	2	-	-	-	-	40	-	-	-	800	7	11	40	
D	90	7	-	-	-	-	-	-	-	7	-	-	-	233			7	
	96	4	-	-	-	-	-	-	-	1	-	-	3	80			4	
Total Plants/Acre (excluding Dead & Seedlings)											'90	1499	Dec:	16%				
											'96	880		9%				
<i>Gutierrezia sarothrae</i>																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	5	-	-	1	-	-	-	-	6	-	-	-	120	5	7	6	
Total Plants/Acre (excluding Dead & Seedlings)											'90	0	Dec:	-				
											'96	120		-				

A G E	YR	Form Class (No. of 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>Opuntia fragilis</i>																		
Y	90	2	-	-	-	-	-	-	-	-	2	-	-	-	66		2	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	90	6	-	-	-	-	-	-	-	-	5	-	1	-	200	4	6	6
	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200	4	12	10
D	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	3	-	-	-	-	-	-	-	-	1	-	-	2	60		3	
X	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	140			7	
Total Plants/Acre (excluding Dead & Seedlings)												'90	266	Dec:	0%			
												'96	280		21%			
<i>Tetradymia canescens</i>																		
M	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	5	3	1	-	-	-	-	-	-	9	-	-	-	180	5	9	9
D	90	-	-	-	-	-	-	-	-	-	-	-	-	0			0	
	96	-	1	-	-	-	-	-	-	-	1	-	-	20			1	
Total Plants/Acre (excluding Dead & Seedlings)												'90	0	Dec:	0%			
												'96	200		10%			

TREND STUDY 2-37-96 (old 2-22)

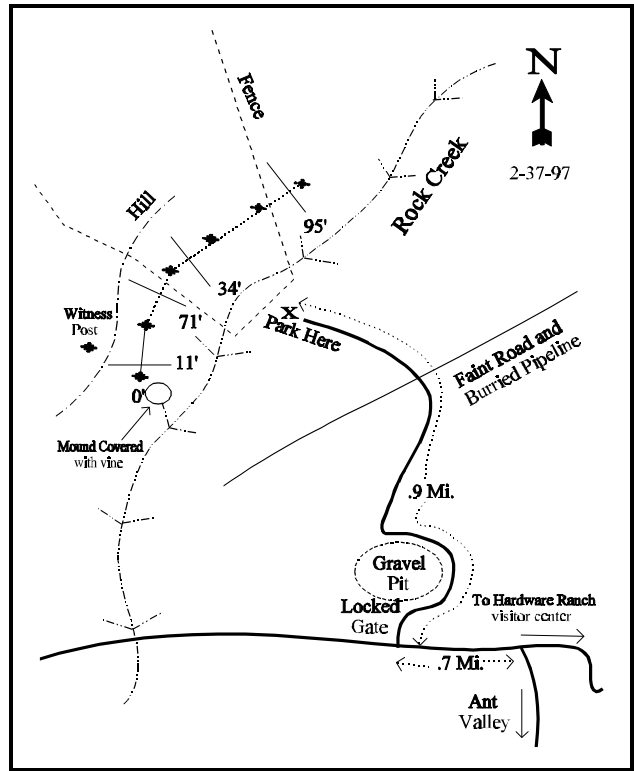
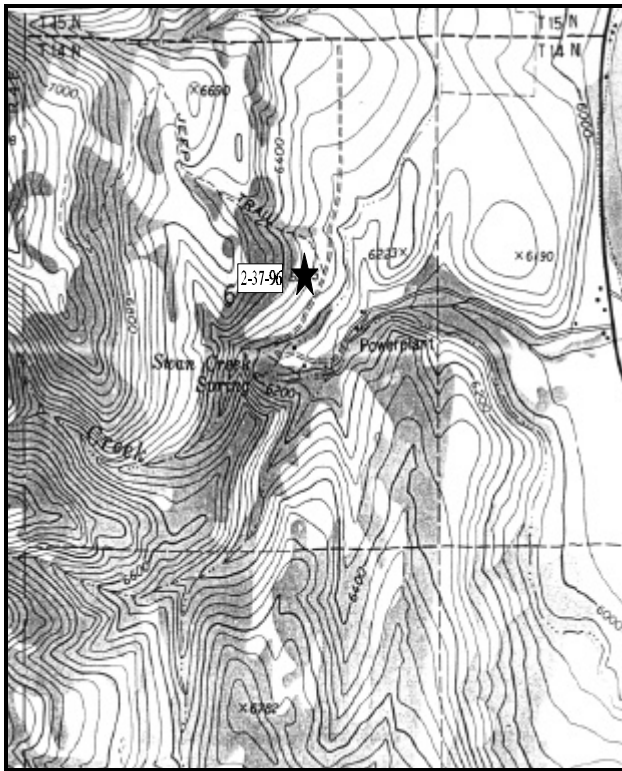
Study site name: Rock Creek. Range type: Riparian.

Compass bearing: frequency baseline 20 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11ft), line 2 (71ft), line 3 (34ft), line 4 (read along baseline), line 5 (95ft).

LOCATION DESCRIPTION

From the corner of the ant hill road turnoff, travel down Blacksmith Fork Canyon 0.7 miles and turn right. Go through a locked gate (you'll need a WRP key to open the gate), around a gravel pit, and travel 0.9 miles to a stopping point. From the parking spot walk down stream to a fence. Cross the creek and look for a witness post on the hill side 200 feet across the fence. From the witness post to the 0-foot stake, take a bearing of 122 degrees magnetic and pace 8 paces. The baseline doglegs along the river in the riparian area. The 100-line runs 20 degrees magnetic. The 200-foot line runs 36 degrees magnetic and the belt is centered on the 25 foot mark. The 300-foot baseline runs 55 degrees magnetic and the belt is centered on the 15 foot mark. The 400-foot baseline runs 69 degrees magnetic and the quadrats are read along the baseline. The 500-foot baseline runs 61 degrees magnetic.



Map Name: Hardware Ranch

Diagrammatic Sketch

Township 10N, Range 3E, Section 10, UTM COOR: 4-51-297E 46-07-376N

DISCUSSIONS

Trend Study No. 2-37

This is a new site established in 1996 along Rock Creek on a degraded riparian community. Slope is nearly level with a slight south aspect. Elevation is about 5,900 feet. Water is available in Rock Creek which is a perennial stream running parallel to the study baseline. The baseline zig-zags along the south side of the creek in order to stay within the narrow riparian corridor. Photo points were also established on willows closest to each baseline stake to record utilization. This area is grazed by cattle and receives some use by horses and elk.

Soil on the site is deep, dark colored with a clay loam texture. Organic matter is high and pH is neutral at 7.3. Effective rooting depth (see methods) is greater than 28 inches along the first two hundred feet of the base line and averages 20 inches along the last 300 feet of the baseline which is also drier. Rock is rare on the surface or in the profile. Little bare ground occurs on the site with no erosion is evident.

Browse is limited on the site and accounts for only 2% of the total vegetative cover. Mountain big sagebrush is the most abundant shrub sampled with a density of 440 plants/acre which occur mostly along the drier edge of the somewhat narrow riparian corridor. These plants are mostly mature and appear to have no use. The only shrubs in the area which likely receive summer use are the coyote willow (*Salix exigua exigua*). The willows were not abundant enough to properly sample them in the shrub density strips. The only relative measure of utilization available is photo point comparisons on the closest individual willow to each base line stake. Some of the willows are tall and partly unavailable to browsing. Several individuals have been highlined in the past, but current use appears light. Some other browse occur on the site in small numbers including; narrowleaf low rabbitbrush, broom snakeweed, Oregon grape, wax current, and woods rose.

Herbaceous plants dominate the site. Perennial grasses are abundant and diverse. Slender wheatgrass is the most common species along with big mountain brome, Kentucky bluegrass, and orchard grass. Grasses were heavily utilized and trampled making identification difficult. As a result, all perennial and annual grasses were lumped into their respective categories. Sedges and rushes were identified to the genus level. Perennial grasses contribute 53% of the herbaceous cover. Forbs are abundant and diverse with 33 annual and perennial species encountered. Unfortunately Canada thistle accounts for 59% of the forb cover. Other weedy forbs are also common including; western yarrow, pacific aster, hounds tongue, horsetail, prickly lettuce, and tar weed.

1996 APPARENT TREND ASSESSMENT

The soil trend is stable. Vegetative cover is abundant and little bare soil is exposed. Browse is not a very important aspect of this summer range. The only species which receive much use are the willows. Future comparisons of photo points on willow will be needed to determine relative utilization and condition. Currently these willows appear to be lightly utilized with many growing out of reach. The herbaceous understory is abundant but contains several weedy, invasive forbs. Trend will have to be determined by comparing the composition and abundance of these forbs on future readings.

HERBACEOUS TRENDS --
Herd unit 02 , Study no: 37

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
G	Carex spp.	30	12	.80
G	Juncus spp.	90	22	10.28
G	Unknown grass - annual	62	18	1.25
G	Unknown grass - perennial	436	94	41.40
Total for Grasses		618	146	53.74
F	Achillea millefolium	75	27	1.54
F	Alyssum alyssoides (a)	3	2	.01
F	Ambrosia psilostachya	1	1	.00
F	Artemisia ludoviciana	17	6	.27
F	Astragalus ceramicus	5	2	.06
F	Aster chilensis	14	5	.36
F	Cirsium arvense	235	78	14.17
F	Collomia linearis (a)	1	1	.00
F	Collinsia parviflora (a)	3	1	.00
F	Cynoglossum officinale	82	37	1.47
F	Epilobium brachycarpum (a)	21	7	.16
F	Equisetum spp.	136	46	.83
F	Erodium cicutarium (a)	4	1	.03
F	Erigeron spp	2	1	.00
F	Fragaria virginiana	2	1	.03
F	Hackelia patens	1	1	.00
F	Isatis tinctoria	4	2	.03
F	Lactuca serriola	51	20	.25
F	Madia glomerata (a)	19	9	.17
F	Medicago sativa	4	1	.00
F	Polygonum douglasii (a)	15	6	.10
F	Potentilla gracilis	11	3	.12
F	Ranunculus testiculatus (a)	27	9	.09
F	Rumex crispus	3	2	.06
F	Rudbeckia occidentalis	6	3	.39
F	Smilacina stellata	61	18	2.11
F	Solidago missouriensis	26	10	1.18
F	Taraxacum officinale	13	5	.10
F	Tragopogon dubius	19	10	.11
F	Trifolium gymnocarpon	3	2	.01
F	Urtica dioica	3	1	.00
F	Verbascum thapsus	10	5	.39

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
	Total for Forbs	877	323	24.15

BROWSE TRENDS --

Herd unit 02 , Study no: 37

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	12	1.01
B	Chrysothamnus viscidiflorus stenophyllus	2	.03
B	Gutierrezia sarothrae	1	.03
B	Mahonia repens	5	.03
B	Ribes aureum	2	.03
B	Rosa woodsii	4	.18
B	Salix exigua exigua	0	.03
	Total for Browse	24	1.34

BASIC COVER --

Herd unit 02 , Study no: 37

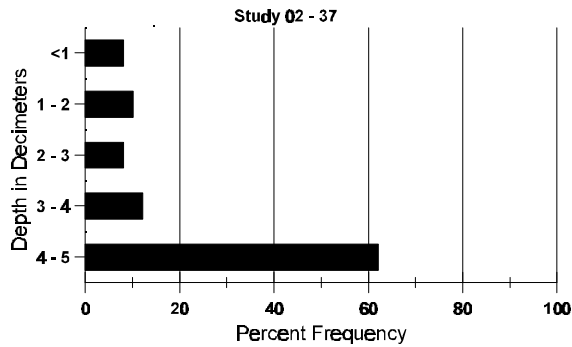
Cover Type	Nested Frequency '96	Average Cover % '96
Vegetation	498	78.00
Rock	63	.97
Pavement	50	.20
Litter	471	44.50
Cryptogams	2	.03
Bare Ground	123	3.07

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 37

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
23.0	50.0 (18.1)	7.3	42.2	31.4	26.4	4.8	31.0	243.2	1.7

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 37

Type	Quadrat Frequency '96
Horse	3
Elk	2
Cattle	5

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 37

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
Y	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340	21	32	17
Total Plants/Acre (excluding Dead & Seedlings)												'96	440	Dec:		-		
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
M	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120	17	21	6
Total Plants/Acre (excluding Dead & Seedlings)												'96	120	Dec:		-		
<i>Gutierrezia sarothrae</i>																		
M	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	11	7	1
Total Plants/Acre (excluding Dead & Seedlings)												'96	20	Dec:		-		
<i>Mahonia repens</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
M	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200	6	5	10
Total Plants/Acre (excluding Dead & Seedlings)												'96	340	Dec:		-		
<i>Ribes aureum</i>																		
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20	-	-	1
Total Plants/Acre (excluding Dead & Seedlings)												'96	60	Dec:		-		

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Rosa woodsii																		
Y	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	96	5	-	-	-	-	-	-	-	-	2	-	3	-	100	13	13	5
Total Plants/Acre (excluding Dead & Seedlings)												'96	180	Dec:	-			

TREND STUDY 2-38-96 (old 2-23)

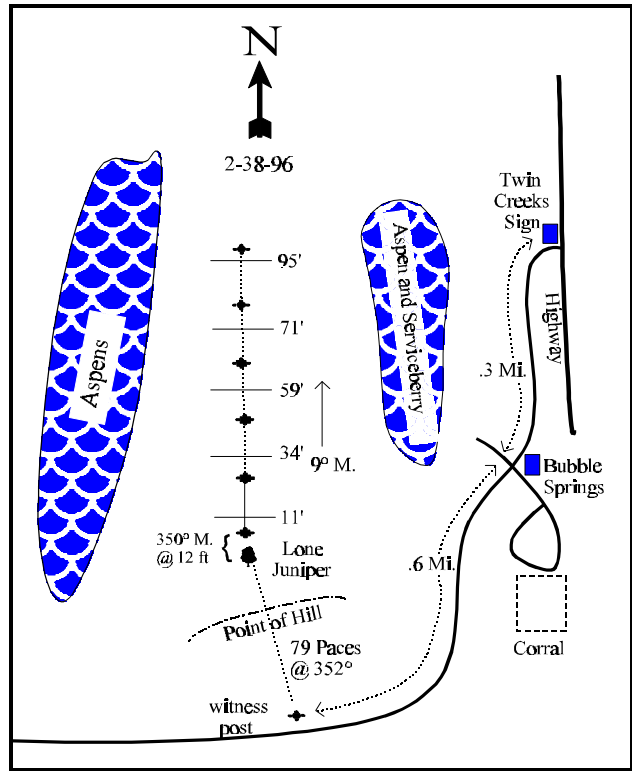
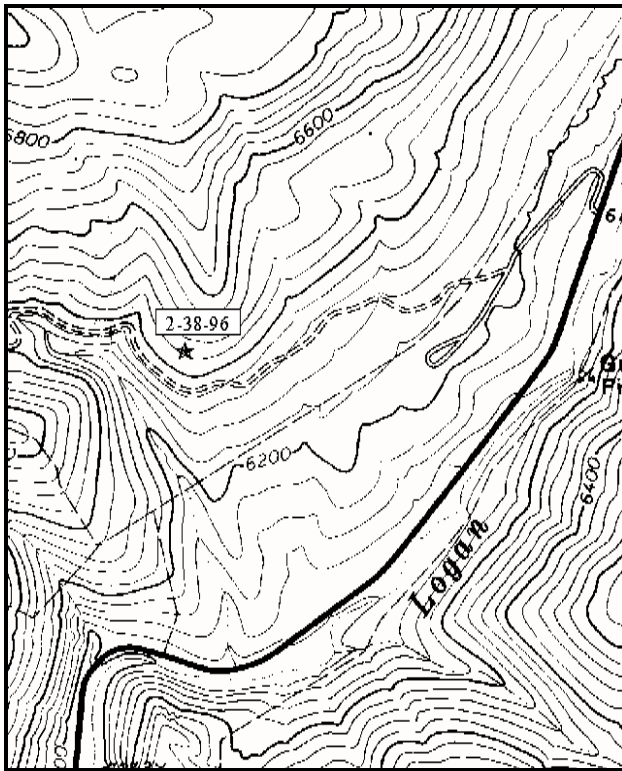
Study site name: Twin Creeks. Range type: Mixed Mtn. Brush.

Compass bearing: frequency baseline 9 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

Take the Twin Creek turnoff off of U.S. 89 and proceed 0.3 miles to the Bubble Springs turn. Continue up Twin Creek for 0.6 miles to a witness post. From the witness post walk 74 paces at a bearing of 352 degrees magnetic to a lone juniper. From the juniper, the 0-foot baseline stake is 12 feet away at a bearing of 350 degrees magnetic. The baseline runs up the slope at 9 degrees magnetic.



Map Name: Temple Peak

Diagrammatic Sketch

Township 13N, Range 3E, Section 3, UTM COOR: 4-51-532E 46-34-755N

DISCUSSIONS

Trend Study No. 2-38

This is a new site established 1/3 of a mile east of the Twin Creeks Corrals. This site was setup to monitor elk concentrations during the winter months. The study is on a south aspect with a 30% slope and an elevation of 6,500 feet. Elk pellet groups are fairly abundant with a quadrat frequency of 28%. Sign of cattle, sheep, and deer were also encountered. Moose sign was observed on the site but not within the sampled quadrats.

The soil is moderately shallow and rocky, similar to most of the sites in this general area. Effective rooting depth (see methods) is estimated at almost 14 inches. Soil texture is a loam with a slightly acid pH of 6.3. Percent organic matter in the soil is relatively high at 6.5%. Bare ground is rare and caused primarily by gopher activity. Vegetation and litter cover are high and well dispersed, effectively limiting erosion.

The site supports a variety of preferred browse forage including; serviceberry, mountain big sagebrush, chokecherry, bitterbrush, and snowberry. Of these species, only mountain big sagebrush and snowberry are very abundant. Mountain big sagebrush number approximately 1,500 plants/acre, 77% of which are large mature plants measuring an average of 27 inches in height with a crown of nearly 4 feet. The stand is light to moderately utilized and generally in good vigor. Some plants were considered chlorotic, yet there was good seed production. Percent decadence is very low at 5%.

Snowberry has a density of 1,220 plants/acre, 18% of which are heavily hedged. Most of the population is mature (84%) with seedlings and young also present. The other highly preferred shrubs, bitterbrush and serviceberry, are found in small numbers which are heavily hedged. Bitterbrush numbers only 180 plants/acre. Age class structure suggests a stable population with a low percent decadency and sufficient numbers of young plants to maintain the population. Serviceberry number only an estimated 20 plants/acre. These are heavily hedged with leaves covered with a rust fungus.

Narrowleaf low rabbitbrush is the most abundant shrub on the site with an estimated density of 2,180 plants/acre, while also providing the most browse cover of all species (29%). The population is almost entirely mature (96%) and does not appear to be increasing.

The herbaceous understory is abundant and diverse. Grasses and forbs combine to produce 58% of the vegetative cover. Grasses are represented by 9 perennial and one annual species. Bluebunch wheatgrass is the most abundant species with Kentucky bluegrass, slender wheatgrass, bulbous bluegrass, and Great Basin wildrye also being common. Cheatgrass is rare. Forbs are also diverse with 19 perennial and 9 annual species sampled. Unfortunately weedy species dominate the composition. Weedy annual forbs account for 43% of the forb cover. Perennials are dominated by mulesears, yellow salsify, pacific aster, and bastard toadflax.

1996 APPARENT TREND ASSESSMENT

Vegetation and litter cover are abundant and well dispersed on the site and erosion is not currently a problem. Trend for soil appears stable. The browse trend also appears stable for the key species. Decadency rates are low and recruitment is good. In addition, the population of the less desirable shrub, narrowleaf low rabbitbrush, appears stable. The herbaceous understory is abundant and diverse. The only problem is the forb composition which is dominated by annuals and aggressive perennial increasers. Future trends will depend on compositional changes.

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 38

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
G	<i>Agropyron spicatum</i>	265	73	12.38
G	<i>Agropyron trachycaulum</i>	70	23	1.93
G	<i>Bromus marginatus</i>	40	18	.79
G	<i>Bromus tectorum</i> (a)	3	2	.06
G	<i>Elymus cinereus</i>	23	7	1.04
G	<i>Melica bulbosa</i>	9	3	.06
G	<i>Poa bulbosa</i>	33	7	1.62
G	<i>Poa pratensis</i>	162	61	3.42
G	<i>Poa secunda</i>	27	10	.46
G	<i>Stipa columbiana</i>	9	3	.21
Total for Grasses		641	207	22.00
F	<i>Achillea millefolium</i>	16	5	.27
F	<i>Alyssum alyssoides</i> (a)	173	57	.85
F	<i>Arabis drummondi</i>	3	2	.01
F	<i>Aster</i> spp.	9	5	.71
F	<i>Balsamorhiza sagittata</i>	2	2	.48
F	<i>Cirsium</i> spp.	3	2	.15
F	<i>Collomia linearis</i> (a)	46	24	.17
F	<i>Comandra pallida</i>	22	9	.48
F	<i>Collinsia parviflora</i> (a)	106	40	.30
F	<i>Crepis acuminata</i>	5	2	.03
F	<i>Delphinium bicolor</i>	10	4	.02
F	<i>Draba</i> spp. (a)	3	2	.01
F	<i>Epilobium brachycarpum</i> (a)	99	42	.66
F	<i>Galium aparine</i> (a)	4	2	.03
F	<i>Helianthella uniflora</i>	5	3	.36
F	<i>Lappula occidentalis</i> (a)	8	4	.07
F	<i>Lactuca serriola</i>	18	6	.08
F	<i>Lithospermum ruderales</i>	14	3	.24
F	<i>Lupinus argenteus</i>	20	11	.38
F	<i>Microsteris gracilis</i> (a)	46	23	.21
F	<i>Polygonum douglasii</i> (a)	69	29	.22
F	<i>Senecio multilobatus</i>	5	1	.03
F	<i>Taraxacum officinale</i>	4	2	.01
F	<i>Thlaspi montanum</i>	1	1	.00
F	<i>Tragopogon dubius</i>	88	45	1.08
F	<i>Veronica biloba</i> (a)	132	43	1.38

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
F	Verbascum blattaria	8	5	.07
F	Wyethia amplexicaulis	31	18	3.81
Total for Forbs		950	392	12.19

BROWSE TRENDS --

Herd unit 02 , Study no: 38

Type	Species	Strip Frequency '96	Average Cover % '96
B	Amelanchier alnifolia	1	.38
B	Artemisia tridentata vaseyana	52	6.65
B	Chrysothamnus viscidiflorus stenophyllus	57	7.40
B	Eriogonum heracleoides	22	2.15
B	Prunus virginiana	5	.09
B	Purshia tridentata	8	2.02
B	Symphoricarpos oreophilus	30	5.64
Total for Browse		175	24.35

BASIC COVER --

Herd unit 02 , Study no: 38

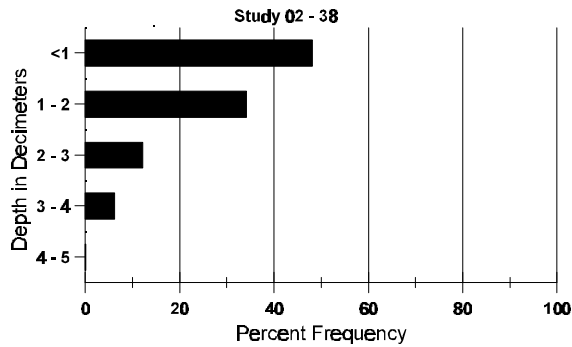
Cover Type	Nested Frequency '96	Average Cover % '96
Vegetation	470	53.65
Rock	260	5.68
Pavement	216	2.76
Litter	491	55.04
Cryptogams	40	.58
Bare Ground	191	5.33

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 38

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.0	58.4 (15.9)	6.3	42.9	32.1	25.0	6.5	38.4	278.4	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 38

Type	Quadrat Frequency '96
Sheep	2
Elk	28
Deer	4
Cattle	2

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 38

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Amelanchier alnifolia</i>																		
M	96	-	-	-	-	-	1	-	-	-	-	1	-	-	20	35	25	1
Total Plants/Acre (excluding Dead & Seedlings)															'96	20	Dec:	-
<i>Artemisia tridentata vaseyana</i>																		
S	96	14	-	-	-	-	-	-	-	-	13	-	1	-	280			14
Y	96	11	1	1	-	-	-	-	-	-	12	-	1	-	260			13
M	96	22	35	1	-	-	-	-	-	-	52	-	6	-	1160	27	43	58
D	96	-	1	1	-	-	-	-	-	-	2	-	-	-	40			2
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	460			23
Total Plants/Acre (excluding Dead & Seedlings)															'96	1460	Dec:	3%
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	96	1	-	-	2	-	-	-	-	-	3	-	-	-	60			3
M	96	105	-	-	-	-	-	-	-	-	103	-	-	2	2100	16	26	105
D	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)															'96	2180	Dec:	1%

A G E	YR	Form Class (No. of 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	96	41	-	-	1	-	-	-	-	-	42	-	-	-	840	8	22	42
D	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'96	860	Dec:	2%			
<i>Prunus virginiana</i>																		
Y	96	2	2	-	2	-	-	-	-	-	6	-	-	-	120			6
M	96	-	-	-	-	1	-	-	-	-	1	-	-	-	20	13	9	1
Total Plants/Acre (excluding Dead & Seedlings)												'96	140	Dec:	-			
<i>Purshia tridentata</i>																		
Y	96	-	2	-	-	-	-	-	-	-	2	-	-	-	40			2
M	96	-	1	3	1	1	-	-	-	-	6	-	-	-	120	21	41	6
D	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'96	180	Dec:	11%			
<i>Symphoricarpos oreophilus</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	96	5	-	-	1	-	-	-	-	-	6	-	-	-	120			6
M	96	17	6	9	19	-	-	-	-	-	45	-	6	-	1020	29	46	51
D	96	2	-	2	-	-	-	-	-	-	2	-	-	2	80			4
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'96	1220	Dec:	7%			

TREND STUDY 2-39-96 (old 2-24)

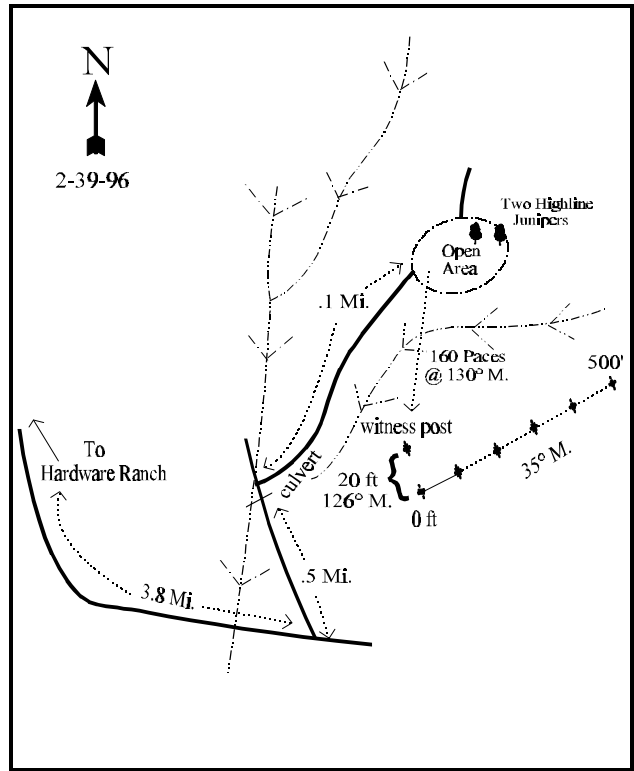
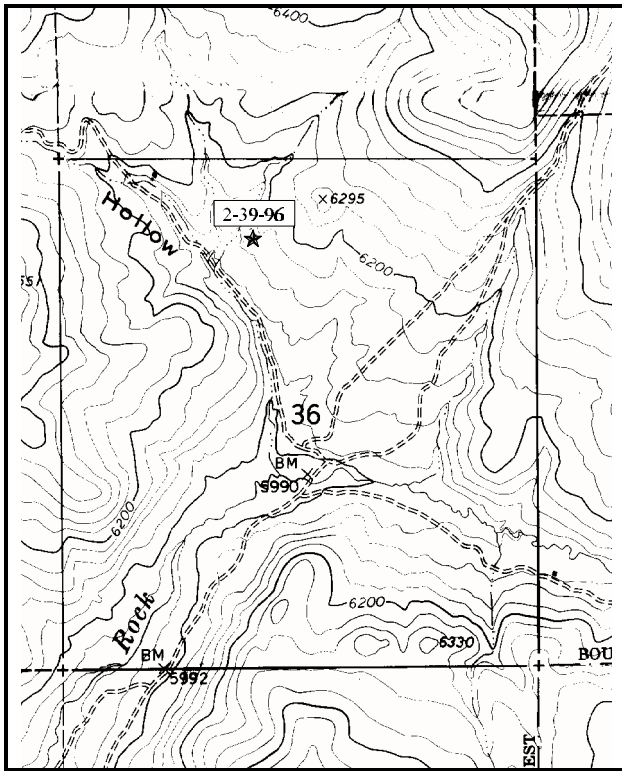
Study site name: Pole Hollow Spring. Range type: Mixed Mtn. Brush.

Compass bearing: frequency baseline 35 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From Hardware Ranch, travel northeast for 3.8 miles to the Pole Hollow Road. Take a left and travel up Pole Hollow for 0.5 miles to a culvert. Take a right and drive 0.1 miles to an open area and park. From the open area, walk 160 paces at a bearing of 130 degrees magnetic to the witness post. From the witness post, walk 20 feet at a bearing of 126 degrees magnetic to the 0-foot baseline stake. The baseline runs at a bearing of 35 degrees magnetic.



Map Name: Boulder Mtn.

Diagrammatic Sketch

Township 11N, Range 3E, Section 36, UTM COOR: 4-59-186E 45-83-122N

DISCUSSIONS

Trend Study No. 2-39

This is a new site established in 1996, east of Hardware Ranch at Pole Hollow Spring. The study monitors a mixed mountain brush community on a southwest aspect with a slope of 18% to 20%. Elk and deer pellet groups are common along with cattle pats. Sheep may have also grazed here in past years.

Soil at the site is moderately deep with an estimated effective rooting depth (see methods) of nearly 20 inches. It has a clay texture and a high percent organic mater content of 5.1%. Some gravel occurs in the profile and on the soil surface.

The site consists of a mixed mountain brush stand with several important browse species. The key species include mountain big sagebrush and bitterbrush. Other preferred browse species include small numbers of serviceberry. Snowberry is abundant on this site but unlike study #38, it appears to be not utilized. Mountain big sagebrush has an estimated density of 4,020 plants/acre. Utilization is mostly light to moderate, vigor is good and percent decadence low at 7%. Bitterbrush number only 500 plants/acre, yet account for 22% of the shrub cover. Utilization is light to moderate with no decadent plants sampled. Overall, there appears to be little shrub utilization on this site.

The herbaceous understory is dominated by a good stand of perennial grasses. However, the most numerous species is Kentucky bluegrass. Cheatgrass and Japanese brome are also present and account for 21% of the grass cover. The only other common perennial grasses is bluebunch wheatgrass. Smooth brome, prairie Junegrass, mutton grass, Sandberg bluegrass, squirrel tail, and letterman needlegrass are all present but combine to produce only 1% cover. Forbs are fairly abundant and diverse but weedy increasers make up most of the forb cover. Western yarrow, pacific aster, and thistle account for 68% of the forb cover. The only other common perennial forb is silvery lupine. It was stated in field notes that areas dominated by bluebunch wheatgrass were less heavily grazed. Those places dominated by Kentucky bluegrass were more heavily used and contained a higher number of weedy forbs. It was also noted that nearby meadow areas contained large amounts of tarweed, mulesears, and curly cup gumweed.

1996 APPARENT TREND ASSESSMENT

Percent vegetation and litter cover are high and well dispersed. Erosion is not currently a problem and the soil trend appears stable. The browse trend also appears stable with mostly light utilization on all browse. Good reproduction is also found for the key species. The herbaceous understory is abundant and diverse but composition is poor, especially for forbs. Kentucky bluegrass is the most abundant grass, indicating past heavy grazing. Aggressive weedy forbs dominate the forb composition. Future trends will be determined by compositional changes in grasses and forbs.

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 39

T y p e	Species	Nested	Quadrat	Average
		Frequency	Frequency	Cover %
		'96	'96	'96
G	Agropyron spicatum	214	64	6.75
G	Bromus inermis	3	1	.03
G	Bromus japonicus (a)	144	43	2.54

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
G	<i>Bromus tectorum</i> (a)	32	11	1.62
G	<i>Koeleria cristata</i>	29	13	.26
G	<i>Poa fendleriana</i>	13	4	.12
G	<i>Poa pratensis</i>	279	78	8.06
G	<i>Poa secunda</i>	8	4	.19
G	<i>Sitanion hystrix</i>	14	5	.10
G	<i>Stipa lettermani</i>	42	19	.40
Total for Grasses		778	242	20.11
F	<i>Achillea millefolium</i>	98	39	1.71
F	<i>Agoseris glauca</i>	5	2	.01
F	<i>Artemisia ludoviciana</i>	6	2	.30
F	<i>Aster chilensis</i>	166	52	2.75
F	<i>Astragalus convallarius</i>	9	4	.04
F	<i>Balsamorhiza sagittata</i>	5	1	.03
F	<i>Cirsium</i> spp.	19	10	.49
F	<i>Comandra pallida</i>	4	4	.07
F	<i>Collinsia parviflora</i> (a)	3	3	.01
F	<i>Cryptantha</i> spp.	1	1	.00
F	<i>Eriogonum umbellatum</i>	7	2	.06
F	<i>Geranium richardsonii</i>	-	-	.03
F	<i>Helianthella uniflora</i>	2	2	.06
F	<i>Ipomopsis aggregata</i>	2	1	.03
F	<i>Lappula occidentalis</i> (a)	3	1	.00
F	<i>Lupinus argenteus</i>	50	25	1.12
F	<i>Microsteris gracilis</i> (a)	10	3	.01
F	<i>Orthocarpus luteus</i> (a)	1	1	.03
F	<i>Penstemon humilis</i>	4	2	.01
F	<i>Phlox longifolia</i>	5	2	.01
F	<i>Potentilla diversifolia</i>	1	1	.15
F	<i>Polygonum douglasii</i> (a)	14	5	.02
F	<i>Senecio multilobatus</i>	3	1	.00
F	<i>Taraxacum officinale</i>	3	1	.00
F	<i>Tragopogon dubius</i>	19	11	.20
F	<i>Veronica biloba</i> (a)	12	3	.01
F	<i>Viguiera multiflora</i>	3	3	.04
F	<i>Wyethia amplexicaulis</i>	3	1	.00
F	<i>Zigadenus paniculatus</i>	2	1	.00
Total for Forbs		460	184	7.27

BROWSE TRENDS --

Herd unit 02 , Study no: 39

Type	Species	Strip Frequency '96	Average Cover % '96
B	Amelanchier alnifolia	12	.18
B	Artemisia tridentata vaseyana	83	12.31
B	Chrysothamnus viscidiflorus stenophyllus	72	2.93
B	Eriogonum heracleoides	2	-
B	Mahonia repens	28	1.49
B	Purshia tridentata	23	7.86
B	Symphoricarpos oreophilus	53	11.23
Total for Browse		273	36.02

BASIC COVER --

Herd unit 02 , Study no: 39

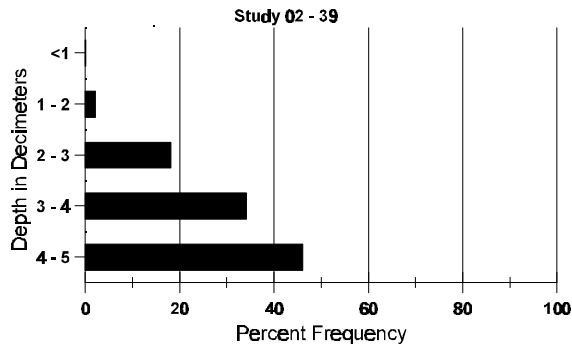
Cover Type	Nested Frequency '96	Average Cover % '96
Vegetation	464	55.67
Rock	46	.50
Pavement	117	1.85
Litter	495	56.73
Bare Ground	229	14.36

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 39

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
19.5	52.8 (18.1)	7.0	28.6	27.4	44.0	5.1	28.8	249.6	1.3

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 39

Type	Quadrat Frequency '96
Elk	6
Deer	2
Cattle	2

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 39

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Amelanchier alnifolia</i>																		
Y	96	2	-	-	-	-	-	-	-	-	1	1	-	-	40		2	
M	96	4	6	1	12	-	-	-	-	-	16	6	1	-	460	33	33	23
Total Plants/Acre (excluding Dead & Seedlings)												'96	500	Dec:	-			
<i>Artemisia tridentata vaseyana</i>																		
S	96	21	-	-	-	-	-	-	-	-	21	-	-	-	420		21	
Y	96	16	1	-	2	-	-	-	-	-	19	-	-	-	380		19	
M	96	114	45	7	1	-	-	-	-	-	167	-	-	-	3340	25	34	167
D	96	4	9	2	-	-	-	-	-	-	13	-	-	2	300		15	
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	700		35	
Total Plants/Acre (excluding Dead & Seedlings)												'96	4020	Dec:	7%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
M	96	126	-	-	16	-	-	-	-	-	142	-	-	-	2840	18	21	142
D	96	9	1	-	2	-	-	-	-	-	5	-	3	4	240		12	
Total Plants/Acre (excluding Dead & Seedlings)												'96	3200	Dec:	8%			
<i>Eriogonum heracleoides</i>																		
M	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	7	19	3
Total Plants/Acre (excluding Dead & Seedlings)												'96	60	Dec:	-			

A G E	YR	Form Class (No. of 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>Mahonia repens</i>																		
S	96	-	-	-	2	-	-	-	-	-	2	-	-	-	40		2	
Y	96	55	-	-	3	-	-	-	-	-	58	-	-	-	1160		58	
M	96	220	-	-	4	-	-	-	-	-	224	-	-	-	4480	4 5	224	
Total Plants/Acre (excluding Dead & Seedlings)												'96	5640	Dec:	-			
<i>Purshia tridentata</i>																		
Y	96	2	1	-	-	-	-	-	-	-	3	-	-	-	60		3	
M	96	11	9	-	2	-	-	-	-	-	22	-	-	-	440	35 62	22	
Total Plants/Acre (excluding Dead & Seedlings)												'96	500	Dec:	-			
<i>Symphoricarpos oreophilus</i>																		
S	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	96	8	-	-	5	-	-	-	-	-	13	-	-	-	260		13	
M	96	79	-	-	12	-	-	-	-	-	91	-	-	-	1820	32 51	91	
D	96	2	1	-	-	-	-	-	-	-	1	-	-	2	60		3	
Total Plants/Acre (excluding Dead & Seedlings)												'96	2140	Dec:	3%			

TREND STUDY 2-40-96 (old 2-25)

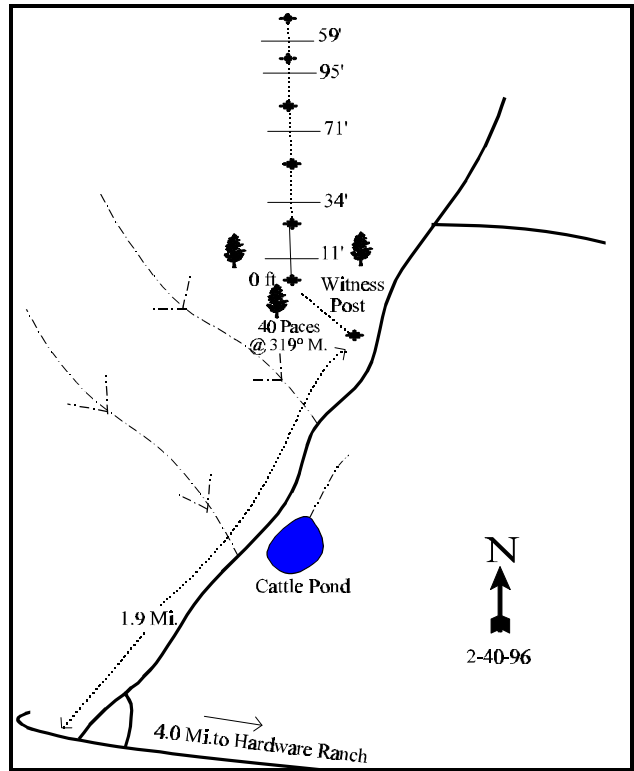
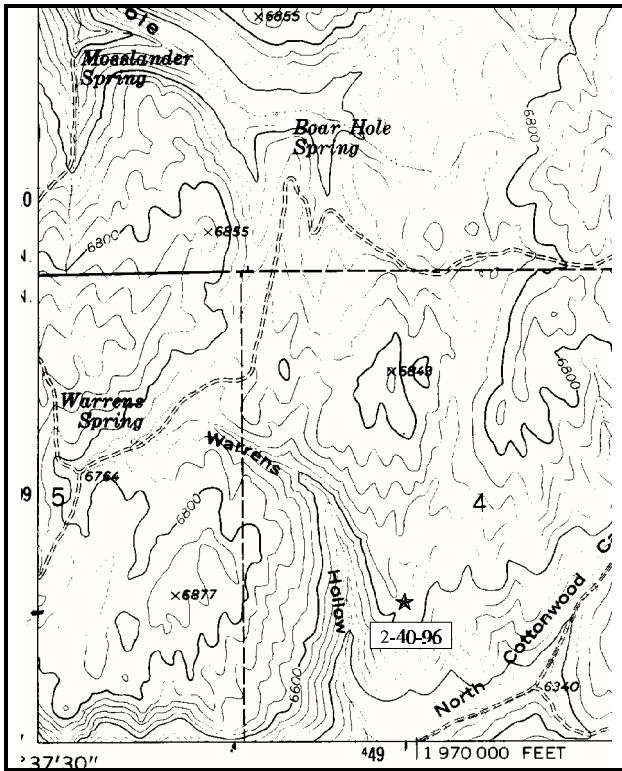
Study site name: Warren's Spring. Range type: Mixed Mtn. Brush.

Compass bearing: frequency baseline 10 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11ft), line 2 (34ft), line 3 (71ft), line 4 (95ft), line 5 (59ft).

LOCATION DESCRIPTION

Drive 4.0 miles from Hardware Ranch down the Blacksmith Fork Canyon Road and take a right towards Warren Springs. Drive 1.9 miles up Warren Springs to a witness post on the left hand side of the road. From the witness post, walk 40 paces at 319 degrees magnetic to the 0-foot baseline stake. The baseline runs at a bearing of 10 degrees magnetic.



Map Name: Boulder Mtn.

Diagrammatic Sketch

Township 10N, Range 3E, Section 5, UTM COOR: 4-49-171E 46-08-587N

DISCUSSIONS

Trend Study No. 2-40

This is a new site established in 1996 to monitor winter range west of Hardware Ranch near Warren's Spring. The site samples a mixed mountain brush slope of 29% with a south, south-east aspect. Elevation is about 6,340 feet. Water is available in Warren's Spring which is about 1/3 of a mile southwest of the study area. Deer, elk, and cattle sign is found on the site. Deer pellet groups are the most abundant. Along with cattle pats, numerous trails run through the area trailing off the hills and down to the road in the bottom of the canyon and south to the spring. Livestock use is heavy in the bottoms all up the canyon. Elderberry plants have no leaves left and bitterbrush near the bottom of the canyon are heavily utilized. In addition, species composition in the bottoms is dominated by weeds.

Soils at the site are moderately deep with an estimated effective rooting depth (see methods) of 15 inches. Texture is a clay loam with a neutral pH of 6.8. Limestone rock and pavement account for 8% of the ground cover. Some compaction occurs due to the numerous livestock trails through the site and most of the bare ground is associated with these trails. Some soil movement down slope is evident, but erosion is not a serious problem.

This mixed mountain brush stand is dominated by mountain big sagebrush which accounts for 73% of the total shrub cover and an estimated population density of 2,680 plants/acre. Utilization of the sagebrush is mostly light with some shrubs showing moderate use. Many of the sagebrush are beginning drop a lot of leaves this season due to the dry conditions, but vigor appears generally good and percent decadence is moderately low at 20%. Bitterbrush shows more heavy use with a low density of only 180 plants/acre estimated. Serviceberry is rare and moderately utilized where found. Other browse found on the site which produce fair forage include; chokecherry, woods rose, and snowberry. These shrubs are only lightly utilized.

The herbaceous understory is not as abundant as site #38 and #39. The grass component is diverse but bluebunch wheatgrass is the only common perennial species. Cheatgrass and Japanese brome are abundant and produce 50% of the grass cover. None of the other seven perennial grasses found on the site produce anymore than <1% cover. Forbs are very diverse and produce nearly as much cover as the grasses. Composition is not good however. Annual forbs provide 33% of the forb cover and weedy perennial forbs including, western yarrow, pacific aster, thistle, common sunflower, dyers woad, and yellow salsify are also common.

1996 APPARENT TREND ASSESSMENT

Trend for soil appears stable but not in as good condition as the site at Pole Hollow Spring. Vegetation and litter cover are fairly abundant and well dispersed. The only erosion occurring is along cattle trails. The browse trend appears stable for the key species, mountain big sagebrush. Some other browse offer additional forage but they occur in small numbers. The herbaceous understory is diverse and fairly abundant, however the composition of the grasses and forbs are poor. Half of the grass cover is provided by cheatgrass and Japanese brome and most of the forbs are annuals or weedy increasers. Future grazing practices will have a major impact on the herbaceous trend.

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 40

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
G	<i>Agropyron spicatum</i>	184	64	4.42
G	<i>Agropyron trachycaulum</i>	7	3	.18
G	<i>Bromus japonicus</i> (a)	142	40	2.75
G	<i>Bromus marginatus</i>	5	2	.06
G	<i>Bromus tectorum</i> (a)	156	48	3.21
G	<i>Elymus cinereus</i>	5	1	.38
G	<i>Poa bulbosa</i>	16	5	.34
G	<i>Poa fendleriana</i>	1	1	.00
G	<i>Poa pratensis</i>	12	4	.45
G	<i>Poa secunda</i>	4	2	.01
Total for Grasses		532	170	11.82
F	<i>Achillea millefolium</i>	19	8	.16
F	<i>Alyssum alyssoides</i> (a)	213	63	.96
F	<i>Allium</i> spp.	81	34	.25
F	<i>Artemisia dracuncululus</i>	6	2	.03
F	<i>Aster chilensis</i>	30	12	.66
F	<i>Astragalus</i> spp.	14	4	.21
F	<i>Astragalus utahensis</i>	1	1	.03
F	<i>Balsamorhiza sagittata</i>	15	7	1.33
F	<i>Castilleja</i> spp.	1	1	.00
F	<i>Chaenactis douglasii</i>	10	4	.04
F	<i>Cirsium</i> spp.	6	4	.27
F	<i>Collomia linearis</i> (a)	40	19	.12
F	<i>Comandra pallida</i>	5	2	.01
F	<i>Collinsia parviflora</i> (a)	44	19	.41
F	<i>Crepis acuminata</i>	5	3	.04
F	<i>Cymopterus</i> spp.	2	1	.00
F	<i>Epilobium brachycarpum</i> (a)	65	28	.61
F	<i>Galium aparine</i> (a)	5	2	.15
F	<i>Helianthus annuus</i> (a)	2	1	.63
F	<i>Helianthella uniflora</i>	-	-	.00
F	<i>Holosteum umbellatum</i> (a)	1	1	.00
F	<i>Isatis tinctoria</i>	36	12	.45
F	<i>Lactuca serriola</i>	1	1	.03
F	<i>Linum lewisii</i>	15	7	.14
F	<i>Lithospermum ruderales</i>	-	-	.00
F	<i>Lupinus argenteus</i>	11	5	.85

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
F	<i>Machaeranthera canescens</i>	1	1	.02
F	<i>Microsteris gracilis</i> (a)	33	15	.10
F	<i>Penstemon</i> spp.	-	-	.00
F	<i>Polygonum douglasii</i> (a)	50	18	.13
F	<i>Taraxacum officinale</i>	1	1	.00
F	<i>Tragopogon dubius</i>	21	15	.40
F	<i>Veronica biloba</i> (a)	166	55	.42
F	<i>Viguiera multiflora</i>	5	3	.04
F	<i>Wyethia amplexicaulis</i>	1	1	.18
Total for Forbs		906	350	8.79

BROWSE TRENDS --

Herd unit 02 , Study no: 40

Type	Species	Strip Frequency '96	Average Cover % '96
B	<i>Amelanchier alnifolia</i>	3	.15
B	<i>Artemisia tridentata</i> <i>vaseyana</i>	76	14.11
B	<i>Chrysothamnus</i> <i>nauseosus consimilis</i>	2	-
B	<i>Chrysothamnus</i> <i>viscidiflorus</i> <i>stenophyllus</i>	24	1.19
B	<i>Eriogonum</i> <i>heracleoides</i>	1	.63
B	<i>Mahonia repens</i>	5	.09
B	<i>Prunus virginiana</i>	4	.38
B	<i>Purshia tridentata</i>	9	1.69
B	<i>Rosa woodsii</i>	2	.63
B	<i>Symphoricarpos</i> <i>oreophilus</i>	26	2.10
Total for Browse		152	20.98

BASIC COVER --

Herd unit 02 , Study no: 40

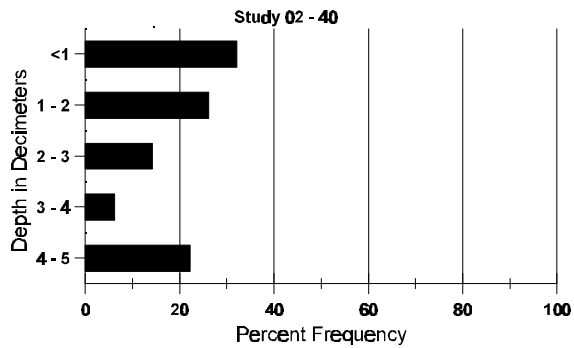
Cover Type	Nested Frequency '96	Average Cover % '96
Vegetation	446	38.24
Rock	178	5.32
Pavement	215	2.70
Litter	490	48.71
Cryptogams	12	.10
Bare Ground	293	19.22

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 40

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.1	59.8 (15.6)	6.8	29.9	35.7	34.4	4.7	12.9	279.4	.7

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 02 , Study no: 40

Type	Quadrat Frequency '96
Rabbit	2
Elk	4
Deer	22
Cattle	1

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 40

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Amelanchier alnifolia</i>																		
M	96	-	3	-	-	-	-	-	-	-	3	-	-	-	60	36	29	3
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'96	60	Dec:	-			
<i>Artemisia tridentata vaseyana</i>																		
S	96	2	-	-	1	-	-	-	-	-	3	-	-	-	60			3
Y	96	17	-	-	-	-	-	-	-	-	17	-	-	-	340			17
M	96	68	18	-	1	3	-	-	-	-	89	1	-	-	1800	23	38	90
D	96	19	8	-	-	-	-	-	-	-	12	-	-	3	540			27
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	220			11
Total Plants/Acre (excluding Dead & Seedlings)												'96	2680	Dec:	20%			
<i>Chrysothamnus nauseosus consimilis</i>																		
M	96	1	1	-	-	-	-	-	-	-	2	-	-	-	40	33	58	2
Total Plants/Acre (excluding Dead & Seedlings)												'96	40	Dec:	-			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	96	37	-	-	4	-	-	-	-	-	39	-	2	-	820	16	23	41
D	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'96	880	Dec:	2%			
<i>Eriogonum heracleoides</i>																		
M	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20	2	4	1
Total Plants/Acre (excluding Dead & Seedlings)												'96	20	Dec:	-			
<i>Mahonia repens</i>																		
Y	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	96	23	-	-	-	-	-	-	-	-	23	-	-	-	460	5	8	23
Total Plants/Acre (excluding Dead & Seedlings)												'96	520	Dec:	-			
<i>Prunus virginiana</i>																		
Y	96	3	-	-	1	-	-	-	-	-	1	3	-	-	80			4
M	96	1	-	-	1	-	-	-	-	-	-	2	-	-	40	30	28	2
Total Plants/Acre (excluding Dead & Seedlings)												'96	120	Dec:	-			
<i>Purshia tridentata</i>																		
M	96	3	2	1	-	-	1	-	-	-	7	-	-	-	140	24	52	7
D	96	1	-	-	-	-	-	1	-	-	-	-	-	1	40			2
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'96	180	Dec:	22%			
<i>Rosa woodsii</i>																		
M	96	1	-	-	1	-	-	-	-	-	2	-	-	-	40	14	4	2
Total Plants/Acre (excluding Dead & Seedlings)												'96	40	Dec:	-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Symphoricarpos oreophilus																		
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	96	18	-	-	12	-	-	-	-	-	29	-	1	-	600	21	35	30
D	96	6	-	-	-	-	-	-	-	-	4	-	1	1	120		6	
Total Plants/Acre (excluding Dead & Seedlings)												'96	760	Dec:	16%			

TREND STUDY 2-41-96 (old 2-26)

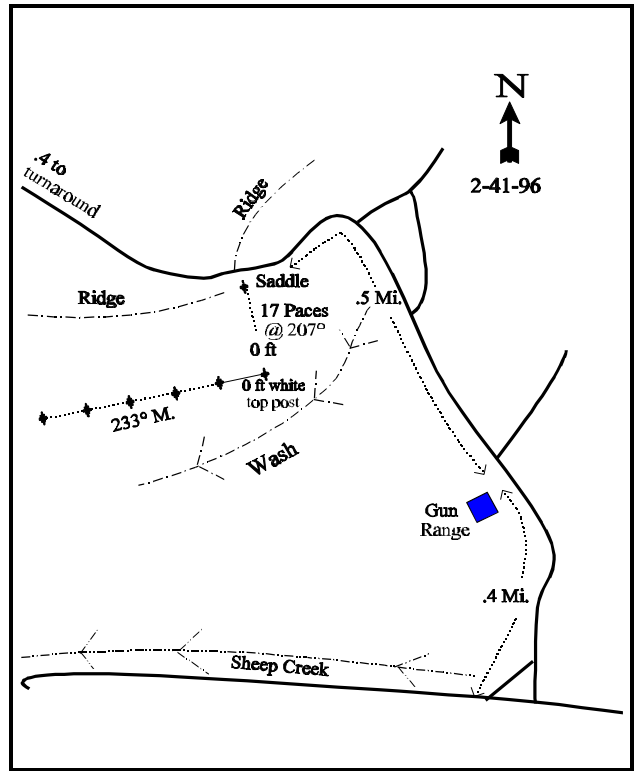
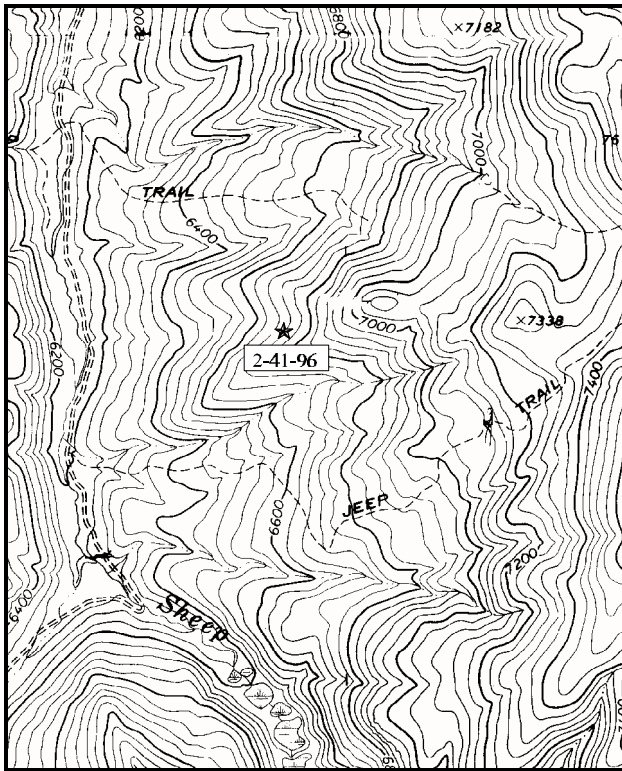
Study site name: Boundary Spring. Range type: Mountain brush.

Compass bearing: frequency baseline 233 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

LOCATION DESCRIPTION

From Hardware Ranch, travel south on the Ant Valley Road for 7 miles to the Sheep Creek Ranch. Turn left, go through a gate, and proceed 0.1 miles to a fork in the road. Take a right at the fork and continue on the Sheep Creek Road for 0.5 miles. Stay left, and continue 0.8 miles crossing the creek and passing by a small reservoir. At 0.8 miles turn right and continue for 0.4 miles going past a gun range on the left to a fork in the road. Stay left and continue for 0.5 miles to a witness post on the left hand side of the road. From the witness post, walk 17 paces at a bearing of 207 degrees magnetic. The baseline runs 233 degrees magnetic.



Map Name: Hardware Ranch

Diagrammatic Sketch

Township 9N, Range 3E, Section 13, UTM COOR: 4-53-848E 45-97-008N

DISCUSSIONS

Trend Study No. 2-41

This is a new site established in 1996 to monitor important winter range south of Hardware Ranch near Boundary Spring. The site is placed on the south, southwest side of a ridge with a slope of 33%. Elevation is about 7,000 feet. The browse on this slope is available for most of the winter due to the aspect and the wind blown nature of the site. Deer and especially elk pellet groups are common. There is also some evidence of cattle and sheep use.

The soil is fairly shallow with effective rooting depth (see methods) estimated at almost 10 inches. Texture is a clay loam with a slightly alkaline pH of 7.4. Rock is common on the surface and in the profile. Due to the abundant vegetation, litter and rock cover, there is little unprotected bare ground. Erosion is minimal.

The site supports a moderate stand bitterbrush and mountain big sagebrush. Bitterbrush plants number approximately 700 plants/acre. The average mature plant is quite large measuring only 2½ feet in height but with a crown diameter of over 4 feet. Utilization is mostly moderate with a few individuals displaying heavy use. Percent decadence is low at only 8% with no seedlings or young plants encountered and dead plants numbered 160 plants/acre.

Mountain big sagebrush number only 520 plants/acre. Some of the shrubs display characteristics of basin big sagebrush. Utilization is mostly light with some plants being heavily hedged. Like bitterbrush, no reproduction is evident and dead plants (56%) outnumber live plants. All live sagebrush have good vigor, but with no signs of reproduction, the stand will become increasingly decadent. Other shrubs found on the site include narrowleaf low rabbitbrush, broom snakeweed, snowberry, and gray horsebrush. A few juniper are also found on the site.

The herbaceous understory produces over 31% cover. Grasses dominate the herbaceous component, however the composition is poor. Cheatgrass and Japanese brome are abundant and account for 58% of the grass cover. The only other common perennial grasses include bluebunch wheatgrass and Sandberg bluegrass. Forbs are lacking on the site with only 5 perennial species sampled. The only abundant perennial forb is arrowleaf balsamroot which accounts for 73% of the forb cover. Eight small, low growing annual forbs make up an additional 24% of the forb cover.

1996 APPARENT TREND ASSESSMENT

The soil trend appears stable due to the abundant vegetation and litter cover. There is little exposed bare soil. The browse trend appears to be declining due to a lack of reproduction for bitterbrush and mountain big sagebrush. The sagebrush population appears that it will continue to decline in density. Currently, dead plants outnumber live ones. It is doubtful that sagebrush seedlings can become establish in competition with the vigorous herbaceous understory dominated by winter annuals. Composition of the herbaceous understory is poor; with cheatgrass, Japanese brome, and annual forbs so abundant. Future trends will be dependent on how the composition changes in relation to these key species.

HERBACEOUS TRENDS --

Herd unit 02 , Study no: 41

Type	Species	Nested Frequency '96	Quadrat Frequency '96	Average Cover % '96
G	Agropyron spicatum	152	50	6.18
G	Bromus japonicus (a)	45	15	.37
G	Bromus tectorum (a)	400	91	13.58
G	Poa bulbosa	42	13	1.92
G	Poa fendleriana	-	-	.00
G	Poa secunda	138	52	1.95
Total for Grasses		777	221	24.02
F	Achillea millefolium	2	1	.03
F	Alyssum alyssoides (a)	292	83	1.50
F	Astragalus utahensis	3	2	.04
F	Balsamorhiza sagittata	32	20	5.55
F	Collinsia parviflora (a)	12	4	.07
F	Epilobium brachycarpum (a)	13	7	.06
F	Galium aparine (a)	3	1	.00
F	Holosteum umbellatum (a)	40	17	.11
F	Lactuca serriola	4	3	.06
F	Microsteris gracilis (a)	2	1	.00
F	Ranunculus testiculatus (a)	27	14	.09
F	Tragopogon dubius	15	7	.09
F	Veronica biloba (a)	3	1	.00
Total for Forbs		448	161	7.64

BROWSE TRENDS --

Herd unit 02 , Study no: 41

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	18	3.36
B	Chrysothamnus viscidiflorus stenophyllus	14	1.31
B	Gutierrezia sarothrae	8	.36
B	Juniperus osteosperma	0	.00
B	Purshia tridentata	27	8.30

Type	Species	Strip Frequency '96	Average Cover % '96
B	Symphoricarpos oreophilus	2	.03
B	Tetradymia canescens	4	.79
Total for Browse		73	14.17

BASIC COVER --

Herd unit 02 , Study no: 41

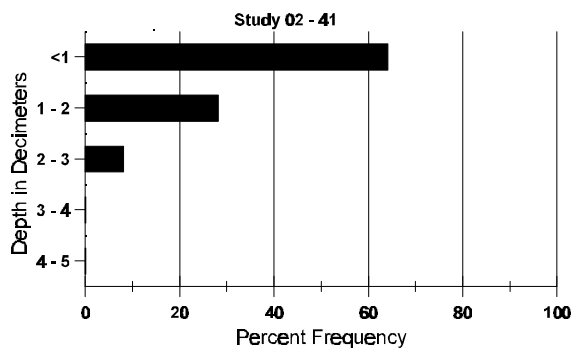
Cover Type	Nested Frequency '96	Average Cover % '96
Vegetation	489	45.95
Rock	339	16.20
Pavement	202	3.28
Litter	495	48.12
Cryptogams	50	.42
Bare Ground	128	2.49

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 41

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.5	62.8 (11.6)	7.4	42.7	30.0	27.3	3.4	14.2	214.4	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 02 , Study no: 41

Type	Quadrat Frequency '96
Sheep	5
Rabbit	1
Elk	42
Deer	23
Cattle	5

BROWSE CHARACTERISTICS --
Herd unit 02 , Study no: 41

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
M	96	17	1	-	-	-	-	-	-	-	18	-	-	-	360	27	41	18
D	96	-	6	2	-	-	-	-	-	-	8	-	-	-	160			8
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	660			33
Total Plants/Acre (excluding Dead & Seedlings)												'96	520	Dec:		31%		
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
M	96	23	-	-	-	-	-	-	-	-	23	-	-	-	460	16	24	23
Total Plants/Acre (excluding Dead & Seedlings)												'96	460	Dec:		-		
<i>Gutierrezia sarothrae</i>																		
M	96	16	-	-	-	-	-	-	-	-	16	-	-	-	320	8	11	16
Total Plants/Acre (excluding Dead & Seedlings)												'96	320	Dec:		-		
<i>Juniperus osteosperma</i>																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'96	0	Dec:		-		
<i>Purshia tridentata</i>																		
M	96	4	27	-	1	-	-	-	-	-	32	-	-	-	640	29	52	32
D	96	-	-	3	-	-	-	-	-	-	3	-	-	-	60			3
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	160			8
Total Plants/Acre (excluding Dead & Seedlings)												'96	700	Dec:		9%		
<i>Symphoricarpos oreophilus</i>																		
M	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	17	23	1
D	96	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'96	40	Dec:		50%		
<i>Tetradymia canescens</i>																		
M	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220	12	25	11
Total Plants/Acre (excluding Dead & Seedlings)												'96	220	Dec:		-		

SUMMARY

UNIT - 2 - CACHE

Management unit 2 is large, covering the Wellsville mountains, the Cache Valley, the Cache National Forest and the extensive range land around Woodruff, Randolph and Bear Lake. A common trend found for study sites in the Wellsville sub unit and along the Cache Valley winter range is the poor condition of the herbaceous understories. Many of these sites support herbaceous understories which are dominated by annual brome grasses and weedy forbs. These increasingly weedy understories are in some cases crowding out perennial grasses and limiting shrub reproduction. Several of the sites have high soil temperatures which give winter annuals a competitive advantage over more preferred perennial grasses. A summary table of trends on the unit follows.

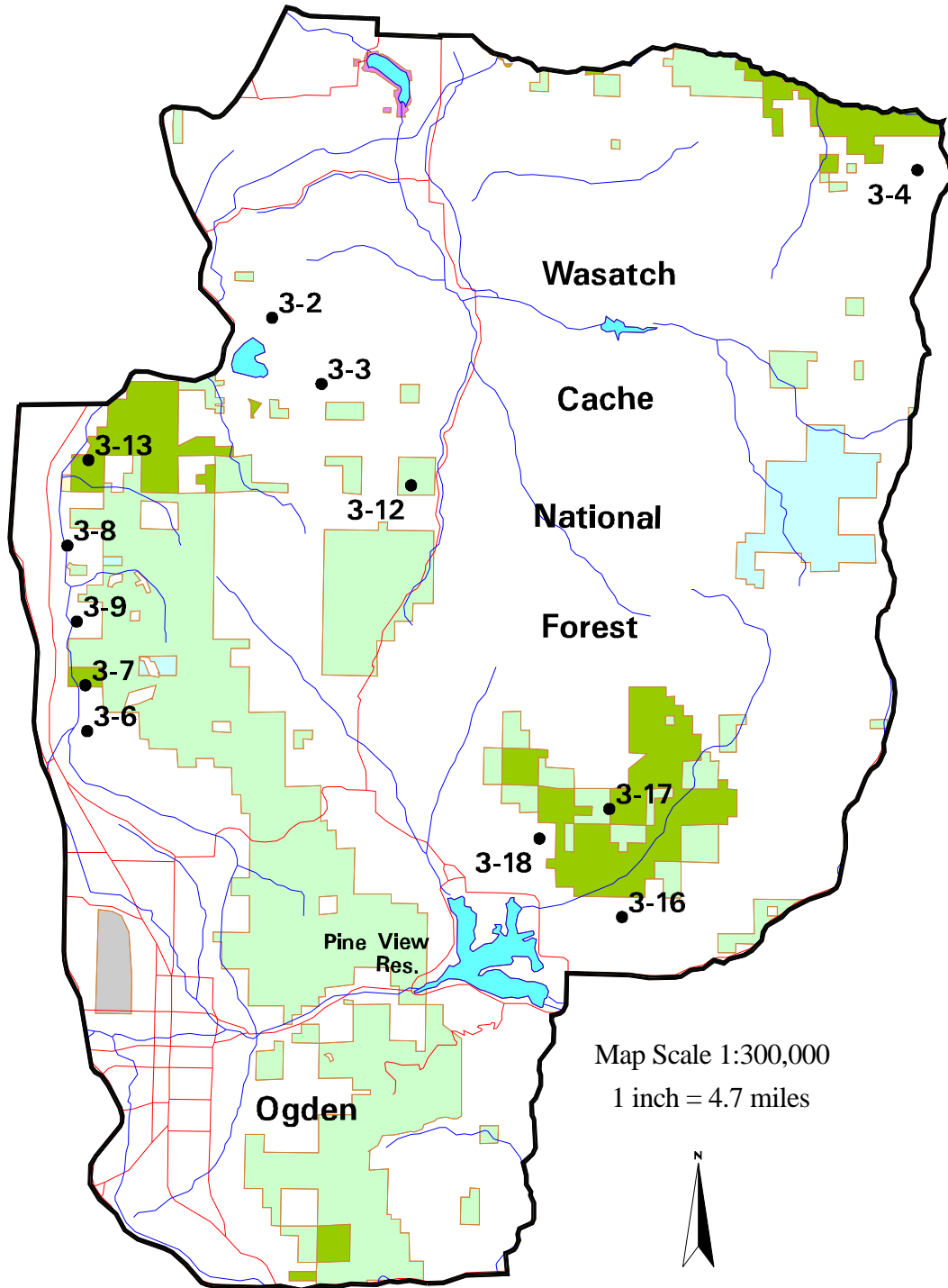
TREND SUMMARY UNIT - 2 - CACHE

Site	1990			1996		
	Soil	Browse	Grasses & Forbs	Soil	Browse	Grasses & forbs
Sub Unit - 2A - Wellsville Mountains						
2-11 Brigham Face	stable	up	stable	stable	stable	stable
2-22 Box Elder canyon	down	down	down	stable	down	up slightly
2-23 Flat Bottom Canyon	down	down	stable	up	down	down slightly
2-24 Calls Fort Canyon	stable	down	stable	up slightly	up	stable
2-25 Mouth of Two Jump Canyon	stable	down	up	up	stable	stable
2-26 Wellsville Canyon				up	stable	stable
Cache Valley Front Winter Range Sites						
2-1 High Creek	up	stable	down	up	stable	down
2-2 Mouth of Blacksmith Fork	stable	up slightly	down	up	up	up
2-4 Crow Mountain	stable	stable	up	up slightly	up slightly	down
2-5 Smithfield Dry Canyon	stable	stable	down	up	up slightly	down
2-6 Green Canyon Exclosure (new in 1996)				appears stable	appears stable	poor
2-8 Millville Canyon	stable	down	up slightly	up slightly	up slightly	down slightly











2-10 Broad Hollow Flat	stable	down	up	up slightly	up slightly	up slightly
2-20 Richmond WMA (new in 1990)				up	down	down
Site	1990			1996		
	Soil	Browse	Grasses & Forbs	Soil	Browse	Grasses & forbs
Cache National Forest and Hardware Ranch Sites						
2-7 Spawn Creek	stable	stable	up slightly	stable	stable	down slightly
2-9 Beirdneau	stable	up slightly	up slightly	stable	stable	stable
2-12 2 nd Dam Blacksmith Fork	down	down	up	up	down slightly	stable
2-13 Hardware Plateau	stable	down	up slightly	up slightly	up slightly	down
2-14 Dry Canyon	down	stable	down slightly	up	down	down
2-19 Rt Fork Logan Canyon (new in 1990)				up	up	stable
2-37 Rock Creek Riparian (new in 1996)				stable	stable	poor
2-38 Twin Creeks (new in 1996)				stable	stable	poor
2-39 Pole Hollow Spring (new in 1996)				stable	stable	poor
2-40 Warren Spring (new in 1996)				stable	stable	poor
2-41 Boundary Spring				stable	stable	poor
Rich County Sites West of Bear Lake						
2-15 Lower Hodges Canyon	stable	stable	up	up	stable	down
2-16 Garden City Canyon	stable	stable	stable	up slightly	stable	stable
2-17 Meadowville	down slightly	stable	up slightly	up	down	stable
2-18 Upper Hodges Canyon	stable	up	up slightly	up slightly	stable	up slightly
2-21 Swan Creek (new in 1990)				up	stable	down slightly

Other Rich County Sites						
2-27 Old Lake Canyon	down slightly	down	up slightly	up	stable	up
2-28 North Eden	down	down	up	up	down slightly	down slightly
2-29 Woodruff Creed	down	down slightly	up slightly	down slightly	down	down slightly
2-30 State Line	stable	stable	down slightly	stable	stable	down slightly
Site	1990			1996		
	Soil	Browse	Grasses & Forbs	Soil	Browse	Grasses & forbs
2-31 South Crawford Mountains	down	down slightly	down	stable	up slightly	stable
2-32 Wood Pass	stable	stable	stable	stable	up	up slightly
2-33 Braizer Canyon	down slightly	stable	down slightly	stable	stable	up slightly
2-34 Otter Creek	down slightly	down slightly	stable	stable	stable	stable
2-35 Higgin's Hollow (new in 1990)				stable	up slightly	down slightly
2-36 Woodruff Co-op (new in 1990)				up	stable	stable

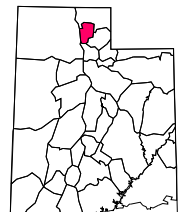
Ogden Management Unit



Legend

- | | | | | | |
|--|---------------------------|---|----------------------|---|--------------|
|  | Forest Service |  | Military Reservation |  | Road |
|  | Bureau of Land Management |  | State Wildlife Ref. |  | Water Course |
|  | State of Utah |  | Water Body | | |
|  | Private Land |  | Transect Location | | |

Unit Location



DEER HERD UNIT 3 - OGDEN

Boundary Description

Weber, Box Elder, Cache, and Morgan counties - Boundary begins at Hyrum and SR-101; east on SR-101 to the Ant Flat Road (at Hardware Ranch); south on this road to SR-39; west on SR-39 to SR-167 (Trappers Loop Road); south on SR-167 to I-84; west on I-84; west on I-84 to I-15; north on I-15 to Exit 364 and US-91; northeast on US-91 to SR-101; east on SR-101 to Hyrum and beginning point.

The Ogden deer herd unit is located within Cache, Box Elder, Weber, and Morgan counties. Municipalities located within or along the unit boundaries include Hyrum, Wellsville, Mantua, Perry, Willard, Ogden, Mountain Green, and Huntsville. The major drainages are the Little Bear River, Ogden river, and Box Elder Creek. Smaller drainages are Davenport Creek, Paradise Dry Canyon, Hyrum Dry Canyon, Hyrum Green Canyon, Perry Canyon, and Willard Canyon. The topography is steep and rough on the western face of the Wasatch mountains above Willard, Perry, and Ogden, east of Avon and Paradise, and more gentle in between. Elevation ranges from 4,400 feet near Willard to 9,764 feet on Willard Peak. According to the most recent deer herd unit management plan (1998), there is approximately 233,469 acres of useable deer winter range in the unit. Summer range totals 152,887 acres. A majority of the winter range (82%) and summer range (72%) is on private land. The U.S. Forest Service administers 19% of the summer range and 13% of the winter range. The Division of Wildlife Resources maintains 6% of the deer summer range and 5% of the winter range on the unit.

Major deer wintering areas are found between 4,600 feet and 7,000 feet on the Wasatch face above Willard and Perry, between 5,100 to 7,000 feet north and east of Mantua Reservoir, from 5,600 to 7,000 feet in the Three-mile Canyon and between 5,400 and 7,000 feet along the slopes on the southeast side of Cache Valley above Paradise and Avon. During severe winters, snow restricts deer use to Three-mile Canyon, and East Fork of the Little Bear River, south of Porcupine Reservoir, Paradise Dry Canyon, Hyrum Dry Canyon, Perry Canyon, and the southeast corner of the unit south of Willard (King and Muir 1971).

Management unit 3 supports approximately 135,907 acres of useable elk summer range and 165,542 acres of elk winter range. Approximately 80% of the summer and 81% of the winter range is privately owned. Most of the remaining range is administered by the U.S. Forest Service and the Division of Wildlife Resources.

Big Game Trends

The current (1998) unit management objectives are to achieve a modeled target population size of 15,000 wintering deer and 1,200 wintering elk. A post season buck doe ratio of 15:100, with 30% of these bucks being three point or better will be maintained. The herd composition objective for elk is to maintain a post season bull to cow ratio of 8:100, with at least 4 of these bulls being 2½ years of age or older. As of 1996, the Ogden buck harvest is only 29% of the target objective of 1,900. Post season and spring classifications have been improving since 1992-93, but are well below 1990 levels. Fawn/doe ratio has declined from 88 fawns/100 does in 1991-92 to only 45 by 1993-94. That ratio improved to 71 fawns/100 does in 1994-95 and 66 in 1995-96. Continued urbanization and loss of winter range on this unit may jeopardize target herd unit objectives. Currently the elk unit is in good condition with a satisfactory mature/yearling ratio. (Evans et. al 1996)

Study Site Description

Thirteen study sites established in unit 3 during the 1984 season were reread in

1990 and 1996 with the exception of East Mantua (3-1) and Porcupine Dam (3-11) which were dropped. Five study sites from former deer herd unit 7, are now part of unit 3. These 5 sites were established in 1985 and reread in 1990 and 1996. All of the sites selected by Interagency and Division personnel for trend monitoring were located on the unit's winter range. Detailed location descriptions, data tables, and written summary follow.

DISCUSSION

Trend Study No. 3-1

This site was not read in 1996. It is dominated by juniper with little browse or herbaceous plants in the understory. The only thing this site currently offers big game animals is thermal cover. Refer to the 1990 Utah Big Game Range Trend Study report for location description and data summary tables.

This study is a steep (70%) south facing slope dominated by Utah juniper located just east of Mantua. Elevation is approximately 5,840 feet. The study samples a relatively small area of concentration that receives very intense winter deer use. A brief reconnaissance of the hillside at the time of study establishment (1984) revealed the presence of 8 recently winter-killed deer fawns.

Soil is classified as "Agassiz-Picaynue Association, Very Steep." This is a limestone derived soil with only moderate permeability and poor water holding capacity. Available soil moisture is usually exhausted for 60 to 90 consecutive days in mid-summer. Agassiz is a shallow very stony or cobbly loam, where bedrock occurs at 14 to 19 inches (Chadwick et al. 1975). Examination of the study site indicates a high rate of erosion due to the steep slope and poor vegetative cover.

Three browse species; mountain big sagebrush, antelope bitterbrush, and Utah juniper provide nearly all the available deer forage. Unfortunately, all three are browsed extremely heavily, leading to high levels of decadence and poor vigor. This is especially apparent with respect to big sagebrush and bitterbrush. Utah juniper is taller and is not available because of its height. Therefore, its vigor has not been affected so greatly. A few other shrub species can be found in the area but all are negligible in importance. Our best estimate is that browse will cease to be an important forage source within a relatively short time because of very high use and the harshness of an extended drought.

Perennial grasses and forbs occur only rarely and in total, provide no more than token quantities of forage. The most important are bluebunch wheatgrass, Utah sweetvetch, and yellow salsify. Annual plants vastly outnumber perennials. The bulk of understory cover comes from hairy brome, pale alyssum, prickly lettuce, and autumn willowweed. Of particular importance is a small but expanding population of Dyers woad. If this species performs as it has elsewhere, it will shortly become a very significant understory component.

1984 APPARENT TREND ASSESSMENT

Range condition is very poor and continues to decline. By almost any measure, both soil and vegetation trend are down.

1990 TREND ASSESSMENT

This east Mantua site has scattered big sagebrush and bitterbrush in the understory of the open juniper canopy which have become increasingly decadent or dead. Sagebrush has basically been eliminated from the study site. There is a density of 64 junipers/acre, mostly mature, highlined trees. The very dense cheatgrass understory has a significant impact on the severely hedged sagebrush for there were no young sagebrush or bitterbrush encountered or observed in 1990. Dyers woad has increased significantly on the site. Bluebunch wheatgrass is the most valuable herbaceous species present. The population is stable. Soil erosion is apparent on the very steep slope.

TREND ASSESSMENT

soil - down

browse - down, loss of most sagebrush, but gains in bitterbrush
herbaceous understory - down, poor composition, mostly weeds the increases
of dyers woad

TREND STUDY 3-2-96

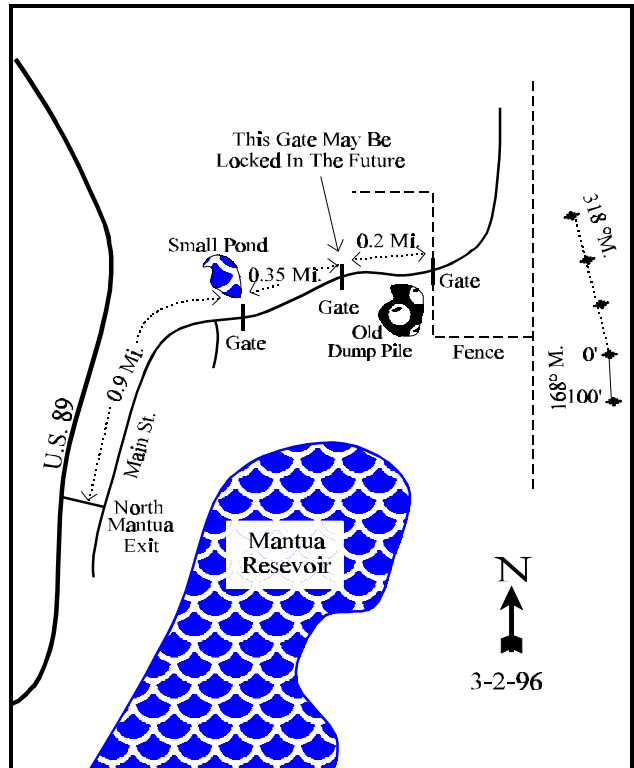
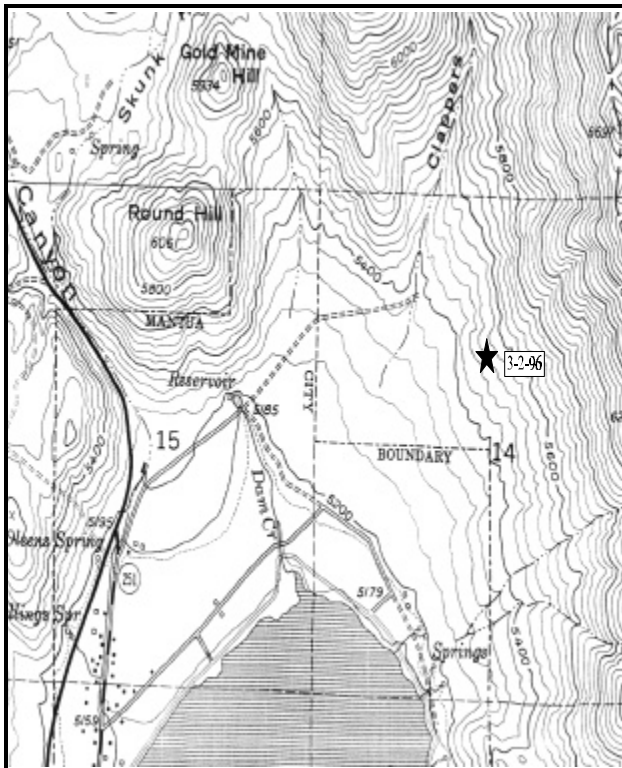
Study site name: NE Mantua Reservoir, Range type: Sagebrush/grass.

Compass bearing: frequency baseline 168 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (59ft), line 3 (71ft), line 4 (34ft).

LOCATION DESCRIPTION

Turn east off of U.S. 89-91 at the north Mantua exit and travel east to main street in Mantua. Turn left (north) on main street and proceed 0.9 miles to a gate with a small pond to the left. Proceed through the gate, stopping at another gate after 0.35 miles (this gate may be locked in the future). Proceed 0.2 miles to another gate with an old dump to the south. From the gate walk south east to a "T" in the fence. From the "T" in the fence walk 60 paces at a bearing of 112° magnetic to the 0-foot baseline stake. Baseline 0-foot stake is marked by browse tag #7105. The first 100 feet of the baseline runs south at a bearing of 165° magnetic. The last 300 feet run north off of the 0-foot stake at a bearing of 318° magnetic.



Map Name: Mount Pisgah

Diagrammatic Sketch

Township 9N, Range 1W, Section 14, UTM COOR: 4-23-240E 45-97-072N

DISCUSSION

Trend Study No. 3-2

This study samples an area located slightly northeast of Mantua Reservoir. The site is a lightly utilized mountain big sagebrush type situated on a west facing 25% slope. Elevation is approximately 5,600 feet. Utilization of the area by big game is light. Severe winters probably exclude deer from this area. Domestic livestock use the site in summer but appear to have had little appreciable impact.

The NRCS mapping unit describing the site is entitled "Goring-Yates Hollow Association, Moderately Steep." Soils in this unit are alluvially deposited from sandstone and quartzite parent material. These are deep, well drained soils. Texture in the upper horizons is clay loam grading to a more gravelly clay below. Complete drying of the soil seldom occurs below a depth of 12 inches. Erosion hazard is moderate (Chadwick et al. 1975). Soils at the site have a clay texture with a slightly alkaline pH of 7.4. Effective rooting depth (see methods) was estimated at 15 inches in 1996. Current conditions suggest that adequate vegetative and litter cover are preventing most erosion.

Browse composition at the site is dominated by a dense and apparently stable population of mountain big sagebrush. A more preferred antelope bitterbrush stand occurs nearby but the original study, for some reason, did not attempt to sample it. These bitterbrush plants display heavy use but appear vigorous. On the study site, mountain big sagebrush provides 91% of the total browse cover with a population approaching 2,000 plants/acre. They are vigorous and grow to a relatively larger size, with a height of over 2 feet and a crown of 4 feet. Utilization was heavy in 1984, but is currently light to moderate and does not affect seed production or leader growth, both of which are excellent. Percent decadency has remained low and is currently (1996) 13%. Reproduction appears adequate to maintain or even increase the existing stand. Other shrubs include occasional individuals of antelope bitterbrush, Rocky Mountain maple, and bigtooth maple. Of particular interest is a small population of Stansbury cliffrose and cliffrose/bitterbrush hybrids growing slightly north of the study site. Broom snakeweed was encountered during the 1996 reading with the much larger sample size. Its estimated population was at 740 plants/acre.

A vigorous herbaceous understory is associated with the mountain big sagebrush. Perennial grasses comprise a substantial portion of the herbaceous composition, however annual brome grasses are abundant and account for 61% of the grass cover. Bulbous bluegrass is also fairly abundant and has increased in sum of nested frequency and quadrat frequency with each reading. Other perennial grasses include small numbers of Kentucky bluegrass, bulbous bluegrass, and oniongrass.

A wide variety of forbs of varying growth habit are also found on the site. However, all forbs combined produce less than 5% total cover. Most forb species individually produce less than one-half of 1% cover. The only common forb species are western yarrow and willowweed. Dyers woad, although not currently abundant, has the potential for rapid increase.

1984 APPARENT TREND ASSESSMENT

Although much of the west facing slope surrounding the study area appears to be progressing toward grass-forb dominance, the study site appears to be a relatively stable big sagebrush community. One could discern no obvious indications to suggest anything other than stable trend. Soil trend is also stable with only minor erosion occurring.

1990 TREND ASSESSMENT

For this northeast Mantua Reservoir site, the density of mature big sagebrush increased by 19% on the density plots (from 1,732 to 2,132 plants/acre). Sagebrush canopy cover is 26%. The plants show light to moderate hedging and have good vigor. There is a robust population of young sagebrush and few decadent plants. Both measures of frequency for bluebunch wheatgrass also increased. There were no significant changes in the elements of ground cover.

TREND ASSESSMENT

soil - stable

browse - upward

herbaceous understory - stable, but noticeable increase in bulbous bluegrass and dyers woad

1996 TREND ASSESSMENT

Trend for soil is up with a significant decline in percent bare ground (16% to 5%). Litter cover remained similar and pavement and rock cover declined from 16% to 10%. Trend for browse is stable. Population density has remained similar between readings, utilization is light to moderate, vigor good, and percent decadence low at 13%. Reproduction is adequate to maintain the population. The herbaceous understory is dominated by annual brome grasses. Trend is down due to a decline in the sum of nested frequency of perennial grasses and forbs. Bulbous bluegrass is the only species of perennial grass found in 1990 that increased in sum of nested frequency. Forbs are diverse but not abundant. Dyers woad is not abundant but it has doubled in its sum of nested frequency value since 1990.

TREND ASSESSMENT

soil - up

browse - stable

herbaceous understory - down and dominated by annual grasses

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 2

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	_a 140	_b 204	_{ab} 163	71	79	61	5.26
G	Bromus japonicus (a)	-	-	349	-	-	96	16.42
G	Bromus tectorum (a)	-	-	36	-	-	14	.86
G	Koeleria cristata	-	-	2	-	-	1	.00
G	Melica bulbosa	7	3	-	3	1	-	-
G	Poa bulbosa	_a 5	_b 41	_c 79	2	17	30	4.22
G	Poa compressa	4	-	-	1	-	-	-
G	Poa secunda	_a 20	_b 113	_a 12	12	42	6	.05
Total for Grasses		176	361	641	89	139	208	26.82
F	Achillea millefolium	_a 119	_b 47	_b 57	47	21	22	1.41
F	Agoseris glauca	-	3	1	-	1	1	.00
F	Allium acuminatum	2	-	-	1	-	-	-
F	Alyssum alyssoides (a)	-	-	94	-	-	35	.20

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	<i>Artemisia ludoviciana</i>	1	5	3	1	4	1	.15
F	<i>Astragalus</i> spp.	_a 32	_a 30	_b -	16	13	-	-
F	<i>Balsamorhiza sagittata</i>	17	20	13	9	11	6	.66
F	<i>Calochortus nuttallii</i>	5	-	3	2	-	1	.00
F	<i>Cirsium</i> spp.	-	-	2	-	-	1	.00
F	<i>Collomia linearis</i> (a)	-	-	5	-	-	2	.01
F	<i>Epilobium brachycarpum</i> (a)	-	-	155	-	-	66	1.39
F	<i>Erodium cicutarium</i> (a)	-	-	3	-	-	1	.03
F	<i>Hackelia patens</i>	_a 3	_b 35	_a 3	1	16	2	.06
F	<i>Isatis tinctoria</i>	_a 3	_{ab} 9	_b 18	2	5	9	.24
F	<i>Lappula occidentalis</i> (a)	-	-	5	-	-	2	.01
F	<i>Lactuca serriola</i>	-	3	-	-	1	-	-
F	<i>Lithospermum ruderale</i>	2	-	2	2	-	2	.18
F	<i>Lupinus argenteus</i>	-	-	4	-	-	2	.21
F	<i>Madia glomerata</i> (a)	-	-	2	-	-	1	.00
F	<i>Microsteris gracilis</i> (a)	_a 54	_b -	_b 3	26	-	1	.00
F	<i>Polygonum douglasii</i> (a)	-	-	7	-	-	5	.03
F	<i>Ranunculus testiculatus</i> (a)	-	-	2	-	-	1	.00
F	<i>Tragopogon dubius</i>	_a 122	_b 74	_c 12	56	34	4	.04
F	Unknown forb-perennial	-	5	-	-	3	-	-
F	<i>Veronica biloba</i> (a)	-	-	9	-	-	3	.01
F	<i>Wyethia amplexicaulis</i>	_a 14	_b -	_b 3	8	-	1	.03
F	<i>Zigadenus paniculatus</i>	-	-	7	-	-	2	.04
Total for Forbs		374	231	413	171	109	171	4.76

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

BROWSE TRENDS --

Herd unit 03 , Study no: 2

T y p e	Species	Strip Frequency	Average Cover %
		'96	'96
B	<i>Artemisia tridentata</i> <i>vaseyana</i>	60	16.34
B	<i>Gutierrezia sarothrae</i>	11	.36
B	<i>Prunus virginiana</i>	2	.00
B	<i>Purshia tridentata</i>	1	.66
Total for Browse		74	17.37

BASIC COVER --

Herd unit 03 , Study no: 2

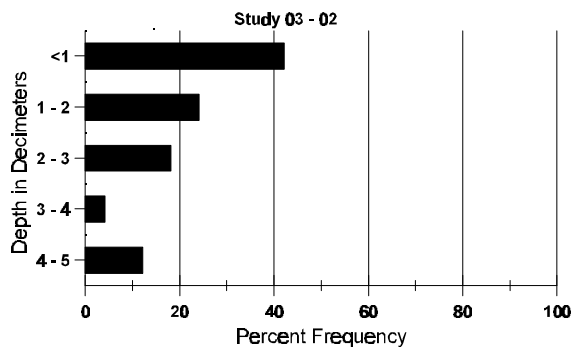
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	385	3.25	10.25	50.70
Rock	203	6.75	4.75	5.68
Pavement	207	6.50	11.75	3.84
Litter	399	66.00	57.25	58.45
Cryptogams	-	0	0	0
Bare Ground	167	17.50	16.00	5.36

SOIL ANALYSIS DATA --

Herd Unit 03, Study no: 2

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.1	66.0 (14.0)	7.4	22.0	36.4	41.6	3.6	29.4	179.2	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 03 , Study no: 2

Type	Quadrat Frequency '96
Deer	5
Cattle	2

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 2

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Amelanchier alnifolia</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	37	37	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Artemisia tridentata vaseyana</i>																		
S	84	47	-	-	-	-	-	-	-	-	47	-	-	-	3133			47
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	84	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	14	-	-	-	-	-	-	-	-	14	-	-	-	933			14
	96	16	-	-	-	-	-	-	-	-	15	-	1	-	320			16
M	84	-	3	18	-	-	-	-	-	-	21	-	-	-	1400	33	36	21
	90	12	1	-	-	-	-	-	-	-	11	1	1	-	866	35	36	13
	96	40	24	-	-	-	-	-	-	-	64	-	-	-	1280	27	49	64
D	84	-	1	3	-	-	-	-	-	-	3	-	1	-	266			4
	90	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	96	7	6	-	-	-	-	-	-	-	10	-	1	2	260			13
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	200			10
Total Plants/Acre (excluding Dead & Seedlings)												'84	1732	Dec:	15%			
												'90	2132		16%			
												'96	1860		14%			
<i>Gutierrezia sarothrae</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	16	-	-	-	-	-	-	-	-	16	-	-	-	320			16
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	20	-	-	1	-	-	-	-	-	21	-	-	-	420	11	15	21
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	740		-			
<i>Prunus virginiana</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	2	-	-	-	-	-	3	-	-	-	60			3
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	20	13	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	60		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Purshia tridentata																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0	
	96	-	-	1	-	-	-	-	-	-	1	-	-	-	20	75	98	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			

TREND STUDY 3-3-96

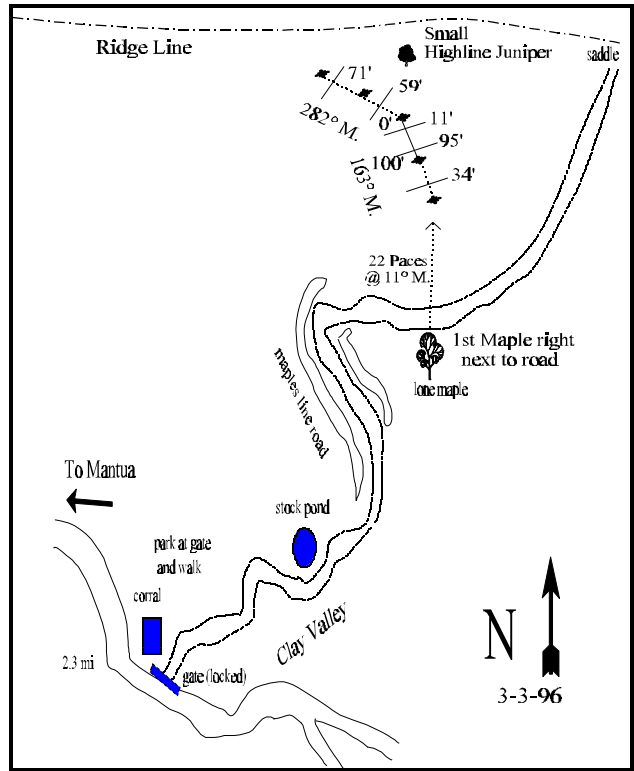
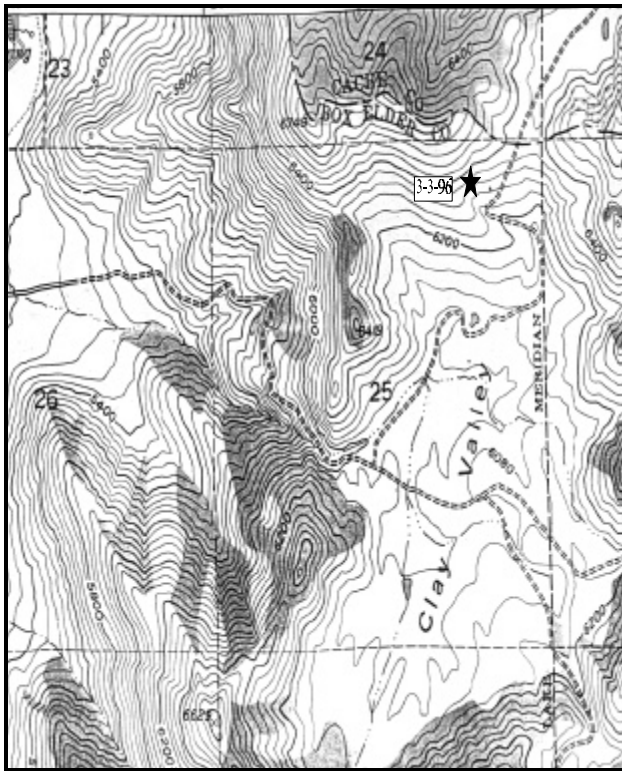
Study site name: Clay Basin. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 163 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Mantua Hatchery, proceed 0.65 miles (towards Mantua) to first possible right turn. Turn right and proceed 2.3 miles up the canyon to Clay Valley, stop at a locked gate on the east end of the corral. Cross the gate and begin walking down road in a northern direction. You will pass a stockpond on the left side of the road. After approximately 0.75 miles, the road will pass through a dense stand of maples, hook sharply to the right and break out of the maples. Proceed 54 paces past switchback to first lone maple on right side of the road. From maple, walk approximately 22 paces on a bearing of 11 degrees magnetic to the 200-foot stake of the baseline. The 0-foot baseline stake is 200 feet at a bearing of 343 degrees magnetic and is marked by browse tag #7997. The first 200 feet of the baseline run 163 degrees magnetic. The second 200 feet run off the 0-foot baseline stake at a bearing of 282 degrees magnetic.



Map Name: Mantua

Diagrammatic Sketch

Township 9N, Range 1W, Section 25, UTM COOR: 4-25-420E 45-94-157N

DISCUSSION

Trend Study No. 3-3

This study is east of Mantua in Clay Valley. Situated at a relatively high elevation (6,320 feet), the site is on a 30% south facing slope occupied by a mountain big sagebrush-grass community. Although within the limits of deer winter, few signs of any significant deer use were apparent in 1984. More obvious, during that reading was spring and summer sheep grazing. Currently, there appears to be light use by deer and elk. Cattle were using the area during the 1996 reading where it was considered light use on site, with heavy use observed in the bottoms near water.

Soil at the study site is "Yeates Hollow Stony Loam", a well-drained, moderately deep soil with a moderate erosion hazard. Derived from sandstone and quartzite. It is rocky or cobbly on the surface, this soil usually dries completely in the upper 4 to 12 inches for 60 to 90 consecutive days in summer (Chadwick et al. 1975). Soils at the site have a clay loam texture with a slightly acid pH of 6.3. The soil is moderately deep with an estimated effective rooting depth (see methods) of just over 12 inches. Gravel is abundant in the profile. Bare ground is rare and usually associated with cattle trails.

The key browse species is a vigorous stand of mountain big sagebrush which provides 95% of the browse cover. Other shrubs such as mountain snowberry and stickyleaf low rabbitbrush are sparsely distributed throughout the area. The mountain big sagebrush population is stable with only light to occasionally moderate hedging. Density is moderately low due to the large size of individual shrubs and the presence of a vigorous herbaceous understory in the shrub interspaces. Decadence was moderately high in 1990 at 42%. Currently percent decadence is moderately low at only 17%. Vigor is normal on all but a few decadent shrubs.

Perennial grasses show exceptionally vigorous growth and consist of a wide variety of species. Among the most frequently occurring are bluebunch wheatgrass, bulbous wheatgrass, Sandberg bluegrass, and Kentucky bluegrass. Unfortunately Japanese brome is also abundant, providing 33% of the grass cover. Slightly lower on the slope are significant amounts of slender wheatgrass, mountain brome, smooth brome, subalpine needlegrass, crested wheatgrass, and Great Basin wildrye. Grasses show evidence of light to negligible grazing use.

Forbs are diverse but not particularly abundant. Weedy forb species including western yarrow, thistle, willowweed, dyers woad, prickly lettuce, sunflower, tarweed, and yellow salsify account for 67% of the forb cover. Many of the more palatable forb species had been moderately grazed by sheep during the 1984 reading.

1984 APPARENT TREND ASSESSMENT

Soil trend appears stable. Erosion is slight due to a good vegetative cover on a gentle to moderate slope. Vegetative trend also seems stable, at least temporarily. There is, however, a potential for change. Grass density may be thickening at the expense of desirable forbs, perhaps in response to the grazing habits of sheep. Such a trend could also inhibit sagebrush reproduction. Another possibility is an increase of undesirable weeds and annuals. These are common on the study area and could easily become more so.

1990 TREND ASSESSMENT

This privately-owned sagebrush/grass range in Clay basin has recently been grazed by cattle and receives moderate winter deer use. Mountain big sagebrush has

remained stable and vigorous since 1984. Seedling and young sagebrush commonly occur in limited areas, but were not sampled by the density plots. The majority of the sagebrush have a moderately hedged growth form. The sum of nested frequency of bluebunch wheatgrass has increased greatly. Cheatgrass remains a commonly occurring undesirable. Under the current management and grazing by cattle instead of sheep, the trends for winter range values appear stable.

TREND ASSESSMENT

soil - stable

browse - stable, with sagebrush slightly increasing

herbaceous understory - stable, key grasses are increasing, but should continue to monitor densities of weedy species like dyers woad's in which quadrat frequency has gone from 5% to 47%

1996 TREND ASSESSMENT

Trend for soil is up due to a decline in percent bare ground (12% to 2%). Litter cover increased while rock and pavement cover declined from 13% to 4%. Trend for mountain big sagebrush is stable. Population density declined somewhat, but much of the decline is due to the much larger sample used in 1996. Dead plants are rare (220 plants/acre or 7%) indicative of a stable population. Utilization is mostly light, decadence has declined from 42% to 17% and recruitment is good. The herbaceous understory is dominated by bulbous bluegrass and Japanese brome. However, sum of nested frequency for bluebunch wheatgrass has increased significantly since 1990, while sum of nested frequency for Kentucky bluegrass and Sandberg bluegrass have declined significantly. Sum of nested frequency for perennial grasses has increased, while for forbs it has declined substantially. But, forbs are only a minor element of the understory for they only make up 9% of the herbaceous cover. Trend for the herbaceous understory is slightly down .

TREND ASSESSMENT

soil - up

browse - stable

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 3

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	_a 28	_b 87	_c 156	10	31	68	8.15
G	Agropyron trachycaulum	2	2	-	1	1	-	-
G	Bromus japonicus (a)	-	-	293	-	-	87	12.51
G	Bromus marginatus	-	3	-	-	1	-	-
G	Bromus tectorum (a)	-	-	25	-	-	9	.31
G	Koeleria cristata	1	-	-	1	-	-	-
G	Melica bulbosa	_a 44	_{ab} 36	_b 15	19	21	9	.22
G	Poa bulbosa	_a 18	_b 63	_c 213	6	26	68	12.98
G	Poa pratensis	_{ab} 79	_a 97	_b 44	30	41	20	1.30
G	Poa secunda	_a 20	_b 129	_b 87	8	49	33	2.44
Total for Grasses		192	417	833	75	170	294	37.95

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	<i>Achillea millefolium</i>	_a 99	_a 87	_b 51	39	34	25	.89
F	<i>Agoseris glauca</i>	_a 50	_a 37	_b 10	20	18	5	.02
F	<i>Allium acuminatum</i>	_a 44	_b 14	_c -	20	8	-	-
F	<i>Alyssum alyssoides</i> (a)	-	-	25	-	-	11	.05
F	<i>Aster</i> spp.	1	-	-	1	-	-	-
F	<i>Astragalus</i> spp.	_a 20	_a 28	_b -	12	10	-	-
F	<i>Camelina microcarpa</i> (a)	-	-	3	-	-	1	.00
F	<i>Calochortus nuttallii</i>	_{ab} 5	_a 6	_b -	2	5	-	-
F	<i>Cirsium</i> spp.	_a 3	_b 23	_{ab} 16	3	12	7	.77
F	<i>Collomia linearis</i> (a)	-	-	28	-	-	16	.08
F	<i>Collinsia parviflora</i> (a)	-	-	1	-	-	1	.00
F	<i>Crepis acuminata</i>	3	-	1	1	-	1	.00
F	<i>Cryptantha</i> spp.	-	-	3	-	-	2	.03
F	<i>Draba</i> spp. (a)	-	-	1	-	-	1	.00
F	<i>Epilobium brachycarpum</i> (a)	-	-	39	-	-	16	.35
F	<i>Galium aparine</i> (a)	-	-	11	-	-	5	.10
F	<i>Geranium</i> spp.	3	-	3	1	-	1	.01
F	<i>Grindelia squarrosa</i>	-	2	-	-	1	-	-
F	<i>Helianthus annuus</i> (a)	-	5	13	-	3	5	.10
F	<i>Holosteum umbellatum</i> (a)	-	-	41	-	-	16	.22
F	<i>Isatis tinctoria</i>	_a 9	_b 109	_a 6	5	47	4	.04
F	<i>Lappula occidentalis</i> (a)	-	-	1	-	-	1	.00
F	<i>Lactuca serriola</i>	_a -	_b 75	_a 1	-	32	1	.00
F	<i>Lupinus argenteus</i>	23	33	21	13	16	11	.47
F	<i>Madia glomerata</i> (a)	_a -	_b 11	_b 19	-	5	8	.21
F	<i>Microsteris gracilis</i> (a)	9	-	6	4	-	2	.03
F	<i>Phlox longifolia</i>	-	2	-	-	1	-	-
F	<i>Polygonum douglasii</i> (a)	-	-	35	-	-	20	.10
F	<i>Senecio multilobatus</i>	_a 53	_b 7	_b -	26	2	-	-
F	<i>Taraxacum officinale</i>	_a 3	_b 13	_a 1	1	6	1	.00
F	<i>Tragopogon dubius</i>	_a 11	_b 117	_a 13	7	53	6	.08
F	Unknown forb-perennial	_a -	_b 25	_a -	-	14	-	-
F	<i>Viola</i> spp.	_a -	_b 19	_a -	-	12	-	-
Total for Forbs		336	613	349	155	279	167	3.62

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

BROWSE TRENDS --

Herd unit 03 , Study no: 3

Type	Species	Strip Frequency '96	Average Cover % '96
B	Acer grandidentatum	1	.03
B	Artemisia tridentata vaseyana	78	16.62
B	Chrysothamnus nauseosus albicaulis	2	.03
B	Chrysothamnus viscidiflorus viscidiflorus	2	.03
B	Gutierrezia sarothrae	1	-
B	Juniperus osteosperma	1	.53
B	Symphoricarpos oreophilus	6	.21
Total for Browse		91	17.45

BASIC COVER --

Herd unit 03 , Study no: 3

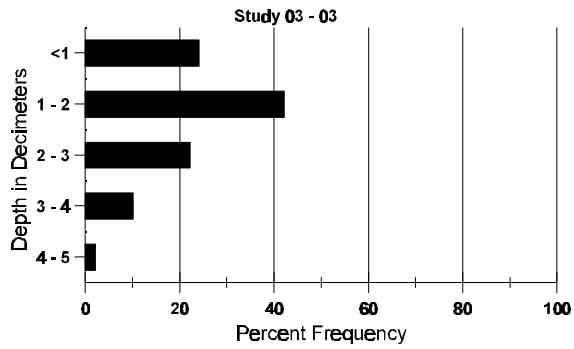
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	383	3.00	14.25	58.50
Rock	50	3.75	1.75	.58
Pavement	154	3.50	10.75	3.86
Litter	398	76.25	61.50	66.88
Cryptogams	9	.50	0	.07
Bare Ground	88	13.00	11.75	2.17

SOIL ANALYSIS DATA --

Herd Unit 03, Study no: 3

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12.3	61.0 (13.4)	6.3	28.7	42.0	29.3	5.3	29.3	240.0	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 3

Type	Quadrat Frequency '96
Sheep	1
Elk	3
Deer	7
Cattle	4

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 3

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Acer grandidentatum																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	22	29	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			

A G E	YR	Form Class (No. of 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	33	-	-	-	-	-	-	-	-	33	-	-	-	660		33	
M	84	25	16	5	-	-	-	-	-	-	46	-	-	-	3066	29 43	46	
	90	22	3	-	8	-	-	-	-	-	33	-	-	-	2200	39 38	33	
	96	79	7	-	-	-	-	-	-	-	86	-	-	-	1720	22 41	86	
D	84	2	2	2	-	-	-	-	-	-	4	-	2	-	400		6	
	90	16	4	1	3	-	-	-	-	-	20	2	2	-	1600		24	
	96	22	3	-	1	-	-	-	-	-	23	-	-	3	520		26	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	220		11	
Total Plants/Acre (excluding Dead & Seedlings)												'84	3532	Dec:	11%			
												'90	3800		42%			
												'96	2900		18%			
<i>Chrysothamnus nauseosus albicaulis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	32 60	1	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	40		50%			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	12 24	1	
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	40		50%			
<i>Gutierrezia sarothrae</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	13 20	1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			

A G E	YR	Form Class (No. of 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	1	-	-	1	-	-	-	20	-	-	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
Symphoricarpos oreophilus																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	4	-	-	-	-	-	4	-	-	-	80	22	47	4
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	1	1	-	-	-	1	-	-	2	60			3
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	0		0%			
												'96	140		43%			

TREND STUDY 3-4-96 (Old 2-11)

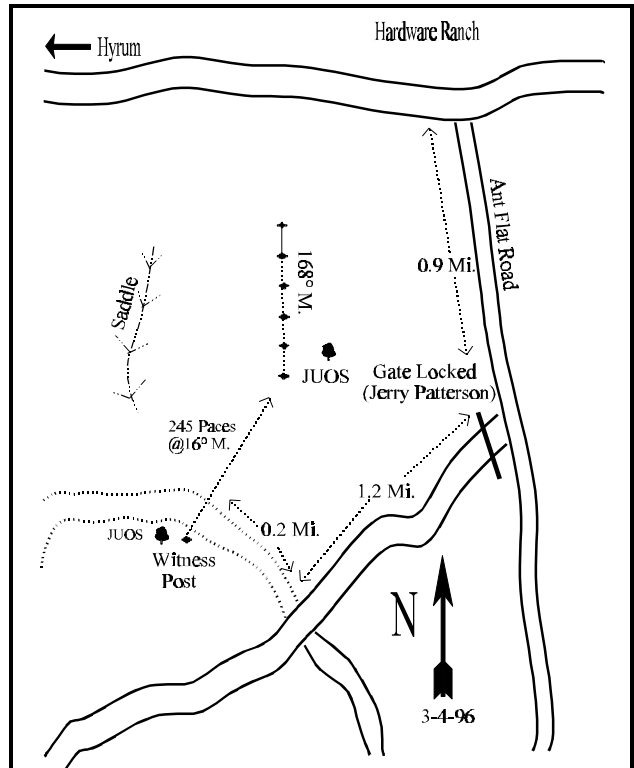
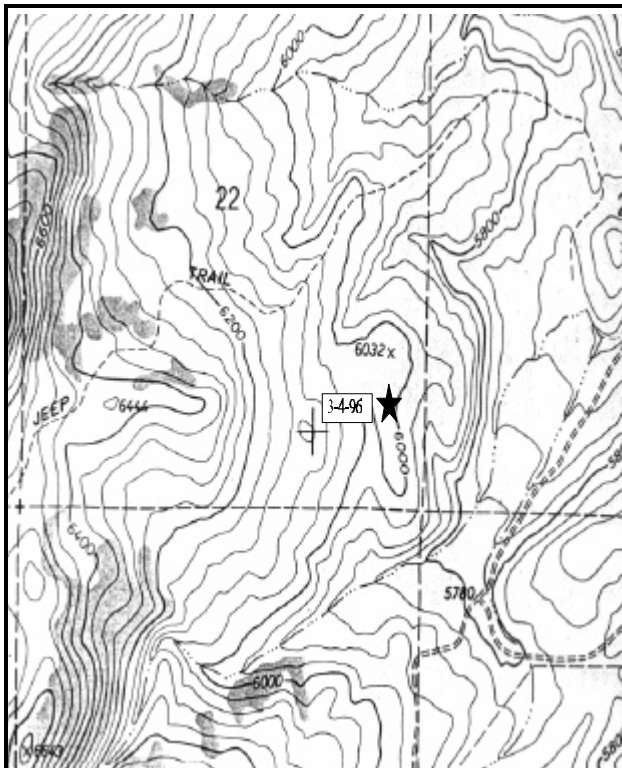
Study site name: Anderson Ranch. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 168 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Hardware Ranch travel south on the Ant Flat Road for 0.9 miles. Turn right, go through a locked gate, cross the Blacksmith Fork River, and proceed up the canyon 1.2 miles to a fork. Turn right (west) and travel 0.2 miles to the witness post by the road on the left side. From the witness post, walk 245 paces at 16 degrees magnetic to the 400-foot stake of the baseline. The 0-foot baseline stake is 400 feet to the north at a bearing of 348 degrees magnetic. The 0-foot stake is marked by browse tag #7932. Baseline bearing is 168 degrees magnetic.



Map Name: Hardware Ranch

Diagrammatic Sketch

Township 10N, Range 3E, Section 22, UTM COOR: 4-51-684E 46-03-581N

DISCUSSION

Trend Study No. 3-4 (2-11)

This study is now part of herd unit 3. It is on normal deer and elk winter range, located just west of the Anderson Ranch in upper Blacksmith Fork Canyon. Elevation is approximately 6,000 feet on a nearly level ridge. The prevailing plant community is mountain big sagebrush/grass with a good association of antelope bitterbrush. Wildlife use is moderately heavy with pellet group frequencies of deer and elk occurring frequently. Domestic sheep and cattle also utilize the area.

Soil is classified as "Ant Flat Loam", a well drained series derived from sandstone and shale. This soil has a porous surface horizon about 7 inches thick with a slightly acid reaction. Below this depth, the subsoil is neutral and increasingly clay in texture. The lower subsoil, at depths of about 60 inches, has concentrations of leached calcium carbonate. Plant root penetration is not a problem until the calcareous zone is reached. The erosion hazard is moderate (Erickson and Mortensen, 1974). Soils at the site have a clay loam texture with a neutral pH of 7.0. It is extremely rocky and compact. Effective rooting depth (see methods) was estimated at almost 12 inches. The site is on nearly level terrain with a good grass cover and minimal erosion.

Mountain big sagebrush and bitterbrush are currently the key browse species. Ninety-two percent of the bitterbrush was classified as decadent in 1984, also along 92% of the shrubs displayed heavy use. Density of young or seedling plants were low and it appeared that stickyleaf low rabbitbrush in association with the vigorous understory of perennial grasses was displacing the establishment of young bitterbrush. By 1996, its population was at 320 plants/acre. Utilization was moderate to heavy, but vigor was good and there were no decadent plants found. Only 100 dead plants/acre were estimated indicating some die off, but it appears that the small samples used in 1984 and 1990 overestimated actual bitterbrush density. The much larger sample used in 1996 tripled the original sample size and better estimates shrub populations which often have clumped and/or discontinuous distributions.

Mountain big sagebrush was also heavily utilized in 1984 with all plants sampled displaying a heavily hedged growth form. Decadence was high at 66% and no reproduction was evident. But by 1990, the population density increased by 60% with mostly light use. During the 1996 reading, the density of sagebrush was similar to 1984 estimates (400 plants/acre). Utilization was light to moderate and no decadent plants were found. However, dead plants, first sampled in 1996, numbered more than live ones (460 plants/acre) indicating a past die-off. Most likely this die-off was associated with the many years of continuous drought.

The most numerous shrub on the site is stickyleaf low rabbitbrush which currently has a stable population of 3,120 plants/acre. It also provides the most cover of any browse species, contributing to 38% of the browse cover. Density of mature shrubs has increased from 2,000 plants/acre in 1984 to nearly 3,000 by 1996. Plants are not utilized, vigor is normal, and decadence is low at only 1%.

Understory composition and density are dominated by perennial grasses, most notably bluebunch wheatgrass and Sandberg bluegrass. Annual grasses, first included in 1996, are also abundant with Japanese brome and cheatgrass producing 29% of the grass cover. Another grass encountered in 1996 was bulbous bluegrass which increases on disturbed sites. Considering elevation and annual precipitation, forb composition is relatively poor. A long history of sheep grazing has possibly given grasses a competitive advantage. The most common forb, western yarrow, is reputedly unpalatable to livestock but is used by deer and elk. Apart from yarrow, most forbs are occur occasionally and provide

relatively little forage. All forbs combined produce less than 3% cover and no single species besides western yarrow (.60%) provides more the one-half of 1% cover.

1984 APPARENT TREND ASSESSMENT

Soil trend is stable because of a moderately dense grass cover that is effective in preventing runoff and erosion. Vegetative trend is declining because of unfavorable age structures in populations of the key browse species and an apparent increase in density and cover of grass and stickyleaf low rabbitbrush.

1990 TREND ASSESSMENT

Contrary to the downward trends predicted in 1984, the browse component on this site has not experienced a significant decline. In fact, mountain big sagebrush and bitterbrush have increased while percent decadency has decreased. The sagebrush and bitterbrush have a more balanced age class structures now. Low rabbitbrush remains a prominent factor in the understory for it has increased also. There is still a high percentage of decadence in the bitterbrush population. The sagebrush and bitterbrush have a heavily hedged growth form, and some forage production is unavailable. The healthy understory of grasses and forbs has stayed about the same. The understory provides adequate vegetative and litter ground cover.

TREND ASSESSMENT

soil - stable

browse - up

herbaceous understory - slightly improving

1996 TREND ASSESSMENT

The soil trend is up with a considerable decline in bare ground cover (22% down to 11%). Litter cover remained similar to 1990 estimates, but cryptogamic cover nearly doubled. Vegetation and litter cover are abundant and well dispersed and effectively limit erosion. The browse trend appears stable. Bitterbrush density declined from 999 plants/acre in 1990 to 320 by 1996. However, the lack of a high number of dead plants (only 100 plants/acre) would indicate that most of the change in density is due to the much larger sample size giving a more accurate population estimate. Utilization is moderate to heavy, vigor normal, and no decadent plants were encountered. The mountain big sagebrush population has declined 60% since 1990. The large number of dead plants (460 plants/acre) would suggest that this change is not related to sample size, but more closely associated with the many years of extended drought. Yet, the current density is similar to the 1984 estimates. Stickyleaf low rabbitbrush is currently the most abundant shrub. It appears to have a stable population. The herbaceous understory is dominated by grasses. Sum of nested frequency for perennial grasses has declined since 1990. Bluebunch wheatgrass has continued to increase in sum of nested frequency, however prairie Junegrass, Sandberg bluegrass, and foxtail barley all declined in frequency. Annual grasses are also common but were not included in the previous samples so no comparisons can be made. The forb component is still poor, making up only 9% of the herbaceous cover. Sum of nested frequency of perennial forbs has declined 53% in nested frequency since 1990. Trend is considered slightly down.

TREND ASSESSMENT

soil - up

browse - stable

herbaceous understory - slightly down

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 4

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	<i>Agropyron spicatum</i>	271	276	267	90	91	88	12.89
G	<i>Bromus japonicus</i> (a)	-	-	186	-	-	61	5.14
G	<i>Bromus tectorum</i> (a)	-	-	114	-	-	40	2.62
G	<i>Elymus cinereus</i>	-	-	2	-	-	1	.53
G	<i>Hordeum jubatum jubatum</i>	4	5	-	2	3	-	-
G	<i>Koeleria cristata</i>	a52	a53	b28	21	20	13	.79
G	<i>Poa bulbosa</i>	a-	a-	b52	-	-	23	1.55
G	<i>Poa secunda</i>	a202	b267	a160	81	90	63	3.42
Total for Grasses		529	601	809	194	204	289	26.96
F	<i>Achillea millefolium</i>	a191	b84	c49	73	40	21	.60
F	<i>Agoseris glauca</i>	a-	b126	a1	-	59	1	.00
F	<i>Allium acuminatum</i>	a23	b4	b-	10	2	-	-
F	<i>Alyssum alyssoides</i> (a)	-	-	114	-	-	45	.32
F	<i>Arabis drummondi</i>	a-	ab1	b9	-	1	5	.02
F	<i>Aster chilensis</i>	-	1	3	-	1	1	.00
F	<i>Astragalus convallarius</i>	a-	b17	b10	-	11	5	.05
F	<i>Calochortus nuttallii</i>	3	-	-	2	-	-	-
F	<i>Cirsium spp.</i>	12	12	14	6	6	6	.39
F	<i>Collomia linearis</i> (a)	-	-	9	-	-	5	.02
F	<i>Collinsia parviflora</i> (a)	-	-	60	-	-	24	.11
F	<i>Crepis acuminata</i>	a-	b10	a-	-	6	-	-
F	<i>Cryptantha spp.</i>	-	6	-	-	3	-	-
F	<i>Descurainia spp.</i> (a)	-	-	3	-	-	1	.00
F	<i>Epilobium brachycarpum</i> (a)	-	-	13	-	-	6	.03
F	<i>Eriogonum cernuum</i> (a)	-	-	1	-	-	1	.00
F	<i>Erodium cicutarium</i> (a)	-	-	7	-	-	4	.07
F	<i>Eriogonum umbellatum</i>	-	3	1	-	2	1	.03
F	<i>Holosteum umbellatum</i> (a)	-	-	76	-	-	31	.28
F	<i>Lappula occidentalis</i> (a)	-	-	2	-	-	1	.00
F	<i>Lithospermum ruderales</i>	a-	a-	b10	-	-	5	.24
F	<i>Lupinus argenteus</i>	9	3	8	4	1	6	.06
F	<i>Lupinus caudatus</i>	-	4	-	-	1	-	-
F	<i>Microsteris gracilis</i> (a)	-	-	44	-	-	17	.08
F	<i>Orthocarpus tolmiei</i> (a)	-	-	19	-	-	10	.30
F	<i>Phlox longifolia</i>	-	5	-	-	2	-	-
F	<i>Polygonum douglasii</i> (a)	-	-	32	-	-	14	.07
F	<i>Ranunculus testiculatus</i> (a)	-	-	9	-	-	3	.01

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	Taraxacum officinale	-	9	-	-	3	-	-
F	Tragopogon dubius	_a 21	_b 3	_{ab} 9	10	1	5	.05
F	Trifolium gymnocarpon	-	-	4	-	-	2	.01
F	Unknown forb-perennial	-	2	-	-	1	-	-
F	Veronica biloba (a)	-	-	1	-	-	1	.00
F	Zigadenus paniculatus	-	3	-	-	1	-	-
Total for Forbs		259	293	508	105	141	221	2.81

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

BROWSE TRENDS --

Herd unit 03 , Study no: 4

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	19	3.47
B	Chrysothamnus viscidiflorus viscidiflorus	66	4.69
B	Gutierrezia sarothrae	9	.24
B	Purshia tridentata	15	4.09
B	Tetradymia canescens	2	-
Total for Browse		111	12.50

BASIC COVER --

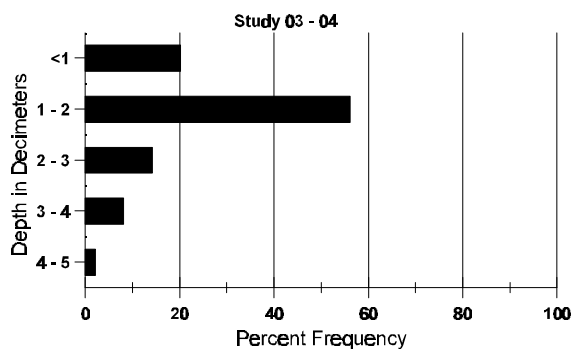
Herd unit 03 , Study no: 4

Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	383	6.25	19.75	43.24
Rock	102	1.00	.75	.86
Pavement	140	1.25	0	.95
Litter	399	70.75	50.75	51.29
Cryptogams	219	5.50	7.00	12.98
Bare Ground	179	15.25	21.75	10.92

SOIL ANALYSIS DATA --
 Herd Unit 03, Study no: 4

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.5	57.4 (15.1)	7.0	42.7	24.0	33.3	3.7	14.3	115.2	.6

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 03 , Study no: 4

Type	Quadrat Frequency '96
Sheep	4
Rabbit	5
Elk	23
Deer	38
Cattle	2

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 4

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160		8	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	2	-	-	4	-	-	-	266		4	
	96	4	1	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	84	-	-	2	-	-	-	-	-	-	2	-	-	-	133	28	35	2
	90	4	2	-	2	-	-	-	-	-	8	-	-	-	533	28	31	8
	96	3	12	-	-	-	-	-	-	-	15	-	-	-	300	35	50	15
D	84	-	-	4	-	-	-	-	-	-	4	-	-	-	266		4	
	90	2	1	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	460		23	
Total Plants/Acre (excluding Dead & Seedlings)												'84	399	Dec :	67%			
												'90	999		20%			
												'96	400		0%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
Y	84	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	266	Dec :	-			
												'90	0		-			
												'96	0		-			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	90	9	-	-	1	-	-	-	-	-	10	-	-	-	666		10	
	96	3	1	-	-	-	-	-	-	-	4	-	-	-	80		4	
M	84	30	-	-	-	-	-	-	-	-	30	-	-	-	2000	12	13	30
	90	27	1	-	9	1	-	1	-	-	39	-	-	-	2600	13	17	39
	96	136	11	-	2	-	-	-	-	-	149	-	-	-	2980	15	23	149
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	1	-	-	-	-	-	-	-	1	-	-	1	133		2	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	2200	Dec :	0%			
												'90	3399		4%			
												'96	3120		2%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Gutierrezia sarothrae</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	21	-	-	-	-	-	-	-	-	21	-	-	-	420	7	9	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	440		-			
<i>Juniperus scopulorum</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	1	-	1	-	-	-	66	134	81	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	66		-			
												'96	0		-			
<i>Purshia tridentata</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	1	-	-	1	-	-	3	-	-	-	200		3	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	1	-	-	-	-	-	-	1	-	-	-	66	32	37	
	90	1	1	-	-	-	-	-	-	-	2	-	-	-	133	15	26	
	96	4	7	4	-	-	-	-	-	-	15	-	-	-	300	29	55	
D	84	-	-	8	-	1	3	-	-	-	11	-	1	-	800		12	
	90	-	-	-	1	4	-	-	-	5	8	-	-	2	666		10	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
Total Plants/Acre (excluding Dead & Seedlings)												'84	866	Dec:	92%			
												'90	999		67%			
												'96	320		0%			
<i>Symphoricarpos oreophilus</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	15	16	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Tetradymia canescens</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	1	-	-	1	-	-	-	-	-	2	-	-	-	40	18	33	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	40		-			

TREND STUDY 3-5-96

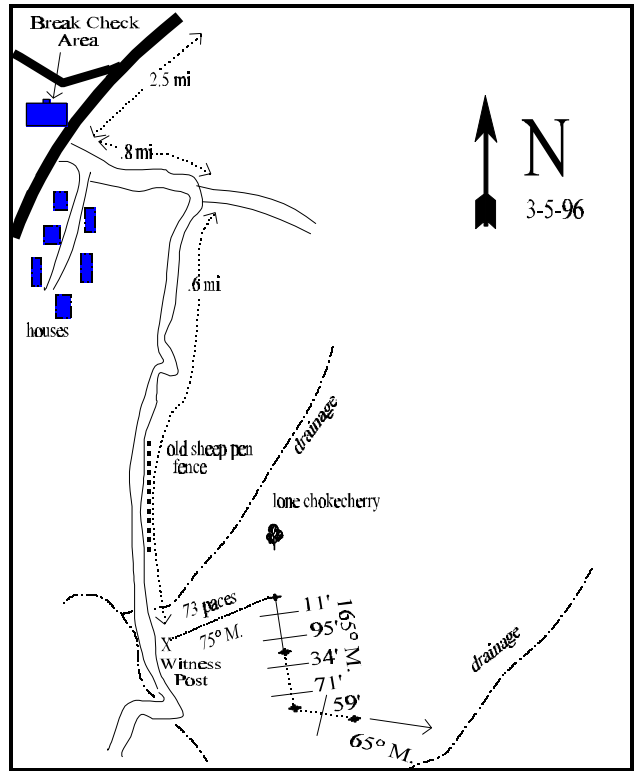
Study site name: Mathias Canyon. Range type: Smooth sumac.

Compass bearing: frequency baseline 165 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34 & 71ft), line 3 (59ft).

LOCATION DESCRIPTION

From Mantua Hatchery, proceed to Box Elder Canyon road (west bound), turn left toward Brigham City, and travel 2.5 miles to a point where a dirt road takes off to the left. A truck brake test area is just opposite and slightly north of this point. Turn left, take left fork up a dugway to DWR property and proceed 0.7 miles toward bench and mouth of Box Elder Canyon. After 0.7 miles you will come to a sharp hairpin turn to the right. Turn here, travel 0.6 miles up onto bench and stop just before Mathias Creek passes under the road. Just before here the creek will pass across the face of an old sheep pen. Approximately 40 feet north of where the creek crosses the road there is a witness post on the east side of the road. From the witness post to the 0-foot baseline stake walk 70 paces at a bearing of 75 degrees magnetic. The 0-foot baseline stake is marked with browse tag #7996. The baseline runs 165 degrees magnetic. Line three of the baseline doglegs at 200 feet and runs in a direction of 120 degrees magnetic.



Map Name: Mantua

Diagrammatic Sketch

Township 9N, Range 1W, Section 31

DISCUSSION

Trend Study No. 3-5

This study samples a steep (65%), west facing slope that is located above the upper lake terrace on the north side of Mathias Canyon. Elevation is approximately 5,280 feet. Thought to be important as severe winter range, the study site is characterized by an extremely rocky soil surface and a badly depleted vegetative composition. Heavy deer use in 1984 was confirmed by pellet group frequency and the level of browsing on available shrubs. Currently (1996) there is little sign of wildlife use.

The study site falls within the "Foxol-Elzinga Association" soil mapping unit. This designation describes shallow and excessively drained soils with textures ranging from silt loam to gravelly loam. Study area soils tend to be gravelly with abundant surface rock. Because maximum soil depth is only about 17 inches, these soils become very dry in the summer. Depth to fractured bedrock is less than 10 inches in many places (Chadwick et al. 1975). Soils on the site have a clay loam texture with a slightly alkaline pH of 7.6. Rocks are common on the surface and in the profile. Effective rooting depth (see methods) was estimated at almost 8 inches. Soil temperature is relatively high averaging nearly 72° F at an average depth of about 10 inches. Due to the abundant rock, vegetation and litter cover, erosion is not currently a problem on the site.

Quality browse forage is in short supply. Easily the most abundant species is Rocky Mountain smooth sumac, a vigorously sprouting shrub that tends to die-back severely each year. This species occurs in large patches over most of the Brigham-Willard face and has within the last couple of decades, replaced much of the native big sagebrush. Small numbers of mountain big sagebrush (200 plants/acre) still persists but they have had a low reproductive potential and therefor have not reproduced sufficiently to increase their density. Both smooth sumac and big sagebrush sustained moderate to heavy use in 1984 but current use is light. Other browse plants include increasers such as stickyleaf low rabbitbrush, and broom snakeweed, and patches of taller shrubs such as bigtooth maple and black chokecherry.

Herbaceous species currently determine the study area's dominant vegetative character. Perennial grasses are the most productive class of plants and consist primarily of bluebunch wheatgrass. Sandberg bluegrass occurs frequently but produces little forage. Annual brome grasses currently dominate the grass component by providing 62% of the grass cover. Annual grasses and annual forbs were not included in previous sampling method, so no comparisons can be made. Forb composition is dominated by a mixture of poor value perennials and a variety of weeds. The most abundant forbs include milkweed, dyers woad, yellow salsify, and ragweed.

1984 APPARENT TREND ASSESSMENT

This study area is representative of the depleted range that extends all along west-facing mountain slopes of herd unit 3. Soil condition is perhaps a little poorer than average and continues to decline. Vegetatively, most of the native plants have been replaced by undesirable shrubs and noxious weeds. Trend is down and no prospects for improvement are in sight.

1990 TREND ASSESSMENT

The limited browse on this rather depleted site in Mathias canyon has been only lightly used the last several years, and has good vigor. The limited distribution of mountain big sagebrush has experienced a small increase in density. The stand of smooth sumac is unchanged. Bluebunch wheatgrass declined

significantly in frequency, but overall the site remains stable but in poor range condition. Although there is a substantial amount of similar range on the west-facing slopes of the Wasatch Mountains in this unit, there is also a surprisingly large amount of productive range on the narrow terraces. Just below the steep and rocky study site, there is a stand of lightly used big sagebrush and tall cliffrose.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - stable to slightly declining, should carefully monitor weedy species, especially dyers woad which has increased

1996 TREND ASSESSMENT

Trend for soil is up due to an increase in percent litter cover and a decline in percent bare ground. Erosion is not currently a problem on this site. The browse trend is stable but dominated by a poor valued smooth sumac. Density of mountain big sagebrush is similar to 1990 estimates. The small decline in density is likely the result of the much larger sample size used this year. Density of smooth sumac is unchanged. Trend for the herbaceous understory is down. Sum of nested frequency of perennial grasses has declined. Both bluebunch wheatgrass and Sandberg bluegrass have declined significantly in their sum of nested frequency values. Currently, annual brome grasses account for 62% of the grass cover. The forb composition is extremely poor and dominated by weeds including ragweed, milkweed, dyers woad, and yellow salsify. Dyers woad has increased in sum of nested frequency with each reading.

TREND ASSESSMENT

soil - up

browse - stable but dominated by smooth sumac

herbaceous understory - down and in poor condition (weedy composition)

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 5

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	202	172	168	82	74	70	12.33
G	Bromus brizaeformis (a)	-	-	104	-	-	40	.85
G	Bromus japonicus (a)	-	-	273	-	-	87	6.67
G	Bromus tectorum (a)	-	-	332	-	-	94	14.35
G	Poa bulbosa	a-	b15	a-	-	5	-	-
G	Poa secunda	a69	a79	b28	32	36	12	.81
Total for Grasses		271	266	905	114	115	303	35.03
F	Achillea millefolium	4	-	2	2	-	1	.15
F	Agoseris glauca	4	2	-	2	1	-	-
F	Allium acuminatum	a9	a12	b-	6	6	-	-
F	Alyssum alyssoides (a)	-	-	2	-	-	1	.00
F	Ambrosia psilostachya	a36	ab32	b21	15	14	10	.32
F	Apocynum androsaemifolium pumilum	1	-	-	1	-	-	-

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	<i>Artemisia ludoviciana</i>	-	1	-	-	1	-	-
F	<i>Asclepias hallii</i>	10	9	14	4	5	5	1.12
F	<i>Comandra pallida</i>	-	-	2	-	-	1	.03
F	<i>Crepis acuminata</i>	-	4	-	-	1	-	-
F	<i>Cymopterus</i> spp.	a-	a-	b34	-	-	14	.07
F	<i>Epilobium brachycarpum</i> (a)	-	-	9	-	-	3	.04
F	<i>Galium aparine</i> (a)	-	-	2	-	-	1	.00
F	<i>Hackelia patens</i>	a23	b-	b-	12	-	-	-
F	<i>Isatis tinctoria</i>	a48	ab81	b97	26	36	46	1.14
F	<i>Lactuca serriola</i>	a-	b26	a9	-	12	4	.04
F	<i>Lomatium</i> spp.	a-	b131	a4	-	64	2	.01
F	<i>Microseris nutans</i>	4	-	-	2	-	-	-
F	<i>Phlox longifolia</i>	-	7	1	-	3	1	.00
F	<i>Tragopogon dubius</i>	a12	b43	c118	7	20	54	2.30
Total for Forbs		151	348	315	77	163	143	5.25

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

BROWSE TRENDS --

Herd unit 03 , Study no: 5

T y p e	Species	Strip Frequency '96	Average Cover % '96
B	<i>Amelanchier alnifolia</i>	0	1.25
B	<i>Artemisia tridentata</i> <i>vaseyana</i>	9	.59
B	<i>Gutierrezia sarothrae</i>	22	.92
B	<i>Opuntia fragilis</i>	4	.03
B	<i>Rhus glabra</i> <i>cismontana</i>	70	8.48
Total for Browse		105	11.30

BASIC COVER --

Herd unit 03 , Study no: 5

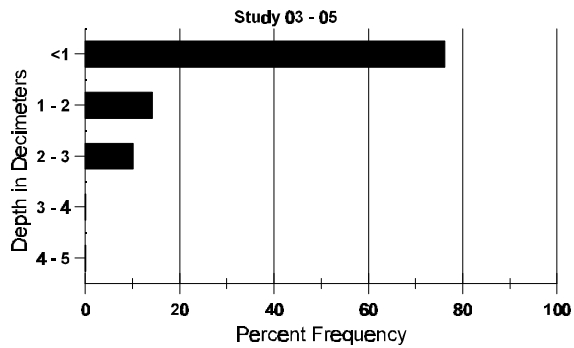
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	380	1.25	8.50	47.75
Rock	341	52.00	43.00	44.36
Pavement	90	5.50	13.75	2.08
Litter	394	34.75	30.50	38.79
Cryptogams	2	0	.25	.01
Bare Ground	55	6.50	4.00	.32

SOIL ANALYSIS DATA --

Herd Unit 03, Study no: 5

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
7.6	71.5 (9.8)	6.7	27.9	42.1	30.0	2.5	18.8	172.8	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 03 , Study no: 5

Type	Quadrat Frequency '96
Deer	2

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 5

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Amelanchier alnifolia</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	106	123	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Artemisia tridentata vaseyana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	4	-	-	1	-	-	-	-	-	5	-	-	-	100			5
M	84	-	-	4	-	-	-	-	-	-	4	-	-	-	266	26	30	4
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266	31	51	4
	96	4	-	-	-	-	-	-	-	-	4	-	-	-	80	22	42	4
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'84	266	Dec:	0%			
												'90	332		0%			
												'96	200		10%			
<i>Gutierrezia sarothrae</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
M	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200	12	9	3
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266	9	17	4
	96	27	-	-	1	-	-	-	-	-	28	-	-	-	560	11	17	28
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	-	-	-	1	66			1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Total Plants/Acre (excluding Dead & Seedlings)												'84	200	Dec:	0%			
												'90	332		20%			
												'96	740		0%			

A G E	YR	Form Class (No. of 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>Opuntia fragilis</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	1	-	-	-	-	-	1	-	-	2	-	-	-	40	5	3	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	80		-			
<i>Prunus virginiana</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	-	-	-	-	-	-	-	-	-	1	-	-	66		1	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	20	-	-	-	-	-	-	-	-	20	-	-	-	1333		20	
	90	40	-	-	-	-	-	-	-	-	4	21	15	-	2666		40	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	19	12	-	-	-	-	-	-	28	-	3	-	2066	13	7	
	90	-	1	-	-	-	-	-	-	-	-	1	-	-	66	34	53	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
Total Plants/Acre (excluding Dead & Seedlings)												'84	3399	Dec:	-			
												'90	2732		-			
												'96	0		-			
<i>Rhus glabra cismontana</i>																		
S	84	2	-	1	-	-	-	-	-	-	3	-	-	-	200		3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	84	16	-	-	-	-	-	-	-	-	16	-	-	-	1066		16	
	90	15	-	-	-	-	-	-	-	-	15	-	-	-	1000		15	
	96	42	-	-	-	-	-	-	-	-	34	7	1	-	840		42	
M	84	-	-	30	-	-	-	-	-	-	30	-	-	-	2000	22	18	
	90	9	27	-	-	-	-	-	-	-	36	-	-	-	2400	23	20	
	96	115	11	-	-	-	-	-	-	-	126	-	-	-	2520	23	27	
D	84	-	-	5	-	-	-	-	-	-	5	-	-	-	333		5	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	1	-	-	-	-	-	-	-	2	-	-	-	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	240		12	
Total Plants/Acre (excluding Dead & Seedlings)												'84	3399	Dec:	10%			
												'90	3400		0%			
												'96	3400		1%			

TREND STUDY 3-6-96

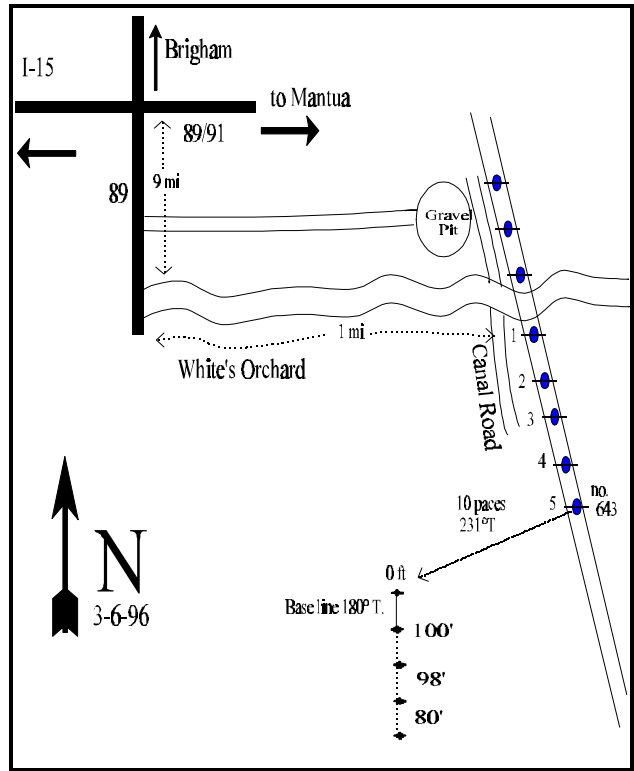
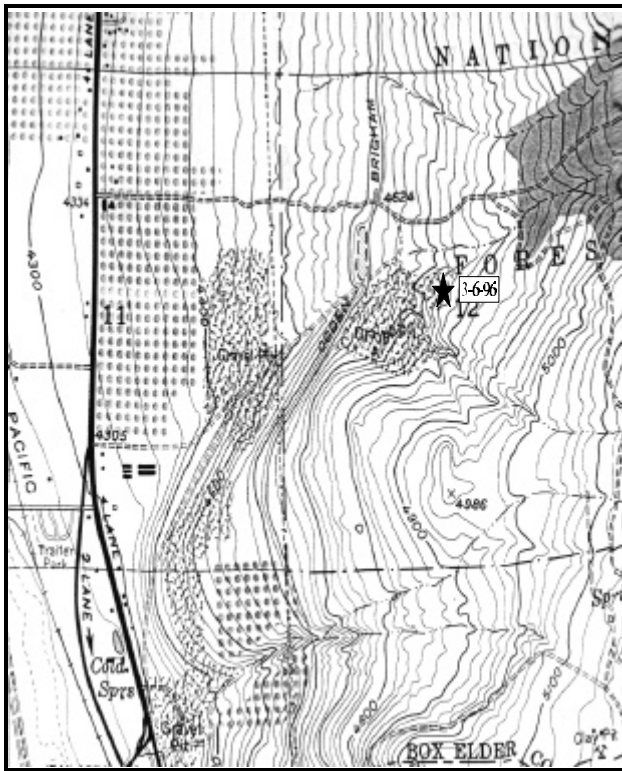
Study site name: White's Orchard. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 71ft), line 2 (34ft), line 3 (95ft), line 4 (59ft).

LOCATION DESCRIPTION

In Brigham City at the junction of US 89 and 91, turn south on US 89 and proceed 9.0 miles. Turn left and drive through White's Orchard, stopping after 1.0 miles where the power lines cross the road. Power poles run at 152 degrees true. Walk south to the fifth pole, number 643. From the base of this pole walk 10 paces at 231 degrees true to the baseline 0-foot stake with browse tag #7920.



Map Name: Plain City

Diagrammatic Sketch

Township 7N, Range 2W, Section 12, UTM COOR: 4-15-092E 45-78-858N

DISCUSSION

Trend Study No. 3-6

This study, located near the south boundary of the herd unit sampling an extensive big sagebrush type on a fairly gentle (20%) northwest slope. Elevation at the site is 4,820 feet. Although winter deer use of the area was reportedly heavy in the past few pellet groups were observed during the 1996 reading. Browse utilization was intense in 1984, but it appeared to be largely a function of livestock use. Cattle pats were very common in 1984 and utilization of the available grass forage approached 80%. Currently (1996), cattle sign is moderately abundant and probably high because of a watering trough near the base of the hill. Coyote scat was also noted in the area along with some den sites.

Soil is "Wasatch Gravelly Sandy Loam", a moderately deep alluvially deposited soil with slightly alkaline characteristics. Permeability to water is rapid and drainage is excessive. Soils on the site have a sandy loam texture with a slightly acidic pH of 6.0. Small sized gravel is found on the surface and in the profile. Effective rooting depth (see methods) was estimated at almost 10 inches. Average soil temperature is moderately high at 67°F at an average depth of 12 inches. Complete soil drying may occur as deep as 35 inches for 90 consecutive days in summer. This soil has a moderate erosion hazard but current vegetation and litter cover appear sufficient to control most soil movement. However, heavy cattle grazing and trampling damage has resulted in some sheet and gully erosion.

Browse composition consists almost exclusively of basin big sagebrush. During the 1984 and 1990 readings, sagebrush was classified as mountain big sagebrush (*Artemisia tridentata vaseyana*). However, in 1996 this was changed to basin big sagebrush (*A. tridentata tridentata*). The only other shrub present, is an occasional broom snakeweed. Sagebrush density is moderately high and age and form class structure suggests a stable population. Utilization was extremely heavy in 1984, with all plants sampled heavily hedged (>60% of twigs browsed). Decadence was also high at 47%. Density increased 27% in 1990 to 4,199 plants/acre. Seedlings and young were extremely abundant and use was mostly light. During the 1996 reading, 2,760 plants/acre were estimated. The number of mature plants remained similar to 1990 estimates (1,600 plants/acre to 1,980), yet the number of young declined by 70% and nearly 1,000 plants/acre of decadent sagebrush appear to have died. Dead plants, first sampled in 1996, number 1,160 plants/acre and support the assumption that the sagebrush population has declined with the long periods of extended drought and winter injury since 1985. Whatever the reason, the result is a smaller and healthier population of sagebrush which is lightly utilized, generally in good vigor with a decadency rate of only 13%.

The herbaceous understory consists almost entirely of grass. The principle perennial grass species is the seeded intermediate wheatgrass. Crested wheatgrass is also present in small numbers. Less desirable bulbous bluegrass, and the annuals, cheatgrass and Japanese brome, are also abundant and account for 45% of the grass cover. These are all low growing, low producing species that dry up very early in summer and produce little useable forage. Forbs were nearly absent in 1984 and 1990, but appear in greater numbers in 1996 partly due to the much larger sample size. Still, composition is extremely poor. Annual and perennial forbs account for less than 3% cover and contain several annuals and weedy perennials. Weedy perennial species which should be closely monitored in the future include, curlycup gumweed, sunflower, thistle, and tarweed.

1984 APPARENT TREND ASSESSMENT

In spite of light to moderate erosion, this site has a relatively stable soil

trend. The lack of steep slope and low precipitation as well as a fair cover, prevent really serious soil loss. Although subsequent readings of the study plots may indicate otherwise, our opinion is that vegetative trend is stable. If heavy cattle grazing persists, it is possible that mountain big sagebrush may even increase in density, although plant size, vigor, and vegetative diversity will continue to be limited.

1990 TREND ASSESSMENT

Basin big sagebrush on the White's Orchard study site shows a notable increase in density. Further data comparisons reveal that the number of mature sagebrush increased from 1,266 to 1,600 plants per acre. The largest increase was in the number of seedlings. There is an average 17% sagebrush canopy cover. The shrubs are vigorous with light to moderate hedging. While the increase in sagebrush could be related to heavy cattle grazing on this private land, the frequency of intermediate wheatgrass also increased. The amount of litter cover decreased and the percentage of bare soil increased from 1% to 15%, but overall there is minimal soil erosion.

TREND ASSESSMENT

soil - stable

browse -improving

herbaceous understory - stable, key grasses slightly up, but should carefully monitor weedy increaser forbs and grasses

1996 TREND ASSESSMENT

The soil trend is up slightly. Percent bare ground declined from 15% to 9%. Erosion is not currently a problem. Trend for browse is stable. Population has declined due to a reduction in young and decadent plants, but the number of mature plants has actually increased (1,600 to 1,980). Seedlings and young are less abundant yet in sufficient numbers to maintain or even increase the current population. Utilization is mostly light and decadence has declined from 30% to 13%. The herbaceous understory continues to be dominated by grasses. Sum of nested frequency for perennial grasses has declined slightly. Sum of nested frequency of intermediate wheatgrass declined significantly. Annual grasses and bulbous bluegrass are abundant and account for nearly half of the grass cover. Forbs are lacking and species composition is extremely poor. Several aggressive weeds are found on the site including ragweed, thistle, curlycup gumweed, sunflower, and tarweed. Trend for the herbaceous understory is considered slightly down due to the significant decline in intermediate wheatgrass.

TREND ASSESSMENT

soil - up slightly

browse - stable

herbaceous understory - down slightly, because of the losses to key perennial grass species

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 6

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron cristatum	6	1	9	3	1	4	.10
G	Agropyron intermedium	222	248	190	82	88	58	14.46
G	Bromus japonicus (a)	-	-	212	-	-	70	7.41
G	Bromus tectorum (a)	-	-	36	-	-	12	.89
G	Festuca myuros (a)	-	-	4	-	-	4	.04
G	Poa bulbosa	_a 270	_b 146	_b 141	99	61	49	3.67
G	Sporobolus cryptandrus	-	-	5	-	-	3	.18
Total for Grasses		498	395	597	184	150	200	26.78
F	Ambrosia psilostachya	-	-	5	-	-	3	.04
F	Artemisia ludoviciana	-	-	3	-	-	1	.03
F	Cirsium spp.	-	-	1	-	-	1	.00
F	Descurainia pinnata (a)	-	-	48	-	-	17	.79
F	Epilobium brachycarpum (a)	-	-	52	-	-	24	.20
F	Erodium cicutarium (a)	-	-	41	-	-	16	.46
F	Erigeron pumilus	_a -	_a -	_b 8	-	-	4	.21
F	Grindelia squarrosa	_a -	_a -	_b 12	-	-	6	.20
F	Helianthus annuus (a)	_a -	_a 3	_b 25	-	2	12	.28
F	Holosteum umbellatum (a)	-	-	1	-	-	1	.00
F	Lactuca serriola	_a -	_a -	_b 11	-	-	6	.20
F	Madia glomerata (a)	-	-	17	-	-	8	.04
F	Plantago patagonica (a)	-	-	32	-	-	14	.14
F	Polygonum douglasii (a)	-	-	35	-	-	19	.17
F	Tragopogon dubius	1	-	1	1	-	1	.00
Total for Forbs		1	3	292	1	2	133	2.79

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

BROWSE TRENDS --

Herd unit 03 , Study no: 6

T y p e	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata tridentata	66	16.13
B	Gutierrezia sarothrae	1	-
Total for Browse		67	16.13

BASIC COVER --

Herd unit 03 , Study no: 6

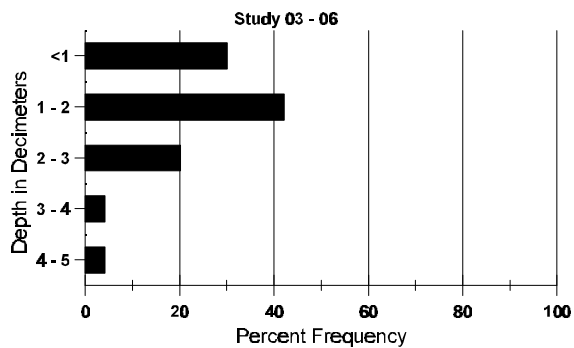
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	364	1.00	15.50	45.02
Rock	67	0	.50	.57
Pavement	208	17.25	7.00	3.35
Litter	400	80.50	56.75	53.93
Cryptogams	99	0	5.50	2.65
Bare Ground	249	1.25	14.75	9.26

SOIL ANALYSIS DATA --

Herd Unit 03, Study no: 6

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
9.7	67.2 (12.0)	6.0	64.6	16.1	19.4	1.9	17.1	137.6	.3

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 03 , Study no: 6

Type	Quadrat Frequency '96
Rabbit	1
Deer	1
Cattle	14

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 6

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata tridentata</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	156	-	-	-	-	-	-	-	-	156	-	-	-	10400			156
	96	33	-	-	-	-	-	-	-	-	33	-	-	-	660			33
Y	84	-	-	5	-	-	-	-	-	-	4	-	1	-	333			5
	90	20	-	-	-	-	-	-	-	-	20	-	-	-	1333			20
	96	19	1	-	-	-	-	-	-	-	19	-	1	-	400			20
M	84	-	-	19	-	-	-	-	-	-	19	-	-	-	1266	29	20	19
	90	18	6	-	-	-	-	-	-	-	24	-	-	-	1600	30	38	24
	96	90	9	-	-	-	-	-	-	-	86	-	12	1	1980	31	40	99
D	84	-	-	21	-	-	-	-	-	1	16	-	6	-	1466			22
	90	10	8	-	1	-	-	-	-	-	12	-	-	7	1266			19
	96	13	4	1	1	-	-	-	-	-	12	1	3	3	380			19
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1160			58
Total Plants/Acre (excluding Dead & Seedlings)												'84	3065	Dec:	48%			
												'90	4199		30%			
												'96	2760		14%			
<i>Gutierrezia sarothrae</i>																		
Y	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	5	8	2
Total Plants/Acre (excluding Dead & Seedlings)												'84	200	Dec:	-			
												'90	0		-			
												'96	40		-			

TREND STUDY 3-7-96

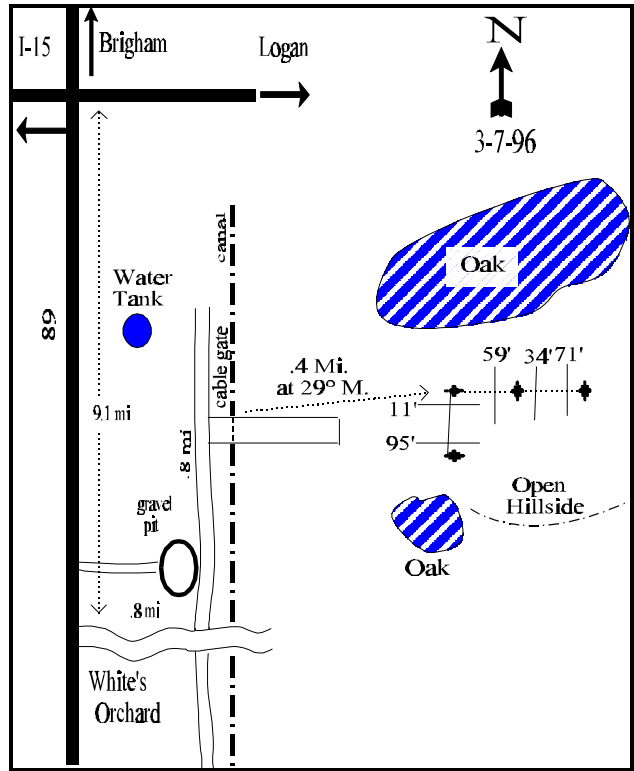
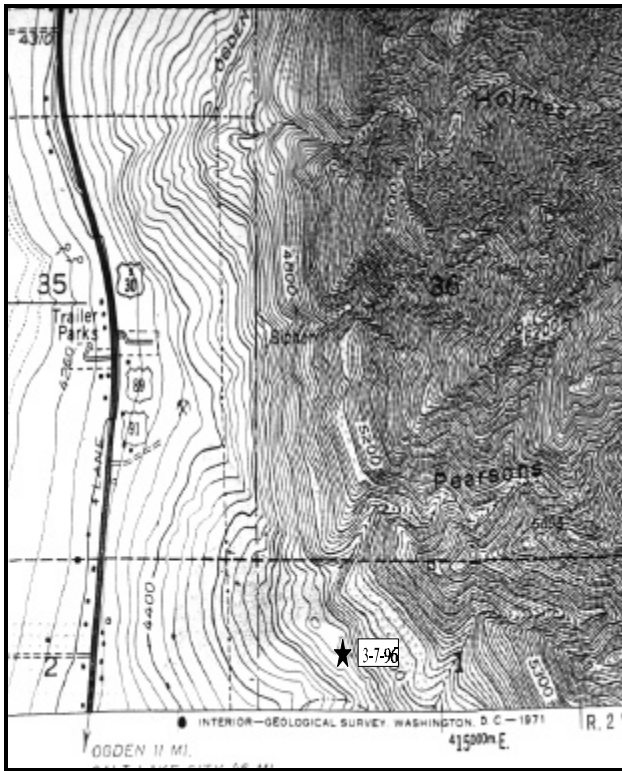
Study site name: Mouth of Pearson's Canyon. Range type: Perennial grass.

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (59ft), line 3 (34 & 71ft).

LOCATION DESCRIPTION

From the junction of Highway 89 and 91 in Brigham City proceed south on 89 for 9.1 miles. Turn left at White's Orchard and travel east for 0.8 miles. Before crossing the canal turn left (north) and proceed 0.8 miles. Turn right and walk across the canal continuing 0.4 miles at a bearing of 29 degrees magnetic to the 0-foot baseline stake. The 0-foot stake is marked by browse tag #7922. The rest of the baseline doglegs off the 0-foot baseline stake at a bearing of 29 degrees magnetic.



Map Name: Willard

Diagrammatic Sketch

Township 7N, Range 8W, Section 1, UTM COOR: 4-15-012E 45-80-879N

DISCUSSION

Trend Study No. 3-7

This study samples critical deer winter range located just south of the mouth of Pearson's Canyon at 4,680 feet elevation. The site has a southwest exposure and a moderately gentle 25% slope. This entire area is characterized by small to medium sized clumps of Gambel oak separated by larger open areas. The site samples an opening surrounded by various sized oak clones. There is little sagebrush to sample here. Sagebrush is more abundant lower on the slope. Judging from pellet group frequency and browse utilization, the intensity of deer use is light. The area, however, contains relatively little available browse to attract deer. Even oak clumps have little available forage. Livestock use is light.

Soil at the site is part of the "Ridd Rock Outcrop Complex." These are shallow, very coarse textured, well-drained soils that formed in alluvium and colluvium from quartzite, gneiss, and schist. Soil reaction is neutral throughout the 24 inch soil profile. Water permeability is moderately rapid with low water holding capability. The result is a soil that often is totally dry in mid-summer (Chadwick et al. 1975). Soils at the site are fairly deep, dry and gravelly with a sandy loam texture and a neutral pH of 6.8. Effective rooting depth (see methods) is estimated at 14 inches with a relatively high soil temperature of nearly 76° F at an average depth of 13 inches. Organic matter is relatively low at 1.3%. The study site has fair plant cover composed of perennial grasses, annual grasses, and weedy forbs. Relatively little browse is present, for total browse cover is barely 1%. The rate of erosion is negligible.

The principle browse species are Wyoming big sagebrush and Gambel oak. The former species constitutes a sparse stand that will probably become even more so in the future. Although existing plants show fair vigor and generally light use, they are currently (1996) so few in number (100 plants/acre) that it is difficult to envision any significant increase due to the competitive nature of the herbaceous understory. Gambel oak occurs as large mature clones that contains little available forage due to its height. Oak shows no sign of expansion or clone enlargement.

Herbaceous composition consists of warm season perennial grasses, annual grasses and forbs, and perennial or biennial weeds. The principle perennial grasses are red three-awn and sand dropseed, both of which are abundant but show no evidence of current or past grazing use. Annual grasses including cheatgrass and rattail fescue which are abundant and account for 79% of the grass cover. The forb composition is extremely poor with common ragweed and hairy goldaster providing 79% of the forb cover. Perennial forbs possessing even moderate forage value are rare.

1984 APPARENT TREND ASSESSMENT

Soil trend seems relatively stable. Although some erosion is apparent it is not serious. Vegetative trend indicators suggest a declining or at best, stable population of Wyoming big sagebrush. Gambel oak clones are self-sustaining and are neither decreasing or expanding. The most likely trend would seem to be a continued increase in weed densities.

1990 TREND ASSESSMENT

Identified as a perennial grass range type in 1984, the area could also be classified as a oak/sagebrush range type. Most openings on the slope support moderately dense stands of sagebrush, a condition lacking on the study site. While it remains sparse, Wyoming big sagebrush increased in density and in the

percentage of seedling and young plants. It is very vigorous with good growth and seed production. The sagebrush do not appear to be browsed and there is no sign of recent deer use. Cows were grazing in the area, apparently for the first time in many years. They prefer sand dropseed, the only palatable herbaceous forage on the site. Dropseed, along with the undesirable three-awn, shows a significant increase in sum of nested frequency since 1984. Other weedy species, especially hairy goldaster and Dyers woad have also increased. One large, mature oak clone was encountered both years. The soil is shallow and loosely compacted. It is easily disturbed and has a high erosion potential. The soil trend currently appears stable. The vegetative trend is more difficult to assess. With the predominance of invader and increaser species, it is contradictory to assess an improving trend for the site even though sagebrush is increasing. Future management of this private rangeland, where an increase in shrubs is an unlikely goal, will have the greatest impact on the site.

TREND ASSESSMENT

soil - stable

browse - upward, but still only about 500 sagebrush per acre

herbaceous understory - downward, most of the species are weedy increasers, especially three-awn, dyers woad, and hairy goldaster

1996 TREND ASSESSMENT

The soil trend is up with a significant decline in percent bare ground (19% to <1%) and an increase in litter cover. Vegetation and litter cover are very abundant, well dispersed and effectively limit erosion. The browse trend appears stable but limited in density. The change in density from 1990 to 1996 is mostly the result of the larger sample used in 1996 because the number of dead in the population cannot explain the drop in the population. Oak appears to be not utilized with a stable population density. The herbaceous understory is poor and dominated by annual grasses and perennial weeds. Cheatgrass and rattail fescue account for 79% of the grass cover while common ragweed and hairy goldaster provide 79% of the forb cover. The only useful species on the site that is fairly common is sand dropseed. Sum of nested frequency of perennial grasses and forbs declined since 1990. Trend is considered down.

TREND ASSESSMENT

soil - up

browse - stable but very low population

herbaceous understory - down and in poor condition and composition

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 7

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Aristida longiseta longiseta	_a 161	_b 212	_c 115	70	83	53	4.99
G	Bromus tectorum (a)	-	-	384	-	-	100	26.94
G	Festuca myuros (a)	-	-	139	-	-	48	2.77
G	Poa bulbosa	-	1	-	-	1	-	-
G	Poa pratensis	-	2	-	-	1	-	-
G	Poa secunda	5	10	3	2	5	1	.03
G	Sporobolus cryptandrus	_a 35	_{ab} 50	_b 81	18	22	35	2.69

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
	Total for Grasses	201	275	722	90	112	237	37.43
F	<i>Alyssum alyssoides</i> (a)	-	-	11	-	-	5	.02
F	<i>Ambrosia artemisifolia</i>	_a 226	_b 61	_b 101	80	29	44	3.47
F	<i>Artemisia ludoviciana</i>	19	15	26	7	5	9	1.10
F	<i>Astragalus utahensis</i>	_a 14	_b 6	_b -	8	3	-	.21
F	<i>Cuscuta</i> spp.	-	-	-	-	-	-	.03
F	<i>Erodium cicutarium</i> (a)	-	-	47	-	-	18	.29
F	<i>Euphorbia</i> spp.	_a -	_a -	_b 23	-	-	13	.29
F	<i>Heterotheca villosa</i>	_a 70	_b 206	_a 81	32	79	40	6.87
F	<i>Isatis tinctoria</i>	_a -	_b 63	_a 7	-	27	3	.10
F	<i>Lactuca serriola</i>	-	7	-	-	3	-	-
F	<i>Lygodesmia grandiflora</i>	_a -	_a -	_b 13	-	-	7	.67
F	<i>Tragopogon dubius</i>	-	-	1	-	-	1	.00
	Total for Forbs	329	358	310	127	146	140	13.06

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

BROWSE TRENDS --

Herd unit 03 , Study no: 7

T y p e	Species	Strip Frequency '96	Average Cover % '96
B	<i>Artemisia tridentata</i> <i>wyomingensis</i>	4	.93
B	<i>Opuntia fragilis</i>	8	.15
	Total for Browse	12	1.08

BASIC COVER --

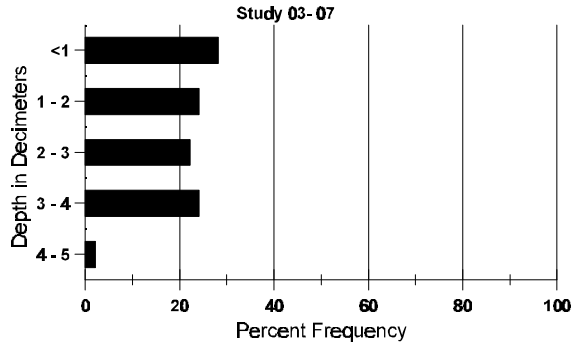
Herd unit 03 , Study no: 7

Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	393	9.50	14.00	56.20
Rock	228	7.00	8.00	11.60
Pavement	161	16.00	13.00	2.90
Litter	395	54.00	46.25	59.95
Cryptogams	23	0	0	.10
Bare Ground	66	13.50	18.75	.53

SOIL ANALYSIS DATA --
 Herd Unit 03, Study no: 7

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
14.1	75.8 (12.8)	6.8	77.6	10.4	12.0	1.3	13.8	105.6	.4

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 03 , Study no: 7

Type	Quadrat Frequency '96
Rabbit	4
Deer	3
Cattle	1

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 7

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata wyomingensis</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	4	-	-	1	-	-	-	-	-	5	-	-	-	166		5	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	1	-	-	-	-	-	-	-	-	1	-	-	-	33		1	
	90	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	1	-	-	-	-	-	-	-	1	-	-	-	33	24	39	1
	90	9	-	-	-	-	-	-	-	-	8	-	1	-	300	26	20	9
	96	1	3	-	-	-	-	-	-	-	4	-	-	-	80	22	48	4
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:	-			
												'90	466		-			
												'96	100		-			
<i>Chrysothamnus nauseosus albicaulis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	37	72	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Opuntia fragilis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	1	-	1	-	66		2	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	33	5	9	1
	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200	7	14	10
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	99		-			
												'96	220		-			
<i>Quercus gambelii</i>																		
M	84	-	-	-	-	1	-	-	-	-	1	-	-	-	33	69	61	1
	90	-	-	-	-	-	-	1	-	-	1	-	-	-	33	98	106	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	38	46	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	33	Dec:	-			
												'90	33		-			
												'96	0		-			

TREND STUDY 3-8-96

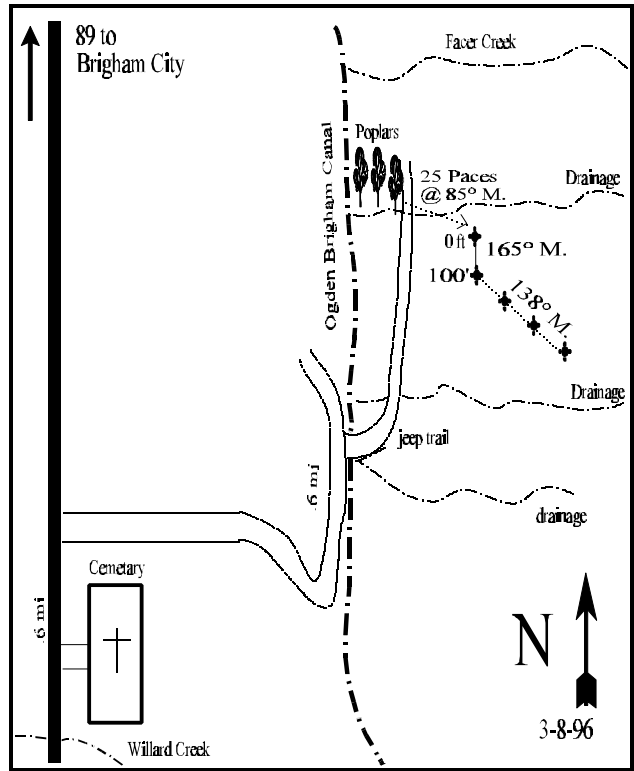
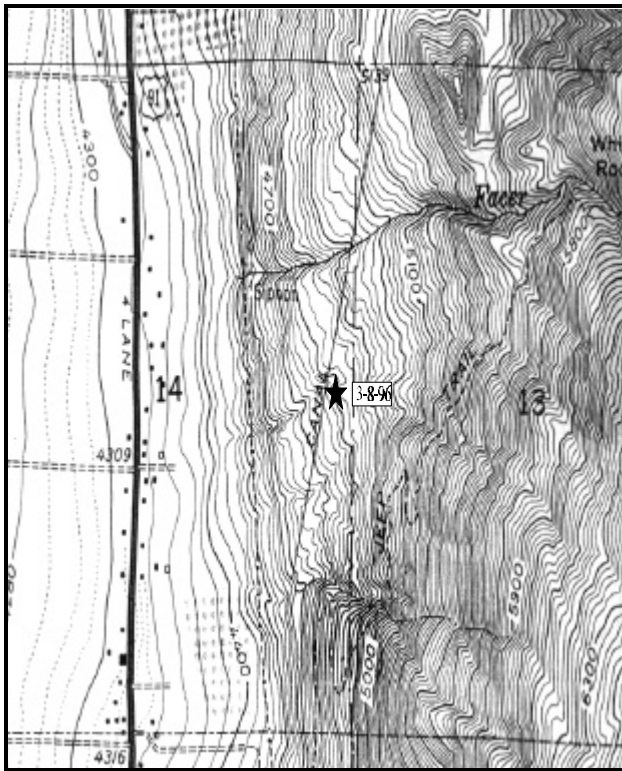
Study site name: Facer Canyon . Range type: Big sagebrush .

Compass bearing: frequency baseline 165 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Willard, proceed north on US 89 to Willard Creek and begin to note mileage. Proceed north 0.6 miles to a private road just south of marker 367 and turn right. Proceed to the Ogden/Brigham canal, turn left on west side of canal and proceed north 0.6 miles to a flood water bridge. Park here and walk across bridge, turn left (north) and follow trail approximately 0.25 miles crossing one wash and stopping at second wash. From the poplar trees on north side of wash, walk 25 paces at 85 degrees magnetic to the 0-foot baseline stake.



Map Name: Willard

Diagrammatic Sketch

Township 8N , Range 2W , Section 14 , UTM COOR: 4-14-218E 45-87-031N

DISCUSSION

Trend Study No. 3-8

This study site, located on the upper Lake Bonneville terrace, slopes gently (15%) to the west at an elevation of 4,800 feet. Like much of the Brigham City-Willard face, this area is critical deer winter range. Deer use, as estimated from pellet group frequency and browse utilization in 1984 and 1990, was light or at most moderate. No deer or elk pellet groups were encountered in 1996. The dominant range type is a mixed population of basin and mountain big sagebrush with a herbaceous understory composed principally of annual forbs and grasses, a few perennial or biennial weeds, and a sparse cover of perennial grass.

Soil is "Wasatch Gravelly Sandy Loam," similar to that described in the write-up for study number 3-6. This is a deep, well drained soil with good potential for producing range forage. Although the upper horizons often become very dry in summertime, potential rooting depth is great enough to allow deeper rooted species uninterrupted access to available water (Chadwick et al. 1975). Soils at the site have a sandy clay loam texture with a neutral pH of 6.8. The soil is extremely gravelly with an effective rooting depth (see methods) estimated at almost 12 inches. Soil temperature is moderately high, averaging nearly 72° F at an average depth of over 15 inches. The site supports abundant vegetation and litter cover which adequately protects the soil from erosion.

Browse composition consisted of a dominant population of mixed basin and mountain big sagebrush and scattered plants of broom snakeweed and white rubber rabbitbrush in 1984 and 1990. The sagebrush was classified as all basin big sagebrush (*Artemisia tridentata tridentata*) in 1984. During the 1990 reading the sagebrush was classified as both basin big sagebrush and mountain big sagebrush (*A. tridentata vaseyana*). The big sagebrush varied in size from new seedlings, of which there are many, to mature plants in excess of four feet high. A large number of established seedlings (i.e., 2-3 years old) in comparison to decadent plants suggests that the population was at least maintaining itself if not actually increasing in density. However, given the size of mature plants it is difficult to see how the stand could become more dense. Utilization varied between individual shrubs from light to moderate and overall vigor was good.

The site burned during the summer of 1995 which eliminated all of the browse on the site. There was evidently no rehabilitation effort after the fire and there are no remnant sagebrush near or on site.

As of 1990, the herbaceous cover was relatively high, but composition was poor. The area was characterized by a dense growth of annual grasses and forbs as well as perennial and biennial weeds. Perennial grasses, represented mainly by bearded bluebunch wheatgrass and red three-awn, were common but were far outnumbered and outproduced by broad-leaved plants. Undesirable increaser and invader species such as common ragweed, autumn willowweed, dyers woad, and annual brome-grasses comprised the bulk of understory biomass. After the fire, annual grasses, annual forbs, and weeds totally dominate the site. Japanese brome, cheatgrass, and rattail fescue account for 98% of the grass cover, while storksbill, dyers woad, prickly lettuce, and common sunflower provide 92% of the forb cover. Bluebunch wheatgrass is currently the only desirable perennial grass found on the site. However, it is uncommon and had a quadrat frequency of only 1% in 1996.

1984 APPARENT TREND ASSESSMENT

Soil trend, on the study site, appears stable but this entire area is subject to high flows in stream channels that originate higher up the mountain. High spring flows in these channels are extremely destructive and result in very deep and

narrow gullies. Sheet erosion does not seem a serious problem at this time. However, large scale slippage and mud slides are a distinct possibility. From a vegetative standpoint, the dominant sagebrush population appears stable or even increasing. The herbaceous understory is comprised of a dense cover of annuals and other weeds which dry up very early in the season and provide abundant fuel capable of carrying a potentially destructive fire.

1990 TREND ASSESSMENT

The dense sagebrush stand on the sampled terrace has increased. Seedling and young shrubs make up 50% of the population. Sagebrush canopy cover is 28%. The abundant browse forage is virtually unutilized, and there is very little sign of big game. While bluebunch wheatgrass was more prevalent in 1990, the understory remains in a depleted condition dominated by weedy species.

TREND ASSESSMENT

soil - stable

browse - upward

herbaceous understory - downward, composition is mostly weeds and they are increasing, especially dyers woad; weedy understory could easily carry a destructive fire

1996 TREND ASSESSMENT

A fire burned the site during the summer of 1996. All browse species were eliminated and the herbaceous understory is dominated by annual grasses, annual forbs, and weeds. Soil trend is still stable even though percent bare ground and percent litter cover declined. The herbaceous vegetation cover and litter are abundant and well dispersed. Erosion is currently not a problem. The browse trend is down and totally absent. There are no signs of any browse in the immediate area. Due to the thick herbaceous understory dominated by annuals and weeds, shrub establishment will be difficult. The only effective way to reestablish sagebrush or other shrubs on the site would be to transplant them. Currently, with no browse species, this site is insignificant as big game winter range. Trend for the herbaceous understory is down. Abundance of grasses and forbs are up but the composition is extremely poor.

TREND ASSESSMENT

soil - stable

browse - down, absent due to fire

herbaceous understory - down and totally dominated by annuals and weeds

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 8

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	a-	b12	a3	-	6	1	.03
G	Bromus japonicus (a)	-	-	255	-	-	90	10.21
G	Bromus tectorum (a)	-	-	147	-	-	50	6.07
G	Festuca myuros (a)	-	-	53	-	-	22	.89
G	Poa bulbosa	a-	ab5	b16	-	2	6	.30
Total for Grasses		0	17	474	0	8	169	17.51

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	Achillea millefolium	1	3	-	1	1	-	-
F	Agoseris glauca	a-	b7	a-	-	4	-	-
F	Alyssum alyssoides (a)	-	-	57	-	-	23	.44
F	Ambrosia psilostachya	42	49	27	15	19	14	.45
F	Collinsia parviflora (a)	-	-	10	-	-	5	.10
F	Epilobium brachycarpum (a)	-	-	7	-	-	4	.14
F	Erodium cicutarium (a)	-	-	264	-	-	86	16.23
F	Galium aparine (a)	-	-	22	-	-	10	.12
F	Helianthus annuus (a)	-	-	28	-	-	16	1.20
F	Holosteum umbellatum (a)	-	-	87	-	-	35	.35
F	Isatis tinctoria	a13	b134	b124	7	62	54	6.86
F	Lactuca serriola	a-	a2	b52	-	2	24	1.68
F	Lithospermum ruderale	-	1	-	-	1	-	-
F	Melilotus officinalis	-	-	2	-	-	1	.03
F	Microsteris gracilis (a)	3	-	5	1	-	3	.04
F	Polygonum douglasii (a)	-	-	3	-	-	3	.02
F	Rumex spp.	-	-	1	-	-	1	.15
F	Taraxacum officinale	1	-	-	1	-	-	-
F	Tragopogon dubius	a34	ab25	b18	19	9	10	.40
F	Unknown forb-annual	-	-	4	-	-	2	.01
F	Veronica biloba (a)	-	-	5	-	-	2	.03
Total for Forbs		94	221	716	44	98	293	28.30

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

BASIC COVER --

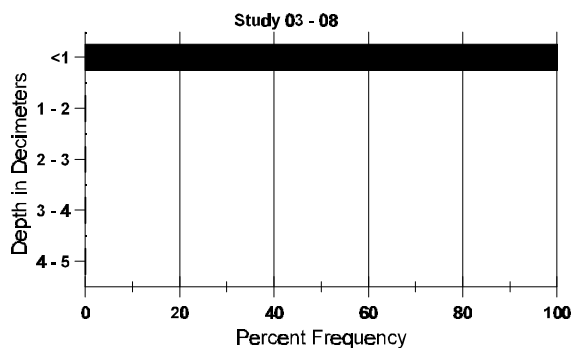
Herd unit 03 , Study no: 8

Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	353	1.00	5.25	49.09
Rock	122	.50	0	3.29
Pavement	251	3.25	6.25	7.67
Litter	384	95.00	85.75	24.46
Cryptogams	-	0	0	0
Bare Ground	211	.25	2.75	7.08

SOIL ANALYSIS DATA --
 Herd Unit 03, Study no: 8

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.6	71.6 (15.6)	6.8	53.7	24.0	22.3	2.7	19.8	256.0	.5

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 03 , Study no: 8

Type	Quadrat Frequency '96
Rabbit	3

BROWSE CHARACTERISTICS --
 Herd unit 03 , Study no: 8

AGE	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Artemisia tridentata tridentata																		
S	84	92	-	-	-	-	-	-	-	-	92	-	-	-	6133		92	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	2	3	-	-	-	-	-	-	-	5	-	-	-	333		5	
	90	23	-	-	7	-	-	-	-	-	27	-	3	-	2000		30	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	8	8	-	-	-	-	-	-	16	-	-	-	1066	48	55	16
	90	16	4	-	1	1	-	-	-	-	22	-	-	-	1466	39	29	22
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	1	2	8	-	-	-	-	-	-	9	-	2	-	733		11	
	90	10	1	-	-	-	-	-	-	-	8	-	2	1	733		11	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	2132	Dec:	34%			
												'90	4199		17%			
												'96	0		0%			

A G E	YR	Form Class (No. of 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	23	-	-	-	-	-	-	-	-	23	-	-	-	1533		23	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	10	-	-	-	-	-	1	-	-	11	-	-	-	733		11	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	26	-	-	-	-	-	-	-	-	26	-	-	-	1733	24	20	26
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	5	-	-	1	-	-	-	-	-	6	-	-	-	400		6	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	2040		102	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	2866		14%			
												'96	0		0%			
<i>Chrysothamnus nauseosus</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200	31	21	3
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	37	26	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	3	-	-	1	-	-	-	-	-	3	-	1	-	266		4	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	200	Dec:	0%			
												'90	465		57%			
												'96	0		0%			
<i>Gutierrezia sarothrae</i>																		
S	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	14	-	-	-	-	-	-	-	-	14	-	-	-	933		14	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	33	-	-	-	-	-	-	-	-	33	-	-	-	2200	16	14	33
	90	12	-	-	-	-	-	-	-	-	12	-	-	-	800	13	10	12
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	9	-	-	-	-	-	-	-	-	8	-	-	1	600		9	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	3133	Dec:	0%			
												'90	1400		43%			
												'96	0		0%			

TREND STUDY 3-9-96

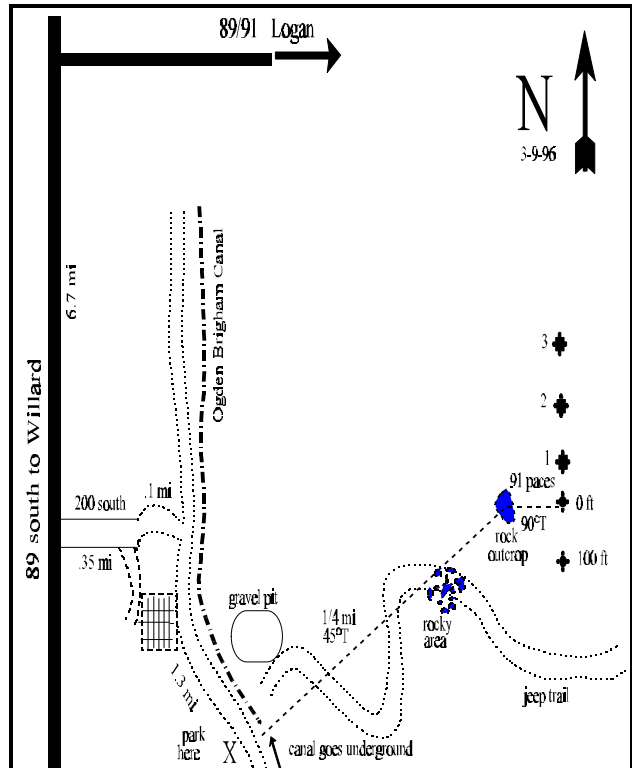
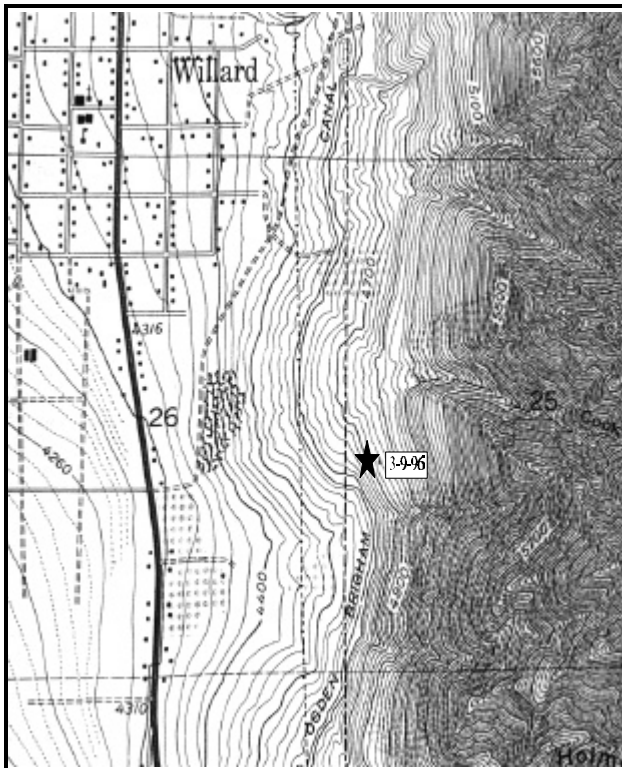
Study site name: Cooks Canyon. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 162 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Proceed south 6.6 miles on US 89 from the intersection of US-89/91 in Brigham City. Turn left (east) on 700 South (south of Willard) and go 0.6 miles to a gravel pit and the Ogden/Brigham Canal. From the point where the canal goes underground, take an azimuth of 45°T and walk approximately ¼ mile up the steep slope to a large rock outcrop. From the rock, take an azimuth of 90°T and walk 91 paces to the 0-foot stake of the frequency baseline, marked with a browse tag #7924.



Map Name: Willard

Diagrammatic Sketch

Township 8N, Range 2W, Section 25, UTM COOR: 4-14-632E 45-83-688N

DISCUSSION

Trend Study No. 3-9

This study is situated on a west-facing slope at 4,760 feet elevation, just south of Cook Canyon. The plant community is a mountain big sagebrush type with scattered white rubber rabbitbrush. It also contains widely scattered Utah juniper and Gambel oak clones. A sparse understory consists of warm season perennial grasses, annual grasses, and a few broadleaf weeds. The 35% to 45% slope is steep enough to contribute to some soil instability and erosion. Deer pellet groups occurred frequently in 1984 and overall browse utilization was relatively heavy, suggesting that the area was an important wintering site with the critical winters of 1983-84. Two winter killed carcasses from those winters were found nearby. Deer use on available browse was light in 1990 and 1996. Deer pellet groups had a quadrat frequency of only 8% in 1996.

The soil is "Wasatch Cobbly Sandy Loam" with a gravelly subsoil. The surface layer averages 17 inches in thickness, but is underlain by a highly permeable subsoil extending to below five feet in depth. Drainage is excessive and water holding capacity is poor. During the mid-summer period, the top 35 to 40 inches often is completely dry. The erosion hazard for this soil is moderate (Chadwick et al. 1975). The study site is very rocky and has incomplete plant cover. Soil at the site has a sandy loam texture with a moderately acidic pH of 6.0. The soil is rocky with abundant gravel throughout the profile. Soil temperature is high, averaging 75.6° F at a depth of 10 inches. Erosion is moderately severe as evidenced by the prevalence of erosion pavement, gullies, rills, and plant pedestaling.

The key browse species is mountain big sagebrush. Other shrubs include a small population of broom snakeweed, an occasional mature white rubber rabbitbrush, a few junipers, and isolated patches of Gambel oak and bigtooth maple. Upon first inspection in 1984, mountain big sagebrush seemed a rather sparse and slightly decadent stand. Closer examination, however, revealed the presence of abundant seedlings (5,800 per acre). The previous two or three years (1981-82) must have been highly favorable for seedling establishment. This same trend was apparent at several other locations along the front. However, apparently few of the abundant seedlings encountered in 1984 survived. During the 1990 reading, population density remained similar to 1984 estimates (2,399 and 2,599 plants/acre). Utilization was light and decadence relatively low at 20%. By 1996, population density declined slightly yet the number of mature plants was similar at 1,460 plants/acre. The largest decline came from the decadent age class which fell from 533 plants/acre to only 180 plants/acre. As a result, percent decadency declined to only 9%. Utilization was light and vigor normal. Seed production was extremely good in 1996.

Like many sites along the front, the herbaceous understory on this site is dominated by annuals and weedy perennial forbs. Annual brome species and rattail fescue combine to produce 87% of the grass cover on the site. The only moderately abundant perennial species consists of purple threeawn, a warm season increaser. Bluebunch wheatgrass, mutton grass, Sandberg bluegrass, and sand dropseed also grow on the site, but in small numbers. Forbs are fairly diverse yet produce only 2% cover. The most common perennial species consist of dyers woad, Louisiana sagebrush, and fleabane.

1984 APPARENT TREND ASSESSMENT

This site appears to have an unacceptable rate of soil erosion. For this reason, soil trend must be judged as declining. Plant composition may be at a turning point. The established mountain big sagebrush community appears decadent but could be rejuvenated by a large population of seedlings. If these succeed, they

will ensure the continued dominance of big sagebrush. Herbaceous composition is somewhat depleted but seems relatively stable.

1990 TREND ASSESSMENT

Trend for big sagebrush is stable. Seedlings were 71% of the population in 1984. In 1990, the stand is dominated by a slightly increased density of mature shrubs. The number of decadent plants declined while the number of young increased. Sagebrush canopy cover was estimated at 14%. The understory is largely cheatgrass, but there is a significant amount of muttongrass, three-awn, and bluebunch wheatgrass. Sum of nested frequency for perennial grasses, and forbs increased since 1984, yet composition is still poor.

TREND ASSESSMENT

soil - stable

browse - up

herbaceous understory - up slightly but poor composition

1996 TREND ASSESSMENT

The soil trend is up due to a decline in percent bare ground from 7% to 1%. Some erosion is still occurring, however herbaceous vegetation and litter cover are abundant and well dispersed. Trend for sagebrush is stable. Total density has declined slightly but the decrease comes primarily from the decadent age class. Utilization is light, vigor normal, and percent decadence low at 9%. Trend for the herbaceous understory is down. Composition is poor and sum of nested frequency for perennial grasses has declined by 58%. Currently annual grasses account for 87% of the grass cover. Forbs are limited and also dominated by annuals and weedy species.

TREND ASSESSMENT

soil - up

browse - stable

herbaceous understory - down

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 9

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	a18	b37	a15	11	14	6	.81
G	Aristida purpurea	a208	a184	b76	76	70	31	2.40
G	Bromus japonicus (a)	-	-	8	-	-	2	.18
G	Bromus tectorum (a)	-	-	350	-	-	97	23.83
G	Festuca myuros (a)	-	-	145	-	-	52	2.98
G	Poa bulbosa	a2	a-	b9	1	-	6	.13
G	Poa fendleriana	a27	b130	a9	13	61	3	.09
G	Poa secunda	a-	a-	b28	-	-	17	.44
G	Sporobolus cryptandrus	7	5	13	4	3	6	.18
Total for Grasses		262	356	653	105	148	220	31.06
F	Achillea millefolium	-	-	3	-	-	1	.00

T Y P e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	<i>Artemisia ludoviciana</i>	a6	ab15	b25	3	6	12	.73
F	<i>Collinsia parviflora</i> (a)	-	-	2	-	-	1	.00
F	<i>Epilobium brachycarpum</i> (a)	-	-	22	-	-	10	.10
F	<i>Erodium cicutarium</i> (a)	-	-	7	-	-	3	.01
F	<i>Erigeron</i> spp	a-	a-	b16	-	-	7	.66
F	<i>Euphorbia</i> spp.	-	-	14	-	-	6	.22
F	<i>Helianthus annuus</i> (a)	-	5	-	-	5	-	.00
F	<i>Holosteum umbellatum</i> (a)	-	-	5	-	-	2	.01
F	<i>Isatis tinctoria</i>	a-	b13	c33	-	7	16	.37
F	<i>Lactuca serriola</i>	-	-	-	-	-	-	.00
F	<i>Microsteris gracilis</i> (a)	-	-	4	-	-	2	.01
F	<i>Phlox longifolia</i>	a-	b11	ab7	-	5	2	.01
F	<i>Senecio multilobatus</i>	-	-	4	-	-	2	.06
F	<i>Sisymbrium altissimum</i> (a)	-	-	1	-	-	1	.00
F	<i>Tragopogon dubius</i>	a7	b-	ab2	4	-	1	.00
Total for Forbs		13	44	145	7	23	66	2.24

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

BROWSE TRENDS --

Herd unit 03 , Study no: 9

T Y P e	Species	Strip Frequency '96	Average Cover % '96
B	<i>Artemisia tridentata</i> <i>vaseyana</i>	64	19.13
B	<i>Chrysothamnus</i> <i>nauseosus albicaulis</i>	3	.15
B	<i>Chrysothamnus</i> <i>viscidiflorus</i> <i>stenophyllus</i>	0	.00
B	<i>Gutierrezia sarothrae</i>	7	.96
B	<i>Quercus gambelii</i>	1	.63
Total for Browse		75	20.88

BASIC COVER --

Herd unit 03 , Study no: 9

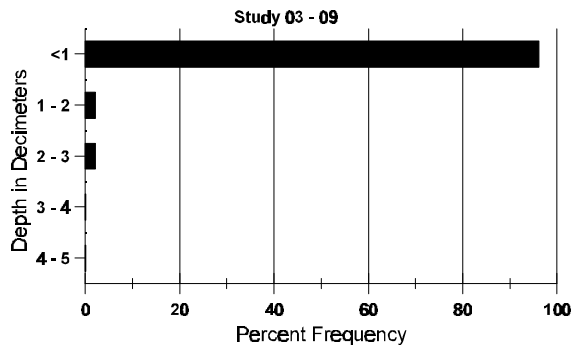
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	364	2.25	17.00	53.98
Rock	230	20.50	14.25	21.08
Pavement	77	8.50	5.50	.55
Litter	375	66.50	56.25	47.18
Cryptogams	35	.25	.50	.50
Bare Ground	88	2.00	6.50	.85

SOIL ANALYSIS DATA --

Herd Unit 03, Study no: 9

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
8.9	75.6 (10.1)	6.0	54.7	26.0	19.3	1.8	13.5	131.2	.4

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 03 , Study no: 9

Type	Quadrat Frequency '96
Rabbit	4
Deer	8

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 9

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
S	84	87	-	-	-	-	-	-	-	-	87	-	-	-	5800		87	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	84	1	-	1	-	-	-	-	-	-	2	-	-	-	133		2	
	90	6	-	-	-	-	-	-	-	6	-	-	-	400		6		
	96	13	-	-	-	-	-	-	-	13	-	-	-	260		13		
M	84	-	1	21	-	-	-	-	-	-	22	-	-	-	1466	23 39	22	
	90	25	-	-	-	-	-	-	-	25	-	-	-	1666	24 32	25		
	96	71	2	-	-	-	-	-	-	73	-	-	-	1460	27 47	73		
D	84	-	1	11	-	-	-	-	-	-	9	1	2	-	800		12	
	90	8	-	-	-	-	-	-	-	-	-	3	3	2	533		8	
	96	7	2	-	-	-	-	-	-	-	8	-	-	1	180		9	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	520		26	
Total Plants/Acre (excluding Dead & Seedlings)											'84	2399	Dec:	33%				
											'90	2599		21%				
											'96	1900		9%				
<i>Chrysothamnus nauseosus albicaulis</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	84	1	-	-	-	-	-	-	-	-	1	-	-	-	66	21 22	1	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	25 31	1	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	38 63	2	
Total Plants/Acre (excluding Dead & Seedlings)											'84	66	Dec:	-				
											'90	66		-				
											'96	60		-				
<i>Gutierrezia sarothrae</i>																		
S	84	5	-	-	-	-	-	-	-	-	5	-	-	-	333		5	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	32	-	-	-	-	-	-	-	-	32	-	-	-	2133	15 14	32	
	90	12	-	-	-	-	-	-	-	-	12	-	-	-	800	10 11	12	
	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220	14 20	11	
Total Plants/Acre (excluding Dead & Seedlings)											'84	2133	Dec:	-				
											'90	800		-				
											'96	220		-				
<i>Opuntia fragilis</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	7 19	0	
Total Plants/Acre (excluding Dead & Seedlings)											'84	0	Dec:	-				
											'90	0		-				
											'96	0		-				

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Quercus gambelii																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60	-	-	3
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	60		-			
Unknown browse																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	48	75	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			

TREND STUDY 3-10-96

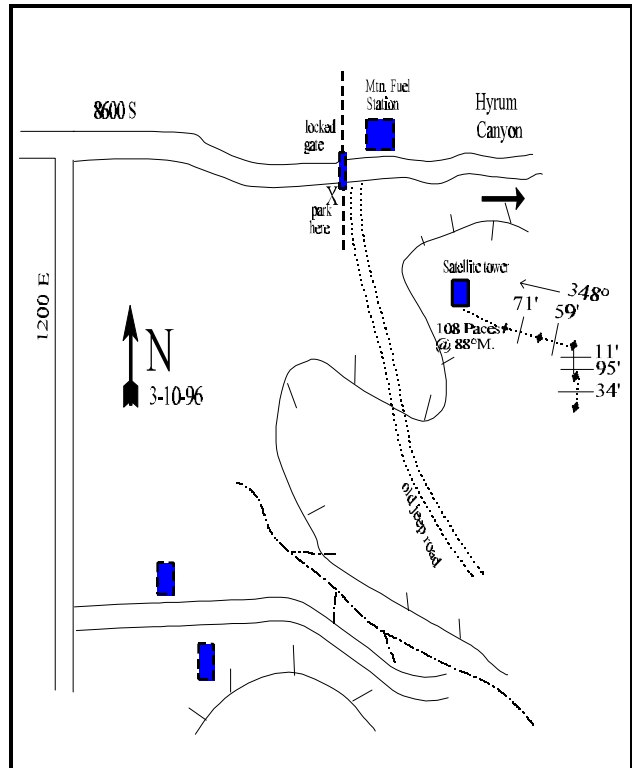
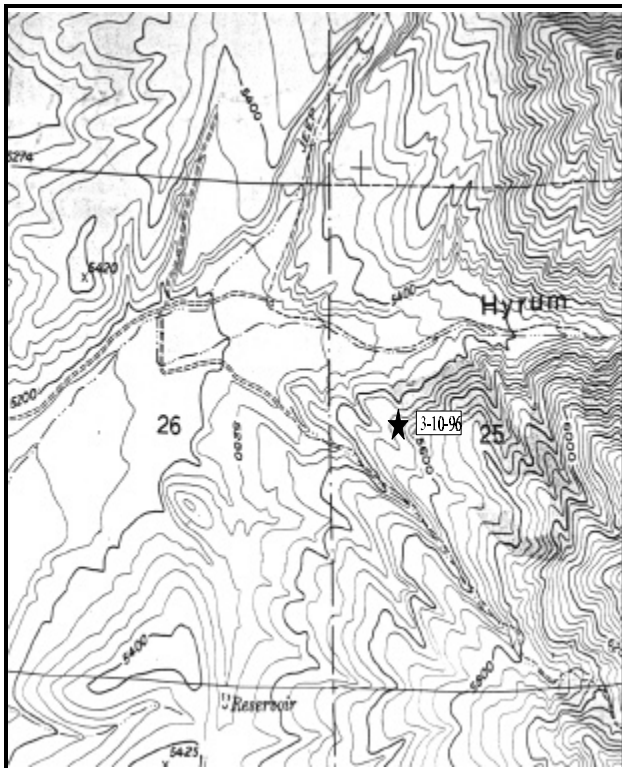
Study site name: Hyrum Canyon. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 129 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Drive east from the town of Paradise to the intersection of 1200 East and 8600 South. Continue east towards Hyrum Canyon for 0.5 miles to a Mountain Fuel station and a locked gate. Park here and walk approximately ½ mile southeast up on the sagebrush bench to a satellite receiving tower. From this reflector walk 108 paces bearing 88° to the 400-foot baseline stake on the end of the dog leg, located by a small maple. The 0-foot stake is located 200 feet at a bearing of 168°. This stake is marked by browse tag #7981. Lines one and two run from the 0-foot stake at a bearing of 129° while lines three and four are run from the 0-foot stake at a bearing of 348 degrees magnetic.



Map Name: Paradise

Diagrammatic Sketch

Township 10N, Range 1E, Section 25

DISCUSSION

Trend Study No. 3-10

This study samples a mountain big sagebrush-grass community located east of Paradise in Hyrum Canyon at an elevation of 5,560 feet. The study site is considered critical deer winter range. Slope is gentle (15%) and faces southwest. This area supports a dense and vigorous stand of mountain big sagebrush that has sustained moderate to heavy use from deer, domestic sheep, horses, and cattle in the past. Currently there is no sign of any domestic grazing and no wildlife pellet groups were encountered. Understory composition has been unfavorably influenced by past heavy grazing practices.

Soil is "Nebeker Silt Loam," an alluvially deposited, well-drained soil derived from sandstone, quartzite and shale. This soil is moderately deep and slightly acidic but becomes increasingly clayey and calcareous at depths greater than four feet. Water holding capability, permeability, and erosion hazard are all moderate. Dry farmed cropland is a principal use of Nebeker soil (Erickson and Mortensen 1974). Soils at the site have a clay loam texture with a slightly acid pH of 6.4. Effective rooting depth (see methods) is estimated at almost 16 inches. Due to the gentle slope and good plant cover, the site shows few signs of erosion.

Browse composition consists almost exclusively of mountain big sagebrush. Vigor, even of decadent plants, is good. Population density has remained stable at around 3,000 plants/acre since 1984. Utilization was heavy in 1984, but mostly light use in 1990 and 1996. Percent decadence is moderately low at 15%. Seedlings were extremely abundant in 1990 (14,466 per acre) but none were encountered in 1996. The abundant herbaceous understory and prolonged drought combined to reduce seedling establishment and survival.

The understory has been depleted as a result of past sheep, cattle, and horse use. Although perennial grasses are present, they are inferior in both numbers and production to invader and increaser forbs and annual grasses. Annual grasses consisting of Japanese brome and cheatgrass provide 91% of the grass cover. Perennial grasses include Kentucky bluegrass, Sandberg bluegrass, bluebunch wheatgrass, slender wheatgrass, and bulbous bluegrass. Forbs are diverse and abundant, producing nearly as much cover as the grasses. Desirable perennial and biennial forbs however are rare. Among the less desirable forbs are curlycup gumweed, autumn willowweed, common ragweed, annual sunflower, dyers woad, tarweed, and spreading fleabane daisy.

1984 APPARENT TREND ASSESSMENT

Soil is deep and fertile and shows few signs of serious erosion in spite of some trampling and compaction by livestock. Trend appears stable. Vegetative trend is stable with respect to the key browse species but slightly down for understory composition.

1990 TREND ASSESSMENT

The mountain big sagebrush has excellent vigor, good reproduction, and light hedging. From a population that was classified as 44% decadent yet stable in 1984; sagebrush values for density have increased slightly. The dense and healthy understory of Kentucky bluegrass increased in frequency. Vegetative cover increased and the percentage of bare soil decreased to 9%.

TREND ASSESSMENT

soil - slightly up

browse - up for the key species, mountain big sagebrush

herbaceous understory - slightly downward because of the large quantities of weedy increaser species and annuals

1996 TREND ASSESSMENT

The soil trend is up due to a notable decline in bare ground (9% to 1%) and a large increase in litter cover (55% to 80%). Vegetation and litter cover are very abundant and almost completely protect the ground surface. No erosion is evident. Trend for sagebrush is stable. It appears that the sagebrush population has reached its density limit. Most plants appear unutilized and vigorous with abundant seed production. Percent decadence is moderately low at 15%. The herbaceous understory is very abundant producing nearly 50% cover split nearly evenly between grasses and forbs. Unfortunately, 91% of the grass cover comes from annual brome grasses (Japanese brome and cheatgrass). Sum of nested frequency for the most common perennial grass in 1990, Kentucky bluegrass, has declined 72%. It currently has a quadrat frequency of only 15%. Forbs are diverse and productive, yet the composition is extremely poor. The most common perennial species include willowweed, curlycup gumweed, tarweed, Louisiana sage, western yarrow, dyers woad, prickly lettuce, and yellow salsify. Sum of nested frequency of perennial grasses has declined while sum of nested frequency for perennial forbs has remained similar. Trend is considered down.

TREND ASSESSMENT

soil - up

browse - stable

herbaceous understory - down with an extremely poor composition

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 10

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron intermedium	a-	b12	a-	-	4	-	-
G	Agropyron spicatum	11	7	9	4	3	4	.19
G	Agropyron trachycaulum	a-	a2	b15	-	2	7	.80
G	Bromus japonicus (a)	-	-	359	-	-	99	22.79
G	Bromus tectorum (a)	-	-	55	-	-	19	2.61
G	Poa bulbosa	a-	b24	a5	-	9	3	.04
G	Poa pratensis	a104	a130	b37	45	53	15	1.18
G	Poa secunda	a-	b10	b17	-	5	10	.27
Total for Grasses		115	185	497	49	76	157	27.90
F	Achillea millefolium	60	71	76	21	27	30	2.12
F	Agoseris glauca	ab6	a13	b-	3	5	-	-
F	Alyssum alyssoides (a)	-	-	10	-	-	4	.02
F	Artemisia ludoviciana	17	17	11	5	5	4	1.31
F	Cirsium spp.	-	3	-	-	2	-	-
F	Collomia linearis (a)	-	-	1	-	-	1	.00
F	Collinsia parviflora (a)	-	-	8	-	-	3	.04
F	Cryptantha spp.	a-	a-	b42	-	-	17	.50
F	Descurainia pinnata	-	-	5	-	-	2	.01

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	<i>Epilobium brachycarpum</i> (a)	-	-	225	-	-	79	8.24
F	<i>Erigeron</i> spp	-	-	2	-	-	2	.33
F	<i>Galium aparine</i> (a)	-	-	72	-	-	30	.93
F	<i>Gilia aggregata</i>	a-	b6	a-	-	4	-	-
F	<i>Grindelia squarrosa</i>	ab98	a125	b72	37	53	28	4.13
F	<i>Hackelia patens</i>	a20	b39	ab34	10	21	18	.54
F	<i>Holosteum umbellatum</i> (a)	-	-	3	-	-	1	.00
F	<i>Isatis tinctoria</i>	a-	a-	b34	-	-	17	.89
F	<i>Lappula occidentalis</i> (a)	-	-	14	-	-	6	.05
F	<i>Lactuca serriola</i>	a-	a-	b50	-	-	22	.71
F	<i>Lupinus caudatus</i>	-	1	-	-	1	-	-
F	<i>Madia glomerata</i> (a)	-	-	15	-	-	8	.09
F	<i>Microsteris gracilis</i> (a)	-	-	4	-	-	2	.01
F	<i>Penstemon</i> spp.	-	-	2	-	-	1	.00
F	<i>Phlox longifolia</i>	-	-	3	-	-	1	.00
F	<i>Polygonum douglasii</i> (a)	-	-	45	-	-	18	.21
F	<i>Taraxacum officinale</i>	-	4	-	-	2	-	-
F	<i>Tragopogon dubius</i>	40	42	37	24	23	17	.55
F	Unknown forb-perennial	a-	b8	a-	-	6	-	-
F	<i>Veronica biloba</i> (a)	-	-	7	-	-	2	.03
F	<i>Viola</i> spp.	a-	b11	a-	-	4	-	-
F	<i>Zigadenus paniculatus</i>	-	-	5	-	-	3	.01
Total for Forbs		241	340	777	100	153	316	20.79

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

BROWSE TRENDS --

Herd unit 03 , Study no: 10

Type	Species	Strip Frequency '96	Average Cover % '96
B	<i>Acer grandidentatum</i>	1	.03
B	<i>Artemisia tridentata vaseyana</i>	91	24.34
B	<i>Gutierrezia sarothrae</i>	1	.15
B	<i>Juniperus scopulorum</i>	1	.85
Total for Browse		94	25.37

BASIC COVER --

Herd unit 03 , Study no: 10

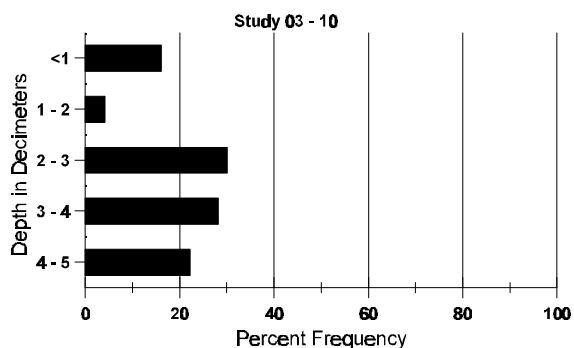
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	383	2.25	35.50	62.45
Rock	41	0	0	.20
Pavement	44	1.00	.75	.18
Litter	399	82.50	55.25	79.99
Cryptogams	3	.25	0	.00
Bare Ground	60	14.00	8.50	1.22

SOIL ANALYSIS DATA --

Herd Unit 03, Study no: 10

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
15.5	58.6 (17.4)	6.4	27.9	36.1	36.0	4.5	23.6	262.4	.6

Stoniness Index



BROWSE CHARACTERISTICS --

Herd unit 03 , Study no: 10

A G E	YR	Form Class (No. of Plants)								Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3		4	Ht.	
Acer grandidentatum																	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	1
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
M	84	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
	96	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	66	Dec:		-	
												'90	66			-	
												'96	20			-	

A G E	YR	Form Class (No. of 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	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	187	-	-	30	-	-	-	-	-	217	-	-	-	14466		217	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	84	-	2	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	11	1	-	1	-	-	-	-	-	13	-	-	-	866		13	
	96	14	-	-	-	-	-	-	-	-	14	-	-	-	280		14	
M	84	4	8	11	-	-	-	-	-	-	23	-	-	-	1533	19 17	23	
	90	28	4	2	-	-	-	-	-	-	31	1	2	-	2266	22 24	34	
	96	116	-	-	-	-	-	-	-	-	116	-	-	-	2320	28 40	116	
D	84	-	7	13	-	-	-	-	-	-	20	-	-	-	1333		20	
	90	2	1	-	-	-	-	-	-	-	3	-	-	-	200		3	
	96	21	2	-	-	-	-	-	-	-	23	-	-	-	460		23	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	1080		54	
Total Plants/Acre (excluding Dead & Seedlings)												'84	2999	Dec:	44%			
												'90	3332		6%			
												'96	3060		15%			
<i>Chrysothamnus viscidiflorus stenophyllus</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	27 54	0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Gutierrezia sarothrae</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	12 15	1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
<i>Juniperus scopulorum</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			

DISCUSSION

Trend Study No. 3-11

This site was not read in 1996 and is currently being considered for elimination or relocation due to the poor site location. Text from the 1990 report has been left. Location description and data tables can be found in the 1990 Utah Big Game Range Trend Study report.

This study samples a winter deer concentration area located on a steep (70%), south facing slope near Porcupine Reservoir. Elevation is approximately 5,640 feet. Signs of deer use (i.e., pellet groups, utilization) indicate that intense pressure was being applied to this site during the early 1980's. The range type is sparse mountain brush. All are very closely hedged. Grasses appear to be increasing.

Soil is eroded and exceptionally rocky. Classified by the NRCS as the "Picayune-Agassiz Association," this soil is moderately deep to bedrock and gravelly in texture in the upper layers. With increasing depth, it becomes more clayey, alkaline and calcareous (Erickson and Mortensen 1974). The study site, being such a steep slope and having only a fair plant cover, is badly eroded. The extensive area of exposed rock surface and well-worn trails contribute greatly to runoff.

Browse composition is mixed but consists principally of mountain big sagebrush. In a relative sense, it is the most abundant species. However, total browse density is very low and thus no species produces very large amounts of forage. One of the most likely factors contributing to low browse density and production is the extremely heavy use by deer. Since then, continued drought and winter injury have caused many problems for sagebrush in Utah in the last 10 years. Although several palatable shrubs occur on the site, all are heavily browsed and have age structures dominated by decadent or dying plants. Apart from big sagebrush, the most important shrubs are antelope bitterbrush, Saskatoon serviceberry and occasional individuals of true mountain mahogany and Utah juniper. None appear to be reproducing at rates sufficient to long maintain a significant presence on the study area.

Herbaceous plants, although perhaps increasing slightly, have limited potential for stabilizing the site because of already poor soil condition. The most conspicuous and abundant species is bluebunch wheatgrass. Other grasses include annuals such as cheatgrass and hairy brome and low growing perennials such as Sandberg bluegrass and bottlebrush squirreltail. These, however, are ecologically subordinate. Forb composition is also limited. The more common species include tapertip onion, yellow salsify, dyer woad, tapertip hawkbeard, thistle, western yarrow, gray Lomatium, Lewis flax, and a variety of small annuals.

1984 APPARENT TREND ASSESSMENT

Steep slope, highly erodible soil and heavy deer use are fundamental problems on this site. Soil and vegetative trend are both declining because of the interrelated nature of these factors.

1990 TREND ASSESSMENT

Compared to adjacent ridge tops, more gentle slopes, and other aspects in the area, the study site has very low productivity and species diversity. The sagebrush on the steep, south-facing slope is mostly decadent or dead. One decadent sagebrush and one mature bitterbrush were classified within the density plots, where 12 dead sagebrush and 3 dead bitterbrush were also counted. The

sparsely scattered junipers are highlined. Dyers woad, cheatgrass, and annual mustards are common and increasing. Judging by deer pellet groups, recent winter use has been light. Undoubtedly, use is heavier in severe winters as in the past. There is no evidence of animal trails contributing to soil movement. Erosion is related to the steep slope and prevalence of loose rock on the surface.

TREND ASSESSMENT

soil - down

browse - down

herbaceous understory - down, watch densities for weedy species, dyers woad and cheatgrass

TREND STUDY 3-12-96

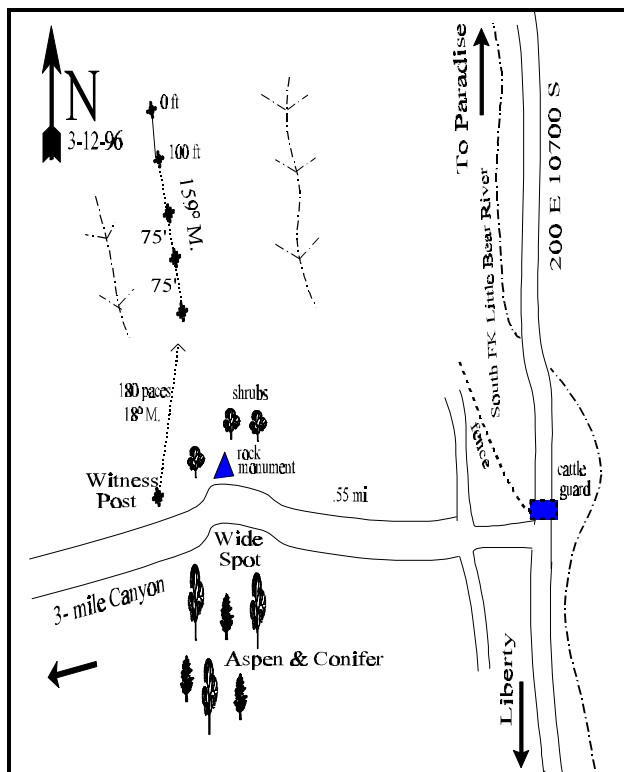
Study site name: Three-mile Canyon. Range type: Bitterbrush.

Compass bearing: frequency baseline 159 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From 200 East 10700 South in Paradise proceed south (towards Liberty) on a dirt road for 7.0 miles. Cross the cattle guard, and turn immediately right (west). Travel 0.55 miles up Three-mile Canyon, and stop adjacent to a rock witness post on the right side of road. Walk 180 paces at 18 degrees magnetic from the witness post to the last baseline stake. From the last baseline stake to the 0-foot baseline stake walk 400 feet at an azimuth 340 degrees magnetic. The 0-foot stake is marked by browse tag #7982.



Map Name: James Peak

Diagrammatic Sketch

Township 8N, Range 1E, Section 4, UTM COOR: 4-29-370E 45-89-687N

DISCUSSION

Trend Study No. 3-12

This study samples a sparse but heavily used mixed bitterbrush/sagebrush community in Three-mile Canyon, a tributary of the South Fork of the Little Bear River. The study area is on a steep (65%) south facing slope with an elevation of 6,120 feet. Winter deer use can be heavy during average as well as severe winters. Use of the available browse was very heavy in 1984 and moderately heavy in 1990. Current use is mostly moderate and deer and elk pellet groups are not abundant.

Soil is classified as "Sheep Creek Cobbly Loam", a soil series that is very cobbly throughout and which becomes more clayey in the subsoil. Drainage is excellent with moderate permeability, very rapid runoff potential, and a high erosion hazard. This soil is only moderately deep (i.e., 28-40 inches to fractured limestone bedrock) and often has a calcareous accumulation at approximately 22 inches depth. Surface horizons range from neutral to slightly alkaline (Erickson and Mortensen 1974). Soils on the site have a clay loam texture with a neutral pH of 7.2. Effective rooting depth (see methods) is estimated at 16 inches. Rocks are common on the surface and in the profile. Soil temperature is relatively high at 67°F at an average depth of 16 inches. Vegetation and litter cover are abundant and well dispersed. Erosion is not currently a problem on the site.

Browse composition consists of a moderately spaced but conspicuous population of antelope bitterbrush interspersed within a low density mountain big sagebrush population which has one-fifth the density of bitterbrush. There are also small amounts of mountain snowberry, woods rose, and serviceberry. The key management species are bitterbrush and big sagebrush, both of which were heavily hedged and had a rather decadent appearance in 1984. Bitterbrush had a density of 599 plants/acre in 1984. All of the shrubs sampled were heavily hedged with a decadence of 44%. In 1990, density was estimated to 466 plants/acre with heavy use found on 36% of the population. Percent decadence remained similar at 42%. No reproduction was evident during either earlier sampling date. The sample size was greatly increased in 1996 and population density was estimated at 820 plants/acre. The increase in numbers noted here would mostly be due the much better estimate given by the larger sample used. Use is currently mostly moderate, vigor normal, and percent decadence has declined to only 4%. Dead plants, first included in 1996, numbered 160 plants/acre. Seedling and young plants were found in sufficient numbers to maintain the population.

Mountain big sagebrush has declined with each reading on this site. The population density was estimated at 999 plants/acre in 1984. Most plants were heavily hedged with 43% classified as decadent. Population density declined 67% by 1990 to 332 plants/acre. Use was mostly moderate but percent decadence increased to 50%. No seedlings or young were encountered during either reading. The larger sample used in 1996 estimated only 180 plants/acre of sagebrush. Dead plants numbered only 60 plants/acre which would indicate that some of the decline is the result of the change in sample size giving a much better estimate of its true density. Utilization is light to moderate, vigor good, and percent decadence is 44%. Recruitment is still limited with only one young plant encountered in the sample.

The herbaceous understory is currently dominated by annual grasses which account for 80% of the grass cover. Perennial species such as bluebunch wheatgrass, Sandberg bluegrass, and Great Basin wildrye are also present. Forbs can be found in fairly large numbers but are mainly low growing perennials or increaser biennials such a thistle and yellow salsify. Another abundant increaser is Louisiana sagebrush (*Artemisia ludoviciana*). Arrowleaf balsamroot is perhaps the

most desirable forb present which only occurs occasionally.

1984 APPARENT TREND ASSESSMENT

Considering the high erosion hazard of this soil and the steep slope, soil movement is surprisingly low. Soil trend is stable or at worst declining slowly. Vegetative trend is more complicated. Although the study site samples an area that is obviously important to and favored by wintering deer, the existing stand of browse seems to be declining. Current forage production is good, but certainly not outstanding, and an increasing grass cover does not argue well for the future of sagebrush.

1990 TREND ASSESSMENT

Bitterbrush and mountain big sagebrush populations both decreased, 22% and 67% respectively. Together, it indicates a definite downward trend for these key browse species. Another moderating factor is that, while in 1984 all the bitterbrush were classified as heavily hedged, in 1990 all form classes were represented, suggesting generally lighter utilization. Bitterbrush canopy cover is 5%. Sagebrush cover is too low to measure with the variable plot method. Significant nested frequency changes were measured for bluebunch wheatgrass, a decline, and yellow salsify (*Tragopogon dubius*), a large increase. Ground cover characteristics are almost unchanged.

TREND ASSESSMENT

soil - stable

browse - down

herbaceous understory - slightly downward, poor composition

1996 TREND ASSESSMENT

The soil trend is up due to a decline in percent bare ground from 21% to 5% and an increase in percent cover of litter from 41% to 64%. Vegetation and litter cover are abundant, well dispersed, and no erosion is evident on the site. Trend for browse is stable but limited. Density of bitterbrush is estimated at 820 plants/acre with the new, larger sample size. Utilization is mostly moderate and percent decadence low at 4%. Recruitment is sufficient to maintain the population. Mountain big sagebrush has a population density of only 180 plants/acre, provides little forage, and contributes only 5% of the browse cover at this time. Reproduction is limited and likely hindered by the abundant herbaceous understory. Trend for the herbaceous understory down slightly due to a decline in the sum of nested frequency for perennial grasses. Nested frequency for perennial forbs increased, but the increase came primarily from weedy species.

TREND ASSESSMENT

soil - up

browse - stable overall

herbaceous understory - down slightly and dominated by annuals and weedy perennial forbs

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 12

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	a ₂₂₀	b ₁₆₄	c ₁₂₀	83	70	47	4.64
G	Bromus japonicus (a)	-	-	354	-	-	99	20.07
G	Bromus tectorum (a)	-	-	209	-	-	66	6.28
G	Elymus cinereus	a ⁻	a ₁	b ₂₂	-	1	7	1.63
G	Poa bulbosa	a ⁻	b ₁₈	b ₁₁	-	9	5	.12
G	Poa secunda	a ⁻	b ₃₂	b ₁₈	-	16	10	.20
Total for Grasses		220	215	734	83	96	234	32.96
F	Achillea millefolium	-	-	6	-	-	2	.03
F	Agoseris glauca	a ₃₄	a ₁₉	b ₅	19	11	2	.01
F	Allium acuminatum	a ₁₇	b ⁻	b ⁻	6	-	-	-
F	Alyssum alyssoides (a)	-	-	88	-	-	36	.30
F	Artemisia ludoviciana	25	30	29	10	10	11	.88
F	Aster chilensis	-	-	1	-	-	1	.06
F	Balsamorhiza sagittata	14	16	6	7	9	2	1.75
F	Camelina microcarpa (a)	-	-	1	-	-	1	.00
F	Calochortus nuttallii	a ⁻	b ₈	a ⁻	-	5	-	-
F	Cirsium spp.	a ₁	b ₂₉	a ₁₃	1	15	8	.37
F	Collomia linearis (a)	-	-	44	-	-	21	.18
F	Collinsia parviflora (a)	-	-	3	-	-	1	.00
F	Crepis acuminata	a ⁻	b ₂₉	b ₂₁	-	13	9	.22
F	Epilobium brachycarpum (a)	-	-	104	-	-	40	.91
F	Galium aparine (a)	-	-	3	-	-	1	.03
F	Holosteum umbellatum (a)	-	-	7	-	-	4	.02
F	Isatis tinctoria	-	4	7	-	2	4	.16
F	Lappula occidentalis (a)	-	-	2	-	-	1	.00
F	Lactuca serriola	a ⁻	b ₄₃	c ₉₉	-	21	44	1.13
F	Lithospermum ruderales	a ⁻	a ⁻	b ₁₂	-	-	4	1.06
F	Lomatium grayi	-	1	-	-	1	-	-
F	Polygonum douglasii (a)	-	-	-	-	-	-	.00
F	Senecio multilobatus	a ₄₁	b ⁻	b ⁻	21	-	-	-
F	Tragopogon dubius	a ₃₂	b ₁₈₅	b ₁₉₅	12	78	80	5.07
F	Veronica biloba (a)	-	-	21	-	-	10	.70
Total for Forbs		164	364	667	76	165	282	12.96

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

BROWSE TRENDS --

Herd unit 03 , Study no: 12

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	8	.41
B	Mahonia repens	2	.15
B	Purshia tridentata	25	8.01
B	Rosa woodsii	5	.24
Total for Browse		40	8.81

BASIC COVER --

Herd unit 03 , Study no: 12

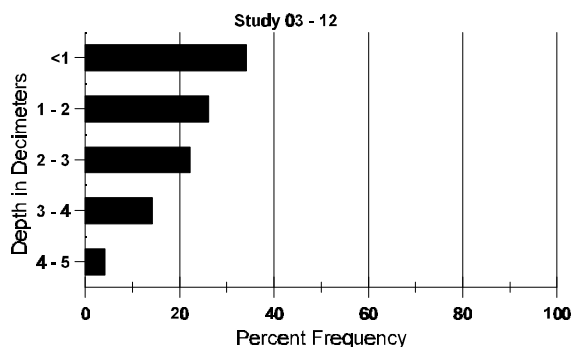
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	394	3.50	9.00	56.96
Rock	167	15.25	12.75	5.47
Pavement	72	10.25	17.00	.50
Litter	397	49.75	40.50	64.06
Cryptogams	-	.75	0	0
Bare Ground	146	20.50	20.75	4.86

SOIL ANALYSIS DATA --

Herd Unit 03, Study no: 12

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
16.1	67.4 (16.3)	7.2	27.3	40.7	32.0	3.1	15.8	201.6	.6

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 03 , Study no: 12

Type	Quadrat Frequency '96
Elk	1
Deer	5

BROWSE CHARACTERISTICS --
 Herd unit 03 , Study no: 12

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Amelanchier alnifolia</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	29	34	0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	0		-			
<i>Artemisia tridentata vaseyana</i>																		
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	84	-	4	13	-	-	-	-	-	-	17	-	-	-	566	26	32	17
	90	1	4	-	-	-	-	-	-	-	5	-	-	-	166	21	17	5
	96	3	-	-	1	-	-	-	-	-	4	-	-	-	80	18	22	4
D	84	-	-	13	-	-	-	-	-	-	13	-	-	-	433			13
	90	1	3	1	-	-	-	-	-	-	2	-	-	3	166			5
	96	1	2	-	1	-	-	-	-	-	4	-	-	-	80			4
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3
Total Plants/Acre (excluding Dead & Seedlings)												'84	999	Dec:	43%			
												'90	332		50%			
												'96	180		44%			
<i>Mahonia repens</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	-	-	-	16	-	-	-	-	-	16	-	-	-	320	6	6	16
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	320		-			

A G E	YR	Form Class (No. of 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>Purshia tridentata</i>																		
S	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	84	-	-	10	-	-	-	-	-	-	10	-	-	-	333	30 48	10	
	90	4	2	2	-	-	-	-	-	-	8	-	-	-	266	25 48	8	
	96	9	20	5	-	-	-	-	-	-	34	-	-	-	680	32 59	34	
D	84	-	-	8	-	-	-	-	-	-	8	-	-	-	266		8	
	90	2	1	3	-	-	-	-	-	-	4	1	-	1	200		6	
	96	-	1	-	-	-	1	-	-	-	2	-	-	-	40		2	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	160		8	
Total Plants/Acre (excluding Dead & Seedlings)												'84	599	Dec:	44%			
												'90	466		43%			
												'96	820		5%			
<i>Rosa woodsii</i>																		
Y	84	5	-	-	-	-	-	-	-	-	5	-	-	-	166		5	
	90	33	-	-	-	-	-	-	-	-	33	-	-	-	1100		33	
	96	6	2	-	-	-	-	-	-	-	8	-	-	-	160		8	
M	84	5	-	-	-	-	-	-	-	-	5	-	-	-	166	7 4	5	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	96	8	5	-	-	-	-	-	-	-	13	-	-	-	260	12 11	13	
Total Plants/Acre (excluding Dead & Seedlings)												'84	332	Dec:	-			
												'90	1100		-			
												'96	420		-			
<i>Symphoricarpos oreophilus</i>																		
Y	84	3	-	-	-	-	-	-	-	-	3	-	-	-	100		3	
	90	2	1	-	-	-	-	-	-	-	2	1	-	-	100		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	1	1	1	-	-	-	-	-	-	3	-	-	-	100	18 43	3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
D	84	-	-	1	-	-	-	-	-	-	1	-	-	-	33		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'84	233	Dec:	14%			
												'90	100		0%			
												'96	0		0%			

TREND STUDY 3-13-96

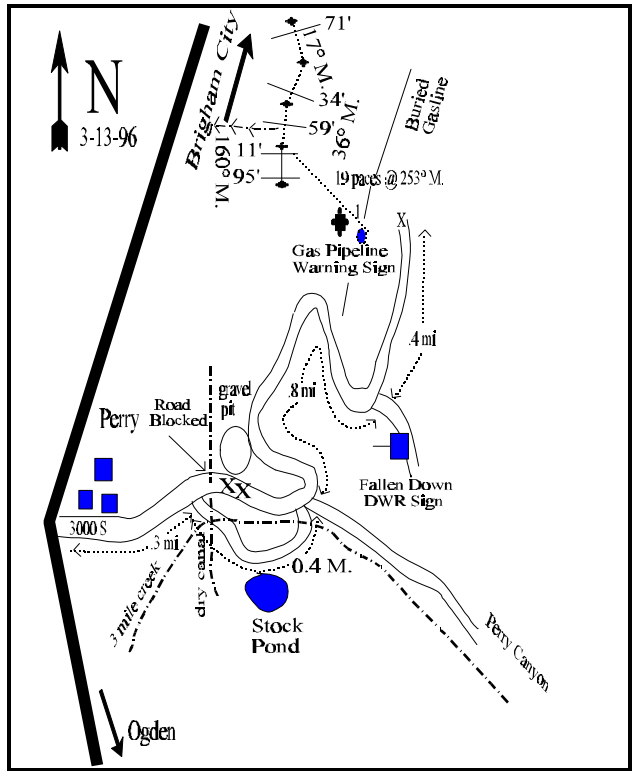
Study site name: Perry Basin. Range type: Sagebrush/grass.

Compass bearing: frequency baseline 160 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft).

LOCATION DESCRIPTION

From 300 South and Highway 89 in Perry, proceed east towards Perry Basin driving around a gravel pit for 0.7 miles and take the left fork. Travel 0.7 miles to another fork, stay to the right (on the main road) and proceed 0.4 miles to Perry Basin. Stop at this point. Perry Basin should be to the east, and a gas pipeline warning sign should be to the west. From the sign, proceed 19 paces at 253 degrees magnetic to the 100-foot stake of the baseline. The 0-foot baseline stake is 100 feet away at 340 degrees magnetic. The stake is marked with browse tag #7994. The rest of the baseline runs off the 0-baseline stake and runs in a northerly direction. Line 2 & 3 run 36 degrees magnetic. Line 4 runs 17 degrees magnetic.



Map Name: Willard

Diagrammatic Sketch

Township 8N, Range 2W, Section 1, UTM COOR: 4-15-156E 45-90-804N

DISCUSSION

Trend Study No. 3-13

This study samples critical deer winter range located slightly west of Perry Basin on the Brigham City-Willard face. The site is near the lower edge of the upper Lake Bonneville terrace and has a comparatively gentle (15%) west-northwest slope. Elevation is approximately 5,100 feet. The range type is classified as mountain big sagebrush/grass. A fire burned the entire area during the summer of 1995 which eliminated essentially all of the browse. Deer use was light to moderate in 1984 and 1990 with no domestic livestock use evident. No big game pellet groups were found during the 1996 reading.

Soil is classed as "Kilburn Gravelly Sandy Loam," a widespread series on lake terraces in this area. All of the Kilburn soils are excessively drained and derived primarily from metamorphic rock. Permeability is rapid with low water holding capability in the upper soil layers. Potential rooting depth, however, extends to at least 60 inches, at which depth water is almost always available. Soil reaction is neutral in the upper horizons and mildly alkaline in the deep subsoil. Runoff and erosion hazards range from medium to high depending upon slope steepness (Erickson and Mortensen 1974). Soils at the site are moderately deep with a sandy loam texture and a slightly acid pH of 6.3. Small pea sized gravel covers a considerable amount of the ground surface (45%). The gentle terrain and the abundant vegetation cover limit erosion. There are some gullies west of the study area on steeper slopes but they are not currently active.

Browse composition was previously dominated by a moderately dense and vigorous stand of mountain big sagebrush. With the exception of a small population of broom snakeweed, no other shrub species were present. The sagebrush population consisted of variable sized shrubs ranging from seedlings to larger than average mature plants. Age structure appeared stable and form class distribution suggested moderate to heavy use in 1984, but only light to moderate use in 1990. The fire which burned the area during the summer of 1995 eliminated nearly all of the browse on the site. Only a few sagebrush seedlings were counted along with a few rubber rabbitbrush plants.

The herbaceous understory is dominated by forbs and annual grasses. Perennial grasses are represented by Sandberg bluegrass and occasional plants of bluebunch wheatgrass. Annual grasses were abundant enough to pose a fire hazard in 1990. After the fire, annual grasses, mostly cheatgrass, Japanese brome, and rattlesnake brome account for 50% of the grass cover. An additional 48% of the grass cover comes from Sandberg bluegrass. The forb composition is diverse yet dominated by annuals and weeds. The most abundant forbs are dyers woad, yellow salsify, flannel mullein, and hoary aster. This site was apparently not seeded after the fire, and at this time it has lost its usefulness as an important winter range for deer.

1984 APPARENT TREND ASSESSMENT

Soil trend is down slightly because of higher than acceptable erosion resulting from an essentially annual understory, which although producing considerable litter, still allows excessive overland flow of water. Vegetative trend is stable for the key browse species but down for understory composition and density.

1990 TREND ASSESSMENT

While this site maintains a moderate density of mountain big sagebrush, data shows a notable decline (21%) in density. The sagebrush population was classified as 58% decadent compared to 42% in 1984. Sagebrush canopy cover

averages 22%. The plants are large and healthy, and have a light to moderate hedged growth form. Several herbaceous components have increased, most significantly Sandberg bluegrass (80% quadrat frequency) and dyers woad (88% quadrat frequency), which are both increasers. Deer use is light. There is no evidence of recent soil erosion.

TREND ASSESSMENT

soil - stable

browse - slight downward trend, increased decadency and lower densities in sagebrush

herbaceous understory - up but composition is poor, can carry a destructive fire

1996 TREND ASSESSMENT

Trend for soil is down slightly due to an increase in percent bare ground and a decline in litter cover due to the fire. Erosion is not a problem however. The browse trend is down and nearly absent on the site. A few seedling sagebrush were found but they will likely not survive to maturity due to competition with the abundant and weedy herbaceous understory. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses remained similar to 1990 estimates while frequency of forbs declined. The decline in forb nested frequency comes primarily from a significant decline in the frequency of dyers woad (235 to 122).

TREND ASSESSMENT

soil - down slightly

browse - down, eliminated by fire

herbaceous understory - stable but poor composition which is dominated by annual grasses and weedy forbs

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 13

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
G	Agropyron spicatum	3	4	4	1	3	1	.15
G	Aristida purpurea	7	3	6	2	1	2	.41
G	Bromus brizaeformis (a)	-	-	93	-	-	47	.54
G	Bromus spp.	-	-	4	-	-	2	.03
G	Bromus tectorum (a)	-	-	253	-	-	87	10.29
G	Festuca myuros (a)	-	-	19	-	-	10	.85
G	Poa bulbosa	-	-	3	-	-	1	.03
G	Poa secunda	_a 20	_b 225	_b 218	12	80	78	11.27
G	Sporobolus cryptandrus	-	3	-	-	1	-	-
Total for Grasses		30	235	600	15	85	228	23.58
F	Achillea millefolium	10	15	7	4	5	3	.21
F	Agoseris glauca	_a 1	_b 16	_{ab} 7	1	9	4	.04
F	Alyssum alyssoides (a)	-	-	70	-	-	30	.40
F	Ambrosia artemisifolia	_a 50	_b 20	_b 4	19	9	2	.03

Type	Species	Nestled Frequency			Quadrat Frequency			Average Cover % '96
		'84	'90	'96	'84	'90	'96	
F	<i>Artemisia ludoviciana</i>	1	4	3	1	1	1	.38
F	<i>Astragalus</i> spp.	-	5	-	-	3	-	-
F	<i>Astragalus utahensis</i>	-	-	3	-	-	2	.01
F	<i>Calochortus nuttallii</i>	a-	b31	a1	-	12	1	.00
F	<i>Collomia linearis</i> (a)	-	-	2	-	-	2	.03
F	<i>Collinsia parviflora</i> (a)	-	-	4	-	-	2	.06
F	<i>Crepis acuminata</i>	a-	b18	b29	-	9	14	.44
F	<i>Epilobium brachycarpum</i> (a)	-	-	8	-	-	5	.03
F	<i>Euphorbia</i> spp.	-	-	1	-	-	1	.00
F	<i>Galium aparine</i> (a)	-	-	5	-	-	2	.03
F	<i>Hackelia patens</i>	-	-	-	-	-	-	.03
F	<i>Helianthus annuus</i> (a)	a-	a1	b11	-	1	6	.63
F	<i>Heterotheca villosa</i>	1	1	1	1	1	1	.21
F	<i>Holosteum umbellatum</i> (a)	-	-	35	-	-	18	.19
F	<i>Isatis tinctoria</i>	a153	b235	a122	74	88	50	5.34
F	<i>Lactuca serriola</i>	a44	b4	b10	18	2	6	.37
F	<i>Lithospermum ruderale</i>	2	3	3	2	1	1	.33
F	<i>Lupinus argenteus</i>	1	-	-	1	-	-	-
F	<i>Lygodesmia grandiflora</i>	1	2	4	1	1	2	.33
F	<i>Machaeranthera canescens</i>	a-	b15	b18	-	5	8	.89
F	<i>Microsteris gracilis</i> (a)	5	-	6	4	-	3	.09
F	<i>Oenothera pallida</i>	6	-	7	2	-	3	.21
F	<i>Phacelia</i> spp.	3	-	6	1	-	4	.09
F	<i>Phlox longifolia</i>	a8	a14	b29	3	5	12	.33
F	<i>Plantago patagonica</i> (a)	-	-	20	-	-	9	.04
F	<i>Polygonum douglasii</i> (a)	-	-	49	-	-	25	.40
F	<i>Tragopogon dubius</i>	a146	ab122	b85	65	49	41	1.55
F	<i>Verbascum thapsus</i>	-	-	51	-	-	19	1.81
Total for Forbs		432	506	601	197	201	277	14.58

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

BROWSE TRENDS --

Herd unit 03 , Study no: 13

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	0	.02
B	Chrysothamnus nauseosus	1	.38
B	Chrysothamnus viscidiflorus viscidiflorus	2	-
Total for Browse		3	0.40

BASIC COVER --

Herd unit 03 , Study no: 13

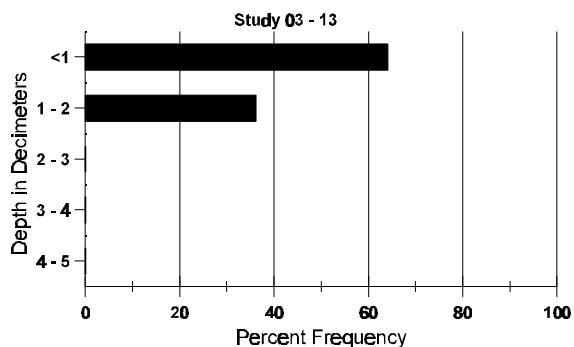
Cover Type	Nested Frequency '96	Average Cover %		
		'84	'90	'96
Vegetation	335	1.00	15.75	38.44
Rock	66	.25	0	.90
Pavement	375	26.00	25.25	45.22
Litter	173	72.00	55.75	2.09
Cryptogams	6	.50	0	.01
Bare Ground	181	.25	3.25	8.69

SOIL ANALYSIS DATA --

Herd Unit 03, Study no: 13

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
22.0	69.0 (18.1)	6.3	66.2	17.4	16.4	2.6	20.7	256.0	.4

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 03 , Study no: 13

Type	Quadrat Frequency '96
Rabbit	2

BROWSE CHARACTERISTICS --
 Herd unit 03 , Study no: 13

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
S	84	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10	
Y	84	8	-	-	-	-	-	-	-	-	8	-	-	-	533		8	
	90	2	-	-	1	-	-	-	-	-	3	-	-	-	200		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	84	5	7	10	-	-	-	-	-	-	20	-	1	1	1466	33 31	22	
	90	13	1	-	-	-	-	-	-	-	14	-	-	-	933	30 29	14	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
D	84	-	6	16	-	-	-	-	-	-	15	-	4	3	1466		22	
	90	18	6	-	-	-	-	-	-	-	18	-	1	5	1600		24	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	900		45	
Total Plants/Acre (excluding Dead & Seedlings)												'84	3465	Dec:	42%			
												'90	2733		59%			
												'96	0		0%			
<i>Chrysothamnus nauseosus</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	19 35	1	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	20		-			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40	14 24	2	
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	-			
												'90	0		-			
												'96	40		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Gutierrezia sarothrae																		
M	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	7	-	-	-	-	-	-	-	-	7	-	-	-	466	10	11	7
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	84	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Total Plants/Acre (excluding Dead & Seedlings)												'84	0	Dec:	0%			
												'90	799		42%			
												'96	0		0%			

TREND STUDY 3-14-97 (old 7-1)

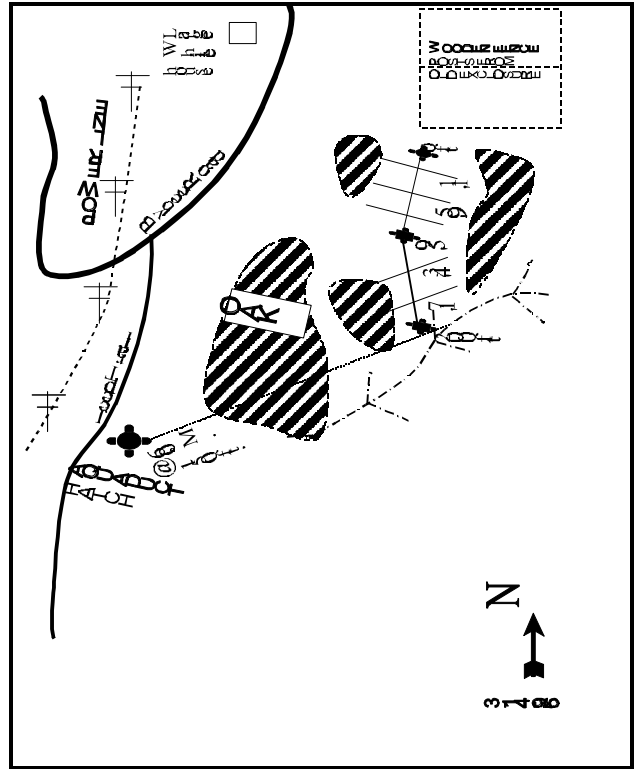
Study site name: Uintah Junction . Range type: Mixed oak-sage .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11, 59, & 95ft), line 2 (34 & 71ft).

LOCATION DESCRIPTION

Beginning at the point above Uintah Junction where the railroad crosses U-89 (two tracks 300 yards apart), travel northwest on U-89 for approximately 100 yards then turn right on Combe Road. Proceed northeast on Combe Road for 0.5 miles to Woodland Drive. Turn right, go 100 yards up Woodland Drive and turn right on Bybee Road. Proceed on Bybee for approximately 1 mile, past new (1990) homes on building lots to where the new road passes under a powerline. At the mouth of the small draw to the east, there is a concrete aqueduct hatch. The beginning of the baseline is on the skyline to the northeast, 250 feet bearing 24° from the concrete hatch. The 0-foot baseline stake is marked by a browse tag.



Map Name: Ogden

Diagrammatic Sketch

Township 5N , Range 1W , Section 25

DISCUSSION

Trend Study No. 3-14 (7-1)

This study is located on the foothills of the Wasatch Face just north of the mouth of Weber Canyon. The site samples critical and very limited winter range on the Front. These low elevation slopes (4,880 feet at the study site) were used heavily by deer in the early 1980's. The steep west facing slopes are covered by a mixture of Gambel oak and sagebrush. The transect is on private land. Land to the north is managed as a protected watershed by the Forest Service and part of the section is owned by the DWR. Development is progressing on the more suitable sites, but as this area is so steep and on an aqueduct, it will probably not be converted to a subdivision, yet houses occur 300 yards from the site. Off road vehicle use is a possible threat to soil stability.

The soil is a deep, well-drained clay loam with a neutral pH of 7.2. Limestone rock that occurs on the surface is covered by litter. Phosphorus and potassium could both be a limiting factor with only 4.1 and 20.7 ppm respectively. Soil temperature is high (80° F at 16") due to the aspect and slope. The potential for severe erosion is high unless a permanent cover is maintained. Currently erosion is not severe, however some soil movement is inevitable and evidenced by pedestaling and terracing.

A moderately dense stand of Gambel oak provides 93% of the browse cover and most of the forage production on the site. It numbered 9,733 stems per acre in 1984, 36% were young and biotic potential was 12% (# of sprouts). The available twigs had been moderately browsed. Since then, the population has become increasingly mature. Currently mature plants account for 79% of the population. Decadent plants are few and young oak are common. Utilization is mostly light.

Basin big sagebrush currently comprises 7% of the browse cover, with 880 plants/acre estimated in 1996. The population has become more mature (68% currently) with few young and no seedlings encountered during any year sampled. Use is mostly light, yet vigor is poor on 20% of the population. Broom snakeweed has declined from 1,533 plants/acre in 1985 to only 380 by 1996.

A vigorous stand of grasses provides excellent erosion control and forage. The most abundant perennial species include bulbous bluegrass and bluebunch wheatgrass. They grow best in the interspaces and appear to be suppressed by shade from the dense oak clumps. Annual grasses consisting of cheatgrass and Japanese brome are abundant and account for 43% of the grass cover. A variety of forbs are represented and many are valuable for forage and/or watershed protection. Common perennial forbs include bastard toadflax, yellow sweet clover, and yellow salsify.

1985 APPARENT TREND ASSESSMENT

An increasing density of Gambel oak would further exclude grasses and sagebrush and would cause a downward vegetative trend. Currently, the area provides a variety of browse and herbaceous forage, but a dense stand of oak would be much like the rest of the front, which would encourage the deer to go even lower to find browse. The soil is stable at low levels of erosion, unless it is disturbed by off road vehicular activity.

1990 TREND ASSESSMENT

The population density of sagebrush on this mixed oak/sage range declined slightly. There is a higher percentage of decadent plants in the lightly to moderately hedged population. Although the Gambel oak provides competition to the sagebrush, the biggest threat to this winter range is the continued housing and road development just below the site. The oak has been moderately hedged by deer and its vigor has

been impacted by insects and drought. Grasses, mainly bluebunch wheatgrass and bulbous bluegrass, are vigorous and abundant. Bluebunch wheatgrass is stable, but there was a loss in the density of bulbous bluegrass which is useful for early spring use. There is evidence of slight erosion and pedestaling, but overall the vegetative and litter cover is adequate to prevent serious erosion.

TREND ASSESSMENT

soil - stable

browse - downward, 50% of the sagebrush was lost

herbaceous understory - slightly downward

1996 TREND ASSESSMENT

Trend for soil is up due to a decline in percent bare ground from 14% to 2%. Some soil movement is inevitable but erosion is not currently a problem. Trend for sagebrush is stable. Population density is similar to 1990 estimates. Percent decadence declined from 45% to 13%, but vigor is poor on 20% of the shrubs. Utilization is light to moderate. Trend for Gambel oak appears stable with similar densities in 1985 and 1990. Trend for the herbaceous understory is stable with similar sum of nested frequency values for perennial grasses and forbs. Nested frequency of bluebunch wheatgrass increased while frequency of bulbous bluegrass declined significantly.

TREND ASSESSMENT

soil - up

browse - stable

herbaceous understory - stable

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 14

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'85	'90	'96	'85	'90	'96	
G	Agropyron intermedium	a13	b-	a11	5	-	4	.93
G	Agropyron spicatum	115	111	125	44	43	47	5.51
G	Aristida longiseta longiseta	-	-	1	-	-	1	.03
G	Bromus japonicus (a)	-	-	79	-	-	28	1.13
G	Bromus spp.	3	-	-	1	-	-	-
G	Bromus tectorum (a)	-	-	204	-	-	60	8.21
G	Poa bulbosa	a298	b226	c131	83	79	41	5.52
G	Poa pratensis	ab5	a13	b-	2	5	-	-
G	Poa secunda	a3	b17	ab7	1	7	2	.06
G	Sporobolus cryptandrus	1	4	2	1	1	1	.00
Total for Grasses		438	371	560	137	135	184	21.42
F	Agoseris glauca	1	-	4	1	-	1	.00
F	Allium spp.	-	3	-	-	1	-	-
F	Ambrosia psilostachya	a11	b-	b-	5	-	-	-
F	Arenaria spp.	a14	b-	b-	7	-	-	-
F	Artemisia ludoviciana	30	11	15	11	4	6	.28

Type	Species	Nestled Frequency			Quadrat Frequency			Average Cover % '96
		'85	'90	'96	'85	'90	'96	
F	<i>Astragalus convallarius</i>	3	5	15	3	2	6	.37
F	<i>Aster</i> spp.	3	-	-	1	-	-	-
F	<i>Calochortus nuttallii</i>	3	-	2	1	-	1	.03
F	<i>Cirsium vulgare</i>	2	-	-	1	-	-	-
F	<i>Comandra pallida</i>	a ⁶⁹	b ¹⁸	ab ⁴⁰	26	9	16	1.54
F	<i>Crepis acuminata</i>	a ¹⁵	b ¹⁷	c ⁻	6	9	-	-
F	<i>Cryptantha</i> spp.	-	3	-	-	1	-	-
F	<i>Erodium cicutarium</i> (a)	3	-	2	1	-	1	.00
F	<i>Hackelia patens</i>	-	-	-	-	-	-	.00
F	<i>Hedysarum boreale</i>	a ²⁵	ab ¹⁰	b ³	12	6	2	.18
F	<i>Helianthus</i> spp.	2	-	-	1	-	-	-
F	<i>Lactuca serriola</i>	a ⁻	a ⁻	b ¹³	-	-	5	.02
F	<i>Lithospermum ruderale</i>	-	2	-	-	1	-	-
F	<i>Lomatium</i> spp.	-	8	-	-	3	-	-
F	<i>Lygodesmia grandiflora</i>	a ⁴⁰	b ⁻	c ¹³	16	-	6	.17
F	<i>Melilotus officinalis</i>	a ⁻	a ⁻	b ⁹²	-	-	39	7.34
F	<i>Medicago sativa</i>	6	1	1	3	1	1	.03
F	<i>Oenothera caespitosa</i>	2	-	-	1	-	-	-
F	<i>Penstemon</i> spp.	3	-	-	2	-	-	-
F	<i>Phlox longifolia</i>	a ³	b ⁷¹	a ²⁶	3	29	11	.10
F	<i>Sphaeralcea coccinea</i>	a ⁵⁶	ab ⁴⁹	b ¹⁸	21	18	7	.26
F	<i>Tragopogon dubius</i>	a ⁸⁹	b ⁴⁵	c ¹¹¹	41	22	50	1.43
F	Unknown forb-perennial	a ⁻	b ¹⁰	ab ²	-	4	2	.06
F	<i>Zigadenus paniculatus</i>	15	3	11	6	2	4	.07
Total for Forbs		395	256	368	169	112	158	11.93

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

BROWSE TRENDS --

Herd unit 03 , Study no: 14

Type	Species	Strip Frequency '96	Average Cover % '96
B	<i>Artemisia tridentata</i>	28	2.65
B	<i>Gutierrezia sarothrae</i>	12	.08
B	<i>Quercus gambelii</i>	82	34.46
Total for Browse		122	37.19

BASIC COVER --

Herd unit 03 , Study no: 14

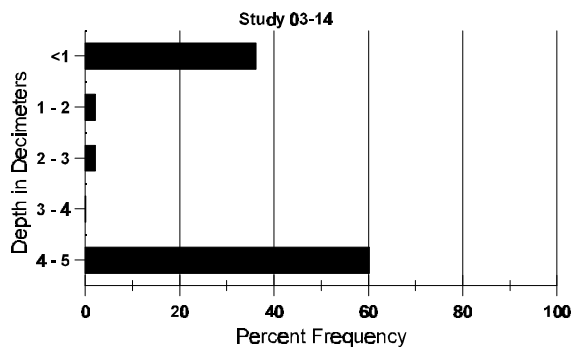
Cover Type	Nested Frequency '96	Average Cover %		
		'85	'90	'96
Vegetation	371	18.00	6.50	63.57
Rock	57	0	.25	3.25
Pavement	14	0	.25	.03
Litter	396	63.25	78.75	72.08
Cryptogams	2	0	.75	.00
Bare Ground	43	18.75	13.50	1.61

SOIL ANALYSIS DATA --

Herd Unit 03, Study no: 14

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
13.1	80.3 (15.7)	7.2	42.6	33.1	24.4	1.2	4.1	16.0	.5

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 03 , Study no: 14

Type	Quadrat Frequency '96
Deer	3

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 14

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata tridentata</i>																		
Y	85	4	-	-	-	-	-	-	-	-	4	-	-	-	266		4	
	90	-	-	-	2	-	-	-	-	-	2	-	-	-	133		2	
	96	2	-	-	6	-	-	-	-	-	4	-	4	-	160		8	
M	85	7	4	-	-	-	-	-	-	-	11	-	-	-	733	22 17	11	
	90	2	2	-	-	-	-	-	-	-	4	-	-	-	266	22 26	4	
	96	24	5	-	1	-	-	-	-	-	26	-	4	-	600	25 33	30	
D	85	3	4	-	-	-	-	-	-	-	6	-	1	-	466		7	
	90	2	2	-	1	-	-	-	-	-	4	-	-	1	333		5	
	96	4	1	-	1	-	-	-	-	-	5	-	1	-	120		6	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	260		13	
Total Plants/Acre (excluding Dead & Seedlings)												'85	1465	Dec:	32%			
												'90	732		45%			
												'96	880		14%			
<i>Gutierrezia sarothrae</i>																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Y	85	6	-	-	-	-	-	-	-	-	6	-	-	-	400		6	
	90	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
M	85	15	-	-	-	-	-	-	-	-	15	-	-	-	1000	9 10	15	
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266	14 13	4	
	96	12	-	-	1	-	-	-	-	-	13	-	-	-	260	17 22	13	
D	85	2	-	-	-	-	-	-	-	-	1	-	-	1	133		2	
	90	7	-	-	-	-	-	-	-	-	1	-	-	6	466		7	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'85	1533	Dec:	9%			
												'90	732		64%			
												'96	380		0%			
<i>Opuntia spp.</i>																		
Y	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	2	-	-	-	-	-	3	-	-	5	-	-	-	333		5	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	6	-	-	-	-	-	-	-	-	6	-	-	-	400	8 9	6	
	90	6	-	-	-	-	-	2	-	-	7	-	1	-	533	6 11	8	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
Total Plants/Acre (excluding Dead & Seedlings)												'85	466	Dec:	-			
												'90	866		-			
												'96	0		-			

AGE	YR	Form Class (No. of 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	85	18	-	-	-	-	-	-	-	-	17	1	-	-	1200		18	
	90	6	-	-	-	-	-	-	-	-	5	1	-	-	400		6	
	96	53	-	-	-	-	-	-	-	-	53	-	-	-	1060		53	
Y	85	51	2	-	-	-	-	-	-	-	53	-	-	-	3533		53	
	90	38	21	3	2	-	-	1	-	-	45	14	6	-	4333		65	
	96	66	-	-	4	-	-	-	-	-	70	-	-	-	1400		70	
M	85	10	74	-	-	-	-	-	-	-	84	-	-	-	5600	32 21	84	
	90	14	10	-	6	-	-	-	-	-	9	21	-	-	2000	44 30	30	
	96	279	11	-	26	-	-	-	-	-	316	-	-	-	6320	36 35	316	
D	85	2	7	-	-	-	-	-	-	-	9	-	-	-	600		9	
	90	15	10	1	3	-	-	-	-	-	7	17	5	-	1933		29	
	96	8	1	2	2	-	-	-	-	-	11	-	-	2	260		13	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	580		29	
Total Plants/Acre (excluding Dead & Seedlings)												'85	9733	Dec:	6%			
												'90	8266		23%			
												'96	7980		3%			

TREND STUDY 3-15-96 (old 7-2)

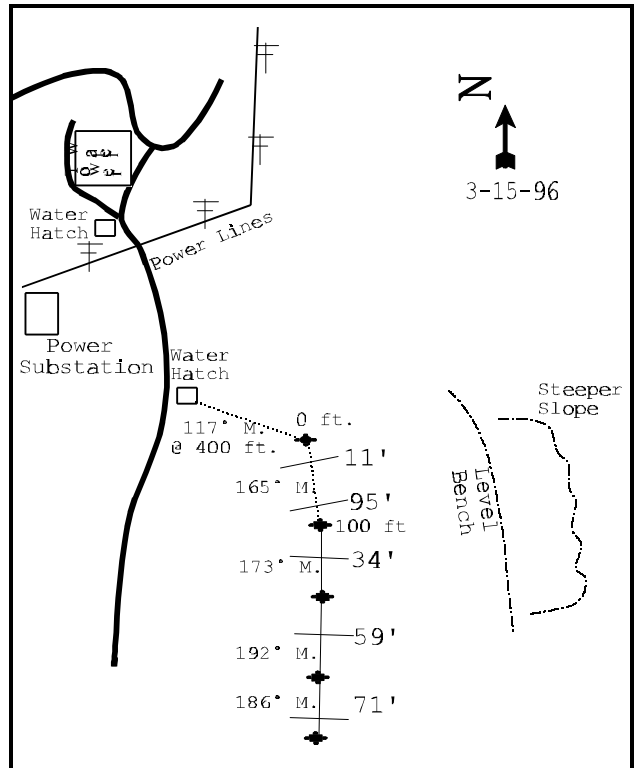
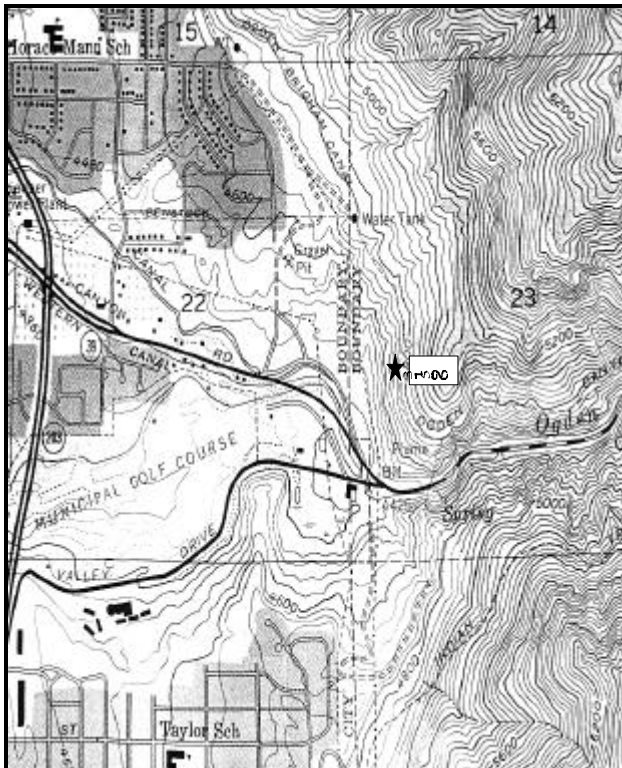
Study site name: Ogden Canyon. Range type: Rubber rabbitbrush.

Compass bearing: frequency baseline 165 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

The transect is located just north of the mouth of Ogden Canyon. From Ogden, drive east on Canyon Road to 1600 East; north on 1600 East to 1350 South; east on 1350 South to Maxfield Drive (1700 E); north on Maxfield to Hislop Dr. and turn right onto Hislop. You should see a water tower east of you on the hillside. Drive past to the water tower, under the power lines and stop at the water hatch on the left hand side of the road. From the water hatch, the study begins 400 feet southeast (117 degrees magnetic) on the edge of a small bench. Walk to the top of the slope above the patch of oak. The baseline stake is 5 to 10 yards south along the rim. The baseline runs 165 degrees magnetic. Line two runs 173 degrees magnetic. Line three runs 192 degrees magnetic. Line four runs 186 degrees magnetic.



Map Name: Ogden, Utah

Diagrammatic Sketch

Township 6N, Range 1W, Section 23

DISCUSSION

Trend Study No. 3-15 (7-2)

This transect, like 3-14, is located in the foothills just above major housing, road and water developments on the Wasatch Front. It is just north of the mouth of Ogden Canyon at an elevation of 4,840 feet. The study samples a rubber rabbitbrush/grass range type situated on a narrow level bench surrounded by steeper oak-covered slopes. It is only representative of this bench which is about 100 feet wide and 500 feet long. The steeper slopes to the north are more open with greater amounts of Wyoming big sagebrush. The area is used moderately heavy by wintering deer and occasionally elk.

The soil is classified as the Kilburn-Francis association. It is slightly more rocky than the Uintah Junction site (3-14). The soil is moderately deep with an estimated effective rooting depth (see methods) of nearly 13 inches. Texture is a sandy loam with a slightly alkaline pH of 7.4. Soil temperature, like the Uintah Junction site, is high averaging over 81°F at a depth of about 15 inches. However, neither phosphorus or potassium are limiting. There is a fair buildup of litter under the vegetation, which helps prevent erosion. According to the USDA Davis-Weber soil survey (1968), the climax vegetation on this soil type and location is 80% perennial grasses, 10% forbs and 10% shrubs. However, annual grasses and weedy annual and perennial forbs dominate the site.

The principle browse species on the site consists of white rubber rabbitbrush and basin big sagebrush. Rabbitbrush currently numbers 700 plants/acre and accounts for 46% of the browse cover, while basin big sagebrush numbers 620 plants/acre and makes up 18% of the shrub cover. The rabbitbrush plants are large, vigorous and lightly hedged. The population appears stable. The basin big sagebrush increased in density between 1990 and 1996 from 266 plants/acre to 620 plants/acre. Comparing the age structure with the previous readings, it appears that the increase in density is primarily due to the larger sample size used in 1996 giving a more accurate estimate. Use of the sagebrush was light in the past and is currently light to moderate.

A few tall Utah serviceberry are found on the site. They have been heavily hedged to the height that deer can reach and now the shrubs average over 10 feet in height with all new growth unavailable. Some of the nearby oaks are tall and have also have been highlined. Oak is not abundant on the site yet it dominates surrounding areas. The most numerous browse species is broom snakeweed, a low value invader, but it only contributes 1% of the browse cover. Large clumps of pricklypear cactus are also present under the rabbitbrush.

The herbaceous understory is abundant, however composition is poor. The grass component is dominated by cheatgrass which accounts for 54% of the grass cover. The next most abundant grass is bulbous bluegrass which makes up an additional 22% of the grass cover. Another undesirable grass found on the site is red threeawn, a warm season perennial increaser. Common preferred perennial grasses include bluebunch wheatgrass, Sandberg bluegrass, and sand dropseed. The bluebunch wheatgrass is large and especially valuable for watershed protection and forage.

Forbs are diverse but not particularly abundant. The most abundant perennial forbs include fleabane, Utah sweetvetch, and hairy goldaster.

1985 APPARENT TREND ASSESSMENT

As with most of the low elevation foothill winter range along the front, the biggest threat is development, roads, and ORV use. If left undisturbed, the soil trend should remain stable. However, the vegetative trend appears to be

downward. The preferred browse species are heavily hedged and becoming unavailable to deer. Broom snakeweed and other invaders appear to be increasing. Management options are limited due to land ownership and watershed concerns.

1990 TREND ASSESSMENT

The vegetative trend has not been as rapidly downward as thought in 1985. Desirable browse remains limited, but the diversity and frequency are unchanged. There is some reproduction of basin big sagebrush and the plants appear vigorous. The shrubs are lightly to moderately hedged, except the heavily browsed serviceberry which occur in very low densities. Broom snakeweed declined in density. Prickly-pear cactus remains common. Perennial grasses dominate the understory. There were shifts in forb species composition, most notably the increases in hairy goldaster, Dyers woad, and decreases in other species. There is minimal erosion on the 20% slope of the lake terrace, but the steeper slopes have less vegetation, detectable erosion with a surface covered with rock and pavement.

TREND ASSESSMENT

soil - stable

browse - slight decline, because of rabbitbrush losses in numbers and vigor

herbaceous understory - slight decline, grasses are holding their own, but the forbs are mostly decreasing with dyers woad increasing greatly

1996 TREND ASSESSMENT

Trend for soil is slightly up. Percent bare ground has declined and is currently only 1%. Herbaceous vegetation is abundant, well dispersed and limits erosion. Trend for browse appears stable at this time. Population density for white rubber rabbitbrush is comparable to 1985 estimates. The sharp decline in 1990 appears questionable due to the general lack of dead rabbitbrush plants (20 plants/acre). There may have been a sampling or identification problem that year. Reproduction of the rabbitbrush is limited but use is light, vigor normal and decadence low at 11%. Basin big sagebrush shows an increase in density (up 57%) since 1990, however this change appears to be the result of the much larger sample used in 1996 giving better population estimates. Density of mature plants has remained similar since 1990. Reproduction is adequate yet vigor is poor on 23% of the population and decadence has risen to 19%. The appearance of oak brush in the sample in 1996 is also the result of the larger sample. Overall trend of the browse appears stable. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses increased slightly but the composition is poorer. The largest increase in sum of nested frequency came from bulbous bluegrass. Sandberg bluegrass and sand dropseed have declined significantly in sum of nested frequency with each reading. Bluebunch wheatgrass has shown an increase in its nested frequency values. Sum of nested frequency for perennial forbs has increased, but overall forbs are not abundant as they only contribute 18% of the herbaceous cover.

TREND ASSESSMENT

soil - up slightly

browse - stable

herbaceous understory - stable, but dominated by cheatgrass and weedy forbs

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 15

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'85	'90	'96	'85	'90	'96	
G	<i>Agropyron spicatum</i>	72	59	77	26	28	27	2.87
G	<i>Aristida longiseta longiseta</i>	_a 91	_b 55	_b 27	36	26	13	1.17
G	<i>Bromus japonicus</i> (a)	-	-	11	-	-	4	.07
G	<i>Bromus tectorum</i> (a)	-	-	309	-	-	89	17.21
G	<i>Poa bulbosa</i>	_a 34	_b 87	_c 158	14	35	51	6.95
G	<i>Poa secunda</i>	_a 120	_b 50	_b 47	47	25	19	.85
G	<i>Sporobolus cryptandrus</i>	_a 111	_{ab} 93	_b 60	48	49	29	2.50
Total for Grasses		428	344	689	171	163	232	31.64
F	<i>Alyssum alyssoides</i> (a)	-	-	15	-	-	8	.06
F	<i>Allium</i> spp.	_a 2	_b 17	_a -	1	7	-	-
F	<i>Ambrosia psilostachya</i>	_a 36	_b -	_b 3	16	-	3	.19
F	<i>Artemisia ludoviciana</i>	_a 63	_b 35	_b 21	23	15	9	.41
F	<i>Cynoglossum officinale</i>	_a -	_a -	_b 45	-	-	23	.41
F	<i>Erigeron</i> spp.	_a 37	_b -	_a 37	-	-	16	1.68
F	<i>Erodium cicutarium</i> (a)	18	-	28	8	-	9	.76
F	<i>Galium</i> spp.	-	-	2	-	-	1	.00
F	<i>Gayophytum ramosissimum</i>	-	-	9	-	-	4	.02
F	<i>Hackelia patens</i>	-	-	2	-	-	1	.00
F	<i>Hedysarum boreale</i>	25	10	22	14	6	9	1.49
F	<i>Heterotheca villosa</i>	_a -	_b 20	_c 10	-	9	5	.98
F	<i>Holosteum umbellatum</i> (a)	-	-	9	-	-	4	.02
F	<i>Isatis tinctoria</i>	_a 3	_b 33	_b 30	1	16	15	.55
F	<i>Lactuca serriola</i>	-	1	-	-	1	-	-
F	<i>Machaeranthera canescens</i>	-	-	6	-	-	3	.01
F	<i>Oenothera caespitosa</i>	2	-	-	1	-	-	-
F	<i>Phlox longifolia</i>	-	-	6	-	-	2	.01
F	<i>Polygonum douglasii</i> (a)	-	-	13	-	-	7	.03
F	<i>Tragopogon dubius</i>	_a 11	_b -	_a 10	5	-	7	.09
F	Unknown forb-perennial	_a 42	_b -	_b 5	16	-	3	.06
Total for Forbs		239	116	273	103	54	129	6.81

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

BROWSE TRENDS --

Herd unit 03 , Study no: 15

Type	Species	Strip Frequency '96	Average Cover % '96
B	Amelanchier utahensis	1	.63
B	Artemisia tridentata tridentata	24	2.71
B	Celtis reticulata	0	.38
B	Chrysothamnus nauseosus albicaulis	22	6.72
B	Chrysothamnus viscidiflorus viscidiflorus	1	.15
B	Gutierrezia sarothrae	15	.22
B	Opuntia spp.	25	1.66
B	Quercus gambelii	5	2.19
Total for Browse		93	14.68

BASIC COVER --

Herd unit 03 , Study no: 15

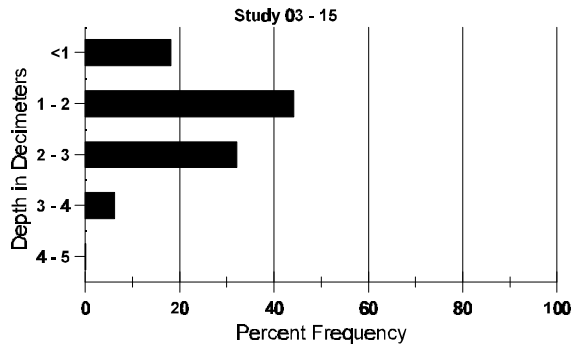
Cover Type	Nested Frequency '96	Average Cover %		
		'85	'90	'96
Vegetation	377	14.25	5.75	53.93
Rock	158	6.00	9.25	9.73
Pavement	132	2.00	14.50	3.67
Litter	383	54.25	66.00	53.44
Cryptogams	25	0	.25	.33
Bare Ground	75	23.50	4.25	.96

SOIL ANALYSIS DATA --

Herd Unit 03, Study no: 15

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
12	81.2 (14.5)	7.4	73.9	12.1	14.0	1.3	12.7	86.4	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 15

Type	Quadrat Frequency '96
Rabbit	4
Elk	1
Deer	21

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 15

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
Amelanchier utahensis																		
M	85	-	-	-	-	-	1	-	-	-	1	-	-	-	66	69	157	1
	90	-	-	1	-	-	-	-	-	-	1	-	-	-	66	108	197	1
	96	-	-	-	-	-	-	1	-	-	1	-	-	-	20	128	154	1
Total Plants/Acre (excluding Dead & Seedlings)												'85	66	Dec:	-			
												'90	66		-			
												'96	20		-			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata tridentata</i>																		
S	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
Y	85	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	11	-	-	-	-	-	-	-	-	11	-	-	-	220			11
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	3	-	-	-	-	-	-	-	3	-	-	-	200	12	14	3
	96	10	3	-	1	-	-	-	-	-	9	-	5	-	280	21	32	14
D	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	1	3	1	1	-	-	-	-	-	4	-	2	-	120			6
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	160			8
Total Plants/Acre (excluding Dead & Seedlings)												'85	266	Dec:	25%			
												'90	266		0%			
												'96	620		19%			
<i>Chrysothamnus nauseosus albicaulis</i>																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	85	10	-	-	-	-	-	-	-	-	10	-	-	-	666	23	31	10
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266	30	41	4
	96	30	-	-	-	-	-	-	-	-	30	-	-	-	600	31	58	30
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	96	3	-	-	1	-	-	-	-	-	4	-	-	-	80			4
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
Total Plants/Acre (excluding Dead & Seedlings)												'85	666	Dec:	0%			
												'90	465		29%			
												'96	700		11%			
<i>Chrysothamnus viscidiflorus viscidiflorus</i>																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	19	38	1
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'90	0		-			
												'96	20		-			

A G E	YR	Form Class (No. of 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	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6	
Y	85	9	-	-	-	-	-	-	-	-	9	-	-	-	600		9	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	38	-	-	-	-	-	-	-	-	38	-	-	-	760		38	
M	85	33	-	-	-	-	-	-	-	-	33	-	-	-	2200	8	6	33
	90	5	-	-	1	-	-	-	-	-	6	-	-	-	400	13	16	6
	96	25	-	-	-	-	-	-	-	-	25	-	-	-	500	9	9	25
D	85	7	-	-	-	-	-	-	-	-	4	-	3	-	466		7	
	90	2	-	-	-	-	-	-	-	-	1	-	-	1	133		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	0		0		
Total Plants/Acre (excluding Dead & Seedlings)												'85	3266	Dec:	14%			
												'90	666		20%			
												'96	1260		0%			
<i>Opuntia spp.</i>																		
Y	85	8	-	-	-	-	-	-	-	-	7	-	-	1	533		8	
	90	3	-	-	-	-	-	-	-	-	2	1	-	-	200		3	
	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40		2	
M	85	7	1	-	-	-	-	-	-	-	7	-	1	-	533	7	7	8
	90	6	-	-	-	-	-	-	-	-	3	1	2	-	400	5	9	6
	96	55	-	-	1	-	-	-	-	-	56	-	-	-	1120	8	18	56
D	85	8	-	-	-	-	-	-	-	-	5	-	1	2	533		8	
	90	9	-	-	-	-	-	-	-	-	4	-	-	5	600		9	
	96	5	-	-	-	-	-	-	-	-	-	-	-	5	100		5	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'85	1599	Dec:	33%			
												'90	1200		50%			
												'96	1260		8%			
<i>Quercus gambelii</i>																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100		5	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	96	24	-	-	-	-	-	-	-	-	24	-	-	-	480	38	44	24
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'90	0		-			
												'96	580		-			

TREND STUDY 3-16-96 (old 7-4)

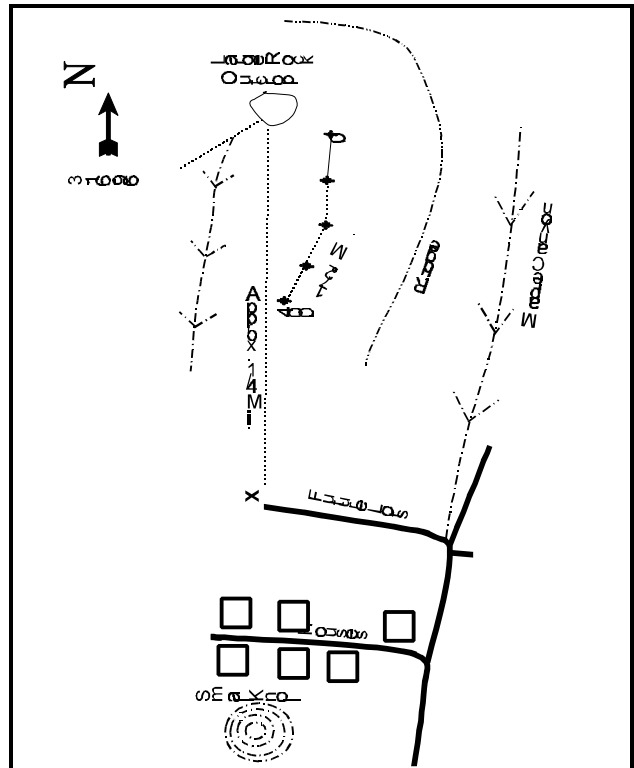
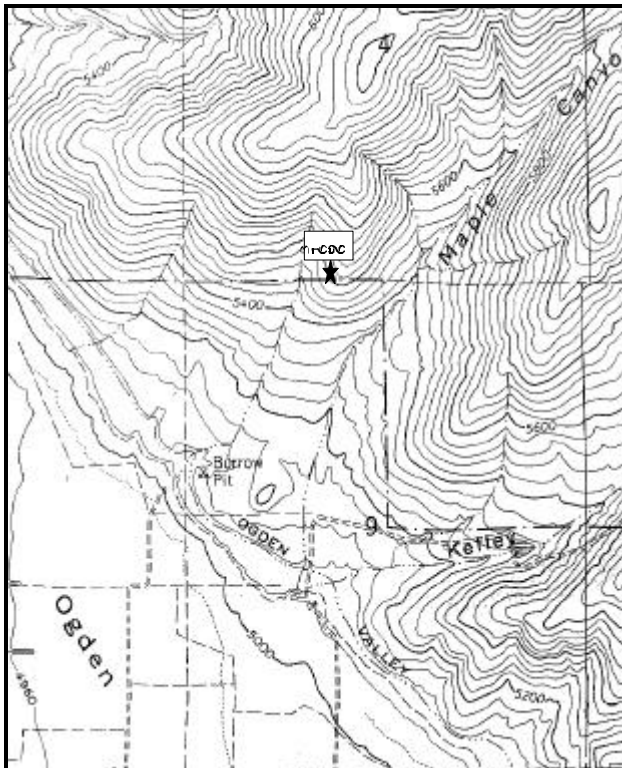
Study site name: Maple Canyon. Range type: Big sagebrush/grass.

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the intersection where Highway U-39 turns 90 degrees and heads east towards Monte Cristo, continue 1.5 miles to mile marker 21 (9000 East). Turn left and proceed 1.1 miles to the mouth of the bowl-shaped draw adjacent to Maple Canyon. Walk up the draw to a 20 foot wide large flat rock located on the east side of the draw approximately half way to the top. From the rock go 35 feet at 135 degrees to the starting point of the baseline. The stake has a red browse tag #7033 attached. Stakes are three feet high rebar stakes. Rock outcrop is on the east side of the drainage about 1 ft. from the bottom of the draw. Most of this area is now being developed. In the future, access to the area may be restricted to homes being built.



Map Name: Brown's Hole, Utah

Diagrammatic Sketch

Township 6N, Range 2E, Section 4, UTM COOR: 4-38-664E 45-70-667N

DISCUSSION

Trend Study No. 3-16 (7-4)

This study is on a privately-owned southwest facing slope within a small draw above Ogden Valley. It has a 40% slope with an elevation of 5,500 feet. The vegetation was originally dominated by mountain big sagebrush and grass, however due to a fire that occurred sometime after 1990, it is now mostly cheatgrass, annual and perennial weeds. The ridge top has some big tooth maple. Land at the base of the hills is being developed for houses, except development on the site itself is doubtful due to the slope. The pellet group transect in nearby Maple Canyon showed a varying trend, with generally moderate deer days use in the past (Jense et al. 1985). Use from grazing cattle also appeared moderate during the 1985 reading. Currently only a few deer pellet groups were found on the site.

The soil is fairly shallow and extremely rocky with an effective rooting depth (see methods) is estimated at just over 10 inches. Rock are common on the surface (31% cover) and through the profile. Texture is a sandy clay loam with a neutral pH of 6.8. A calcium layer is present at a depth of about 12 inches and the soil temperature is moderately high at 70.4°F at a depth of 10 inches. There are currently no erosion problems due to the abundant protective ground cover.

The dominant species on this site used to be mountain big sagebrush and antelope bitterbrush. The sagebrush plants were vigorous and lightly browsed. Thirty-two percent of the population were seedling and young plants in 1985, but the majority were mature plants under two feet tall. The most preferred browse plant was bitterbrush. Most bitterbrush were heavily hedged with little reproduction noted. Many plants were decedent because of past heavy use (67%) during the early 1980's. A fire burned through the area some time after the 1990 reading. Only a few maple, chokecherry, and woods rose remain. These species occur in very small numbers. Some seedling, young, and one mature sagebrush were found on the site, however the nearest existing mature sagebrush stand is about 300 feet down slope.

Escape and thermal cover are nonexistent on the study site, but the rather dense stand of bigtooth maple (*Acer grandidentatum*) over the ridge can provide good cover. The available parts of these large trees have been heavily utilized in the past. Point-center quarter data from 1996 estimate 8 trees/acre with an average diameter of 4.2 inches.

The herbaceous understory was previously dominated by perennial forbs. Large arrowleaf balsamroot and Louisiana sagebrush plants were abundant. After the fire, the site is now dominated by annuals and weeds. Perennial grasses are nearly absent. Cheatgrass and Japanese brome account for 98% of the grass cover while weedy forbs, whitetop, mustard, dyers woad, and flannel Mullen make up almost 40% of the forb cover. Some of the more desirable forbs found in 1985 and 1990 still occur but with reduced frequency.

1985 APPARENT TREND ASSESSMENT

The soil trend is stable because of good litter and vegetative cover. The lack of reproduction and heavy hedging on the bitterbrush could be a downward trend indicator. However, the sagebrush along with the various forbs will continue to provide adequate forage. Cattle may be responsible for the damage to the bitterbrush, and they should be removed from the area when they start feeding heavily on it.

1990 TREND ASSESSMENT

There is good vigor and reproduction of big sagebrush on this privately owned

winter range. Sagebrush increased it's density slightly. The sagebrush receives continued moderate use. The bitterbrush is heavily hedged. These large plants appear increasingly decadent, and there are no signs of reproduction at this time. Grasses are still limited, but several species of valuable forbs remain common. Dyers woad has invaded the area. Rocks comprise 25% of the ground surface, but vegetative and litter cover is generally adequate to hold the soil.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous understory - slightly downward

1996 TREND ASSESSMENT

The soil trend is up due to a decline in percent bare ground from 12% to 3%. Litter cover has declined, however the abundant protective ground cover prevents erosion. Unfortunately, most of the herbaceous ground cover comes from annual grasses which provided abundant fuel for another destructive fire. The browse trend is down and the preferred browse, mountain big sagebrush, has been nearly eliminated from the immediate site. Currently only small numbers of woods rose, maple, and chokecherry remain on the site. Some seedling and young sagebrush were inventoried, but it remains a question if these small plants can effectively compete with the overly abundant herbaceous understory, dominated by annuals and weeds. Trend for the herbaceous understory is also down. Sum of nested frequency for perennial grasses has declined and the remaining species produce less than 1% cover. Sum of nested frequency for perennial forbs has increased primarily due to a very large increase in the sum of nested frequency for prickly lettuce and hoary aster. The previously dominant perennial forbs, Louisiana sagebrush and arrowleaf balsamroot, are still abundant yet with significantly reduced frequency values. Sites like this one and the site at Perry Basin should have been rehabilitated immediately after burning to help avoid the invasion of cheatgrass, noxious weeds, and weedy forbs.

TREND ASSESSMENT

soil - up

browse - down and nearly eliminated by fire

herbaceous understory - down and dominated by annual grasses and weedy forbs

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 16

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'85	'90	'96	'85	'90	'96	
G	Agropyron smithii	2	-	-	1	-	-	-
G	Agropyron spicatum	ab23	a33	b16	10	15	8	.29
G	Bromus japonicus (a)	-	-	287	-	-	92	6.04
G	Bromus tectorum (a)	-	-	352	-	-	99	20.11
G	Poa bulbosa	-	-	2	-	-	1	.00
G	Poa compressa	-	3	-	-	1	-	-
G	Poa fendleriana	a84	b59	c1	33	26	1	.00
G	Poa secunda	-	-	10	-	-	3	.30
Total for Grasses		109	95	668	44	42	204	26.76

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'85	'90	'96	'85	'90	'96	
F	<i>Achillea millefolium</i>	5	5	3	3	3	3	.04
F	<i>Agoseris glauca</i>	-	8	-	-	4	-	-
F	<i>Allium</i> spp.	a15	b-	a6	8	-	4	.02
F	<i>Ambrosia psilostachya</i>	-	-	7	-	-	3	.45
F	<i>Artemisia ludoviciana</i>	a89	ab66	b47	32	26	21	2.04
F	<i>Astragalus beckwithii</i>	-	-	2	-	-	1	.00
F	<i>Balsamorhiza sagittata</i>	a84	a70	b28	36	32	13	7.83
F	<i>Cardaria draba</i>	a-	a-	b54	-	-	20	3.86
F	<i>Calochortus nuttallii</i>	-	-	6	-	-	2	.01
F	<i>Cirsium</i> spp.	-	3	-	-	1	-	-
F	<i>Collomia linearis</i> (a)	-	-	35	-	-	17	.11
F	<i>Collinsia parviflora</i> (a)	-	-	10	-	-	4	.02
F	<i>Crepis acuminata</i>	-	-	2	-	-	1	.15
F	<i>Cryptantha</i> spp.	a-	a-	b79	-	-	32	.26
F	<i>Descurainia pinnata</i> (a)	-	-	100	-	-	38	1.33
F	<i>Draba</i> spp. (a)	-	-	77	-	-	27	.31
F	<i>Erodium cicutarium</i> (a)	-	-	40	-	-	17	.38
F	<i>Erigeron strigosus</i>	-	-	-	-	-	-	.04
F	<i>Galium</i> spp.	-	-	2	-	-	1	.00
F	<i>Gayophytum ramosissimum</i>	-	-	6	-	-	2	.01
F	<i>Holosteum umbellatum</i> (a)	-	-	73	-	-	27	.26
F	<i>Isatis tinctoria</i>	a-	b11	b17	-	6	8	1.31
F	<i>Lactuca serriola</i>	a-	a2	b176	-	1	68	1.59
F	<i>Lepidium</i> spp.	-	-	7	-	-	3	.01
F	<i>Lithospermum</i> spp.	-	-	4	-	-	1	.03
F	<i>Lupinus argenteus</i>	6	1	3	2	1	1	.15
F	<i>Machaeranthera</i> spp	a-	a-	b105	-	-	45	.96
F	<i>Microsteris gracilis</i> (a)	-	-	3	-	-	1	.00
F	<i>Phlox longifolia</i>	a14	b3	ab7	6	1	3	.04
F	<i>Polygonum douglasii</i> (a)	-	-	4	-	-	1	.00
F	<i>Rumex</i> spp.	3	-	-	1	-	-	-
F	<i>Sisymbrium altissimum</i> (a)	a44	b2	c72	17	2	32	.60
F	<i>Stanleya viridiflora</i>	4	3	-	2	1	-	-
F	<i>Tragopogon dubius</i>	a11	b27	a9	4	16	3	.02
F	Unknown forb-perennial	a17	b3	b-	6	1	-	-
F	<i>Verbascum thapsus</i>	-	-	7	-	-	3	1.18
F	<i>Vicia americana</i>	a-	a-	b13	-	-	6	.13
Total for Forbs		292	204	1004	117	95	408	23.20

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

BROWSE TRENDS --

Herd unit 03 , Study no: 16

Type	Species	Strip Frequency '96	Average Cover % '96
B	Acer grandidentatum	1	.38
B	Artemisia tridentata vaseyana	9	.09
B	Gutierrezia sarothrae	1	-
B	Prunus virginiana	3	.93
B	Purshia tridentata	0	-
B	Rosa woodsii	1	.15
Total for Browse		15	1.55

BASIC COVER --

Herd unit 03 , Study no: 16

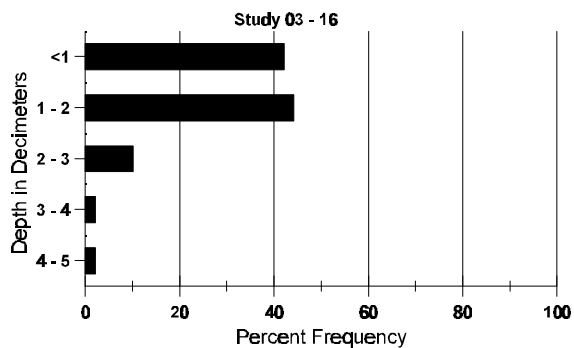
Cover Type	Nested Frequency '96	Average Cover %		
		'85	'90	'96
Vegetation	380	6.50	6.25	50.18
Rock	321	20.75	23.75	30.76
Pavement	115	1.00	1.00	.65
Litter	384	54.25	57.00	42.73
Cryptogams	3	.50	0	.03
Bare Ground	145	17.00	12.00	2.88

SOIL ANALYSIS DATA --

Herd Unit 03, Study no: 16

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
10.1	70.4 (10.2)	6.8	52.6	23.4	24.0	2.9	27.6	272.0	.4

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 16

Type	Quadrat Frequency '96
Deer	6

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 16

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Acer grandidentatum</i>																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'90	0		-			
												'96	20		-			
<i>Artemisia tridentata vaseyana</i>																		
S	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	14	-	-	-	-	-	-	-	-	14	-	-	-	280		14	
Y	85	10	-	-	-	-	-	-	-	-	10	-	-	-	666		10	
	90	4	3	-	-	-	-	-	-	-	7	-	-	-	466		7	
	96	9	-	-	2	-	-	-	-	-	11	-	-	-	220		11	
M	85	18	3	-	-	-	-	-	-	-	21	-	-	-	1400	19 19	21	
	90	-	24	-	-	-	-	-	-	-	24	-	-	-	1600	22 26	24	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	- -	1	
D	85	2	1	-	-	-	-	-	-	-	1	2	-	-	200		3	
	90	1	6	-	-	-	-	-	-	-	6	-	1	-	466		7	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	540		27	
Total Plants/Acre (excluding Dead & Seedlings)												'85	2266	Dec:	9%			
												'90	2532		18%			
												'96	240		0%			
<i>Gutierrezia sarothrae</i>																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	9 16	1	
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'90	0		-			
												'96	20		-			

A G E	YR	Form Class (No. of 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>																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	18	-	-	-	-	-	-	-	-	18	-	-	-	360		18	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	1	-	-	-	-	-	-	-	-	-	-	1	20		1	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	0%			
												'90	0		0%			
												'96	80		25%			
<i>Purshia tridentata</i>																		
M	85	-	2	2	-	-	-	-	-	-	4	-	-	-	266	28 48	4	
	90	-	1	1	-	-	-	-	-	-	2	-	-	-	133	35 46	2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
D	85	-	-	2	-	-	-	-	-	-	1	-	1	-	133		2	
	90	-	1	3	-	-	-	-	-	-	4	-	-	-	266		4	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	200		10	
Total Plants/Acre (excluding Dead & Seedlings)												'85	399	Dec:	33%			
												'90	399		67%			
												'96	0		0%			
<i>Rosa woodsii</i>																		
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	21 47	1	
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'90	0		-			
												'96	20		-			

TREND STUDY 3-17-96 (old 7-5)

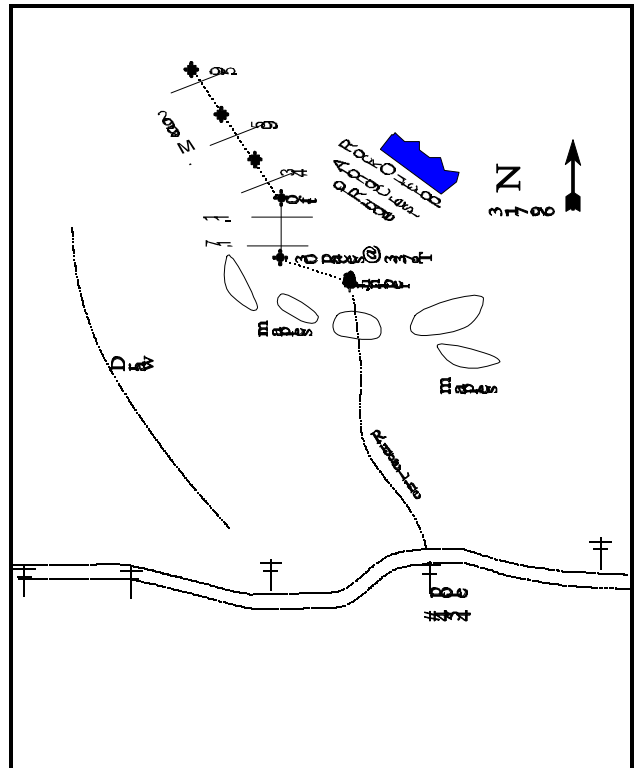
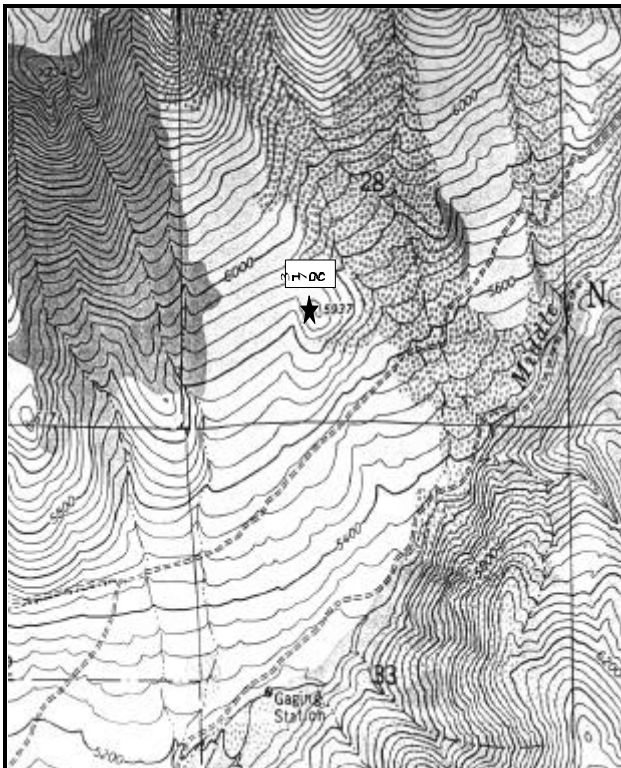
Study site name: Middle Fork. Range type: Low sagebrush.

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

LOCATION DESCRIPTION

From 5500 East 2200 North in Eden, proceed 0.4 miles to a bend. Continue east 1.9 miles further to where the main road bends to the southeast. Continue straight for 1.9 miles to the state land (middle fork wildlife management area). From the sign, drive 0.1 miles to a three way intersection. Stay left and go through the gate. Continue east 0.05 miles to a fork. Stay left. From the fork continue 0.05 miles to a creek. Cross the creek and continue down a ripped rough road which is now a horse trail for 0.8 miles going under power lines to pole #454. Park here and walk up the ridge line beyond the maples to a lone juniper. The 100-foot stake of the frequency baseline is 30 paces away at a bearing of 337 degrees.



Map Name: Brown's Hole, Utah

Diagrammatic Sketch

Township 7N, Range 2E, Section 28, UTM COOR: 4-38-103E 45-75-432N

DISCUSSION

Trend Study No. 3-17 (7-5)

This sagebrush/grass study is on a rocky, a 20% slope, and a west-southwest aspect overlooking the Middle Fork of the Ogden River. The elevation is 5,900 feet. The DWR has purchased the land. Although it was heavily grazed to some extent in the past, there are no recent signs of livestock use. Currently (1996), Elk pellet groups are common and light deer sign is also found on the site. The site is bordered on the east by a large rock outcrop and on the west by maple trees.

The soil is shallow and very rocky with large rocks and rock outcrops abundant on the surface. Soil texture is a loam, with a slightly acid pH of 6.4. Effective rooting depth (see methods) is estimated at almost 9 inches. Due to the rocky nature of the site, average soil temperature could only be probed to about 9 inches which was high at 76°F. There is little bare ground and erosion is not currently a problem on the site.

The most abundant browse plant on the transect currently (1996) is low sagebrush (*Artemisia arbuscula*) which accounts for 80% of the shrub cover. This sagebrush averages about one foot in height and is generally shows light to moderate utilization. Sagebrush density is currently 6,620 plants/acre and has remained fairly consistent between years. Other more valuable species in terms of preference are mountain big sagebrush, antelope bitterbrush, and serviceberry. These key species are found in small numbers however. They have been moderately to heavily hedged in the past, yet current use is light to moderate. No serviceberry was sampled in 1996 and reproduction of the other preferred species is limited. A spreading, but still open stand of bigtooth maple provides fair resting cover, but thermal cover would be limited on the site in winter.

Grasses are moderately abundant and diverse. The most common species is bulbous bluegrass which provides 50% of the grass cover. Cheatgrass and Japanese brome are also found on the site and produce 15% of the grass cover. Other somewhat common perennial grasses include bluebunch wheatgrass and subalpine needlegrass. Forbs are also fairly abundant and diverse. However, composition is poor with pacific aster, western yarrow, yellow salsify, and mulesears wyethia providing 72% of the forb cover.

1985 APPARENT TREND ASSESSMENT

Overall range trend is stable. There is a variety of browse and herbaceous forage available. The lack of reproduction of the sagebrush and bitterbrush is the one troubling factor.

1990 TREND ASSESSMENT

Sagebrush canopy cover on this study, comprised of low sagebrush and a smaller amount of mountain big sagebrush, averages almost 15%. The low sagebrush population is relatively stable in terms of numbers, but the percentage of decadent plants increased to 52%. This could be explained by the very high densities in conjunction with the extended drought. Some areas have an abundance of seedlings. No young mountain big sagebrush could be identified, and that population also shows an increase in the percentage of decadent shrubs. The sagebrush display average vigor and generally moderate hedging. Bitterbrush is uncommon, but several young plants were encountered. The oaks on top of the hill are kept short by heavy use. Grasses are dense, including several species of annual bromes. Sixteen species of perennial forbs were encountered. There is no sign of soil erosion.

TREND ASSESSMENT

soil - stable

browse - stable

herbaceous - stable, but poor composition

1996 TREND ASSESSMENT

Trend for soil is up with a decline in percent bare ground from 6% to <1%. Vegetation and litter cover are abundant, well dispersed, and adequately protect the soil from erosion. Trend for low sagebrush is up slightly. Its density has declined slightly, however percent decadence has also declined from 52% to 11%. Recruitment is currently excellent with a biotic potential (proportion of seedlings) of 19% and 21% of the population consists of young plants. Utilization is light to moderate. The other more preferred mountain big sagebrush and antelope bitterbrush occur in very small numbers. Some of the change in density in these species is the result of the larger, more representative sample used in 1996. The lack of dead plants for bitter brush suggest that the previous samples overestimated its density. This also appears to be the case for mountain big sagebrush which declined by over 200 plants/acre but only 40 dead plants/acre were estimated. Both of these species seem to be just hanging on at this site and without better reproduction in the future may further declines in their respective populations. The herbaceous understory is abundant but composition is very poor. Sum of nested frequency for perennial grasses has remained similar to 1990 yet the preferred bluebunch wheatgrass has declined significantly in sum of nested frequency. Sandberg bluegrass has also declined significantly in sum of nested frequency, while bulbosa bluegrass increased dramatically from a quadrat frequency of only 14% in 1990 to 81% in 1996. Cheatgrass and Japanese brome are also common. Sum of nested frequency for perennial forbs has increased since 1990. However most of the increase comes from a significant 15 fold increase in sum of nested frequency for yellow salsify (11 to 169). Currently, western yarrow, pacific aster, yellow salsify, and mulesears wyethia provide 72% of the forb cover. Trend for the herbaceous understory is considered slightly down do to the undesirable composition changes.

TREND ASSESSMENT

soil - up

browse - up slightly for low sagebrush

herbaceous - down slightly with a poor composition of annuals and weeds

HERBACEOUS TRENDS --

Herd unit 03 , Study no: 17

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'85	'90	'96	'85	'90	'96	
G	Agropyron dasystachyum	-	-	10	-	-	4	.09
G	Agropyron spicatum	a233	a254	b173	79	88	68	4.50
G	Bromus japonicus (a)	-	-	211	-	-	70	1.26
G	Bromus tectorum (a)	-	-	132	-	-	41	1.42
G	Koeleria cristata	-	-	2	-	-	1	.00
G	Melica bulbosa	42	26	28	18	11	11	.20
G	Poa bulbosa	a4	b30	c265	1	14	81	9.23
G	Poa fendleriana	a-	b19	a-	-	8	-	-
G	Poa secunda	a155	b220	c32	58	77	14	.53

Type	Species	Nestled Frequency			Quadrat Frequency			Average Cover % '96
		'85	'90	'96	'85	'90	'96	
G	<i>Stipa columbiana</i>	a-	a1	b43	-	-	16	1.00
G	<i>Stipa lettermani</i>	1	-	-	1	-	-	-
Total for Grasses		435	550	896	157	199	306	18.27
F	<i>Achillea millefolium</i>	ab9	a3	b19	5	1	9	.31
F	<i>Agoseris glauca</i>	20	33	21	11	19	11	.13
F	<i>Allium</i> spp.	a38	b-	b-	20	-	-	-
F	<i>Arabis</i> spp.	-	-	1	-	-	1	.00
F	<i>Artemisia ludoviciana</i>	a71	a45	b5	25	20	2	.06
F	<i>Astragalus beckwithii</i>	-	-	3	-	-	1	.03
F	<i>Aster chilensis</i>	a69	a70	b21	23	24	8	.92
F	<i>Balsamorhiza sagittata</i>	a18	b6	b1	9	4	1	.21
F	<i>Borago officinalis</i>	8	-	-	3	-	-	-
F	<i>Calochortus nuttallii</i>	a5	ab2	b-	4	1	-	-
F	<i>Castilleja</i> spp.	-	4	1	-	1	1	.03
F	<i>Cirsium pulchellum</i>	10	10	5	6	5	3	.04
F	<i>Collomia linearis</i> (a)	-	-	23	-	-	10	.71
F	<i>Comandra pallida</i>	7	4	7	3	4	3	.18
F	<i>Collinsia parviflora</i> (a)	-	-	1	-	-	1	.00
F	<i>Crepis acuminata</i>	3	-	-	1	-	-	-
F	<i>Draba</i> spp. (a)	-	-	41	-	-	14	.12
F	<i>Erodium cicutarium</i> (a)	-	-	1	-	-	1	.00
F	<i>Erigeron strigosus</i>	a-	a-	b11	-	-	5	.22
F	<i>Galium</i> spp.	-	-	1	-	-	1	.00
F	<i>Grindelia squarrosa</i>	-	-	4	-	-	1	.03
F	<i>Hackelia patens</i>	a-	b26	c7	-	9	4	.19
F	<i>Holosteum umbellatum</i> (a)	-	-	14	-	-	4	.16
F	<i>Lactuca serriola</i>	-	9	2	-	3	1	.00
F	<i>Lomatium dissectum</i>	a-	a2	b33	-	1	15	.37
F	<i>Lupinus argenteus</i>	a1	b5	ab3	1	3	1	.15
F	<i>Machaeranthera</i> spp	a-	a-	b57	-	-	22	.23
F	<i>Polygonum douglasii</i> (a)	-	-	14	-	-	7	.03
F	<i>Senecio integerrimus</i>	3	3	-	1	1	-	-
F	<i>Taraxacum officinale</i>	a-	a-	b8	-	-	4	.08
F	<i>Tragopogon dubius</i>	a4	a11	b169	2	7	71	2.69
F	Unknown forb-perennial	a29	b-	b-	15	-	-	-
F	<i>Wyethia amplexicaulis</i>	a14	a10	b44	5	5	18	3.80
Total for Forbs		309	243	517	134	108	220	10.77

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

BROWSE TRENDS --

Herd unit 03 , Study no: 17

Type	Species	Strip Frequency '96	Average Cover % '96
B	Acer grandidentatum	2	1.25
B	Artemisia arbuscula	92	11.80
B	Artemisia tridentata vaseyana	7	1.49
B	Gutierrezia sarothrae	9	.26
B	Purshia tridentata	1	-
Total for Browse		111	14.81

BASIC COVER --

Herd unit 03 , Study no: 17

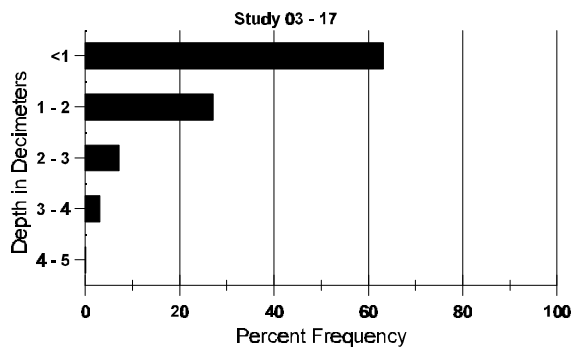
Cover Type	Nested Frequency '96	Average Cover %		
		'85	'90	'96
Vegetation	382	9.25	12.00	48.04
Rock	264	14.50	15.75	19.16
Pavement	136	2.75	9.50	2.04
Litter	389	55.50	56.50	57.15
Cryptogams	83	1.00	.50	.52
Bare Ground	46	17.00	5.75	.34

SOIL ANALYSIS DATA --

Herd Unit 03, Study no: 17

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
8.8	7602 (9.1)	6.4	38.6	32.4	29.0	3.6	13.8	105.6	.4

Stoniness Index



PELLET GROUP FREQUENCY --
 Herd unit 03 , Study no: 17

Type	Quadrat Frequency '96
Rabbit	1
Elk	25
Deer	8

BROWSE CHARACTERISTICS --
 Herd unit 03 , Study no: 17

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Acer grandidentatum</i>																		
S	85	3	-	-	-	-	-	-	-	-	3	-	-	-	200		3	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	85	14	-	-	-	-	-	-	-	-	14	-	-	-	933		14	
	90	6	-	-	2	-	-	2	-	-	10	-	-	-	666		10	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66	14	10	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	
Total Plants/Acre (excluding Dead & Seedlings)												'85	999	Dec:	-			
												'90	666		-			
												'96	40		-			
<i>Amelanchier utahensis</i>																		
Y	85	-	4	3	-	-	-	-	-	-	7	-	-	-	466		7	
	90	-	8	-	-	-	-	-	-	-	8	-	-	-	533		8	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
D	85	-	-	1	-	-	1	-	-	-	1	-	-	1	133		2	
	90	-	3	-	1	-	-	-	-	-	3	-	-	1	266		4	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'85	599	Dec:	22%			
												'90	799		33%			
												'96	0		0%			

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia arbuscula</i>																		
S	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	63	-	-	-	-	-	-	-	-	63	-	-	-	1260		63	
Y	85	16	-	-	-	-	-	-	-	-	16	-	-	-	1066		16	
	90	-	1	-	-	-	-	-	-	-	1	-	-	-	66		1	
	96	70	1	-	-	-	-	-	-	-	66	-	5	-	1420		71	
M	85	77	-	-	-	-	-	-	-	-	67	-	10	-	5133	10 14	77	
	90	21	25	4	-	-	-	-	-	-	50	-	-	-	3333	12 18	50	
	96	132	88	2	-	-	-	-	-	-	203	-	19	-	4440	13 21	222	
D	85	10	-	-	-	-	-	-	-	-	6	-	4	-	666		10	
	90	29	25	3	-	-	-	-	-	-	35	-	-	22	3800		57	
	96	15	23	-	-	-	-	-	-	-	24	-	8	6	760		38	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	780		39	
Total Plants/Acre (excluding Dead & Seedlings)												'85	6865	Dec:	10%			
												'90	7199		53%			
												'96	6620		11%			
<i>Artemisia tridentata vaseyana</i>																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	85	6	-	-	-	-	-	-	-	-	6	-	-	-	400	26 19	6	
	90	4	-	-	-	-	-	-	-	-	4	-	-	-	266	29 41	4	
	96	6	3	-	-	-	-	-	-	-	9	-	-	-	180	26 47	9	
D	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133		2	
	90	2	1	-	-	-	-	-	-	-	2	-	-	1	200		3	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	40		2	
Total Plants/Acre (excluding Dead & Seedlings)												'85	533	Dec:	25%			
												'90	466		43%			
												'96	200		0%			
<i>Gutierrezia sarothrae</i>																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	46	-	-	-	-	-	-	-	-	46	-	-	-	920		46	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200		10	
M	85	2	-	-	-	-	-	-	-	-	2	-	-	-	133	12 9	2	
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	9 11	1	
	96	10	-	-	-	-	-	-	-	-	10	-	-	-	200	9 11	10	
Total Plants/Acre (excluding Dead & Seedlings)												'85	133	Dec:	-			
												'90	66		-			
												'96	400		-			

A G E	YR	Form Class (No. of 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>Purshia tridentata</i>																		
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	85	-	-	1	-	-	-	-	-	-	1	-	-	-	66	8	24	1
	90	1	-	-	-	-	-	-	-	-	1	-	-	-	66	11	31	1
	96	-	2	-	-	-	-	-	-	-	2	-	-	-	40	20	54	2
D	85	-	-	-	-	-	1	-	-	-	1	-	-	-	66		1	
	90	1	1	-	-	-	-	-	-	-	1	-	-	1	133		2	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Total Plants/Acre (excluding Dead & Seedlings)												'85	132	Dec:	50%			
												'90	332		40%			
												'96	40		0%			
<i>Quercus gambelii</i>																		
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
Total Plants/Acre (excluding Dead & Seedlings)												'85	0	Dec:	-			
												'90	0		-			
												'96	0		-			

TREND STUDY 3-18-96 (old 7-6)

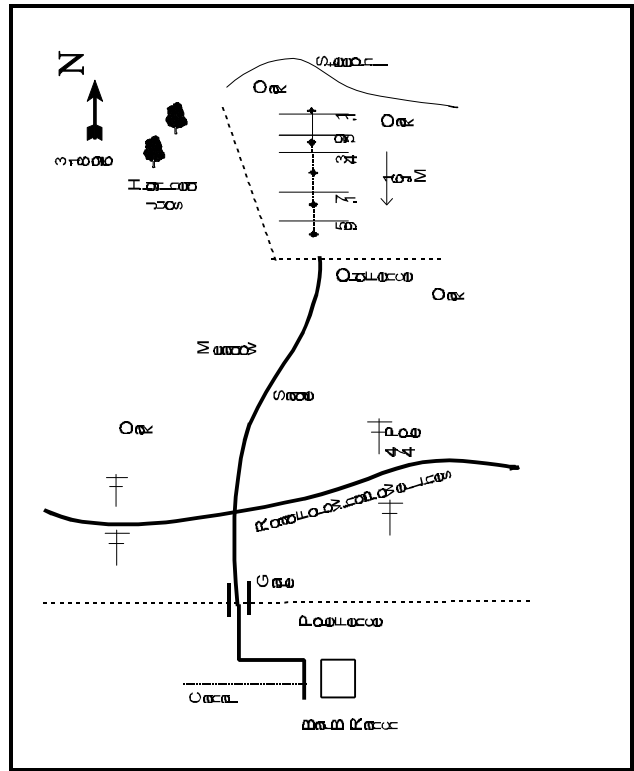
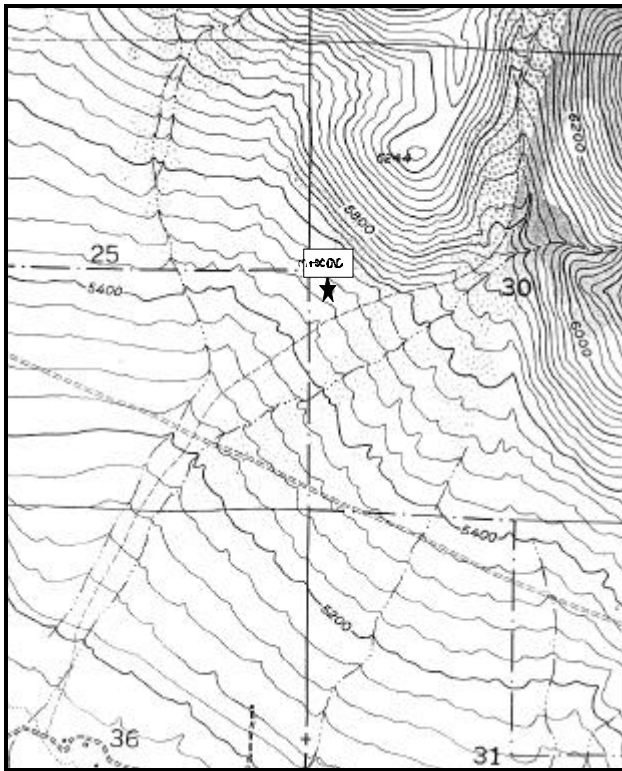
Study site name: Geertsen Canyon. Range type: Big sagebrush-grass.

Compass bearing: frequency baseline 161 degrees magnetic.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) Line 1 (11 & 95ft), line 2 (34ft), line 3 (71ft), line 4 (59ft).

LOCATION DESCRIPTION

Contact Bill Hadlock before doing this site. From the intersection of 5500 East and 2200 North in Eden, go south for 0.35 miles, then turn left and go 0.75 miles east to the Huntsville Stake Center. Continue east 0.2 miles to the gate of Bar B Ranch. Turn left through the gate and go 0.9 miles north up the ranch road past a farm house on the left to another gate. Park here and walk through this gate 0.2 miles to a road along a canal. Turn left and walk 0.1 miles north to a dirt road, then turn right and go 0.55 miles to the high tension power lines. Just to the east is power pole # 474. From pole 474, walk 1/3 of a mile at 11 degrees magnetic to the 0-foot baseline stake. The 0-foot baseline is marked by a 4-foot rebar stake (tagged #7026) located 100 feet down from the oak edge and 100 feet southwest of a large maple. The baseline runs 161 degrees magnetic.



Map Name: Huntsville, Utah

Diagrammatic Sketch

Township 7N, Range 2E, Section 30, UTM COR: 4-35-023E 45-74-124N

DISCUSSION

Trend Study No. 3-18 (7-6)

Located on a hillside north of the mouth of Geertsen Canyon, this study is on Wolf Creek conservation easement land that is managed by the DWR for wildlife and recreation. The site samples a mountain big sagebrush-grass type on a 25% slope with a southwest aspect. Elevation is approximately 5,500 feet. The area has been heavily grazed by horses and cattle in the past, but current livestock use is light. The Geertsen Hollow area is known for wintering concentrations of deer. The pellet group transect near there has measured high levels of use in the past. The average from 1980-85 was 97 deer days use/hectare, the highest on the herd unit (Jense et al. 1985). Two deer antlers and one large elk antler were found on the site during the 1985 reading. Currently (1996), mostly elk are utilizing the site with moderate amounts of pellet groups encountered (27% quadrat frequency), while that of deer showed low quadrat frequencies.

Soils in the area are formed from a weathered conglomerate of sandstone and quartzite. The soil is deep and well-drained but permeability is slow due to clay in the subsoil (USDA 1980). Soil at the site is extremely rocky on the surface and through the profile. Due to the rocky nature of the soil, effective rooting depth (see methods) was estimated at only about 6 inches. Soil on the site has a sandy clay loam texture with a slightly acid pH of 6.2. The hazard of erosion is high if unprotected, but the area has an adequate covering of vegetation and litter. Rocks and pavement make up 13% of the surface cover.

Mountain big sagebrush is the only important browse species present on the study site. Oak and maples are found further up the slope and along the creek. Some of the oak and junipers nearby have been highlined. Density of the mountain big sagebrush is now estimated at 2,080 plants/acre, which is relatively sparse for mountain big sagebrush. The sagebrush shows signs of light to moderate hedging. It is rather low growing with an average height under 1½ feet, but it is healthy and vigorous in appearance. Broom snakeweed was picked up in the larger 1996 sample. Its current density is estimated at 740 plants/acre.

The herbaceous vegetation accounts for most of the cover on the site, however composition is extremely poor. Bulbous bluegrass is the most abundant perennial grass. It accounts for 77% of the grass cover. Bulbose bluegrass provides excellent early spring forage and fair erosion control. However, like cheatgrass, it dries up early in the season and can become a fire hazard. Other, more high-yielding, long-lived perennial species are present in very low numbers. These include bluebunch wheatgrass, thickspike wheatgrass, Kentucky bluegrass, and letterman needlegrass. Annual brome grasses produce an additional 19% of the grass cover.

The forb composition is also extremely poor. Many of the more common forbs are considered weeds, although they may provide some big game forage. Weedy increases including, western ragweed, pacific aster, tarweed, curlycup gumweed, yellow salsify, and moth Mullen account for 81% of the forb cover. Dyers woad is also present in small numbers. It was reported in the 1985 that caterpillars and grasshoppers did considerable damage to the herbaceous vegetation that summer. In 1996, some of the yellow salsify (*Tragopogon dubius*) had been utilized most likely by elk.

1985 APPARENT TREND ASSESSMENT

Basically, the vegetative trend is up in terms of deer winter range. The sagebrush is increasing and there is a dense stand of bulbous bluegrass. Livestock grazing should be restricted until the dense grasses start to interfere with sagebrush seedling establishment. A rest from grazing will allow the more

palatable and desirable species to recover and compete with the invader species that are present.

1990 TREND ASSESSMENT

Mountain big sagebrush displays characteristics of a downward trend on this winter range. Compared to 1985, there are significantly fewer young sagebrush and a large increase in the percentage of decadent plants which has gone from 10% to 76%. This shrub decadency, reduced vigor, and low growth is due mostly to moisture stress. Bulbous bluegrass forms an almost complete ground cover. Other grasses are relatively uncommon.

TREND ASSESSMENT

soil - stable

browse - down

herbaceous understory - down, poor condition because of the very high densities for the increaser, bulbous bluegrass

1996 TREND ASSESSMENT

Trend for soil is up due to a large decline in percent bare ground from 12% to 1%. Litter cover declined but this is likely due to misidentification of dried up bulbous bluegrass as litter cover instead of vegetation cover. There is currently no erosion problem on the site due to the abundant vegetation and litter cover. Trend for mountain big sagebrush is up due to an increase in density, a decline in decadence, and an improvement in vigor. The stand contains an adequate number of seedlings and abundant young plants. Utilization is currently light to moderate. The herbaceous understory trend is stable, however composition is extremely poor. The grass component is dominated by bulbous bluegrass and annual brome grasses which combine to produce 97% of the grass cover. Sum of nested frequency of perennial grasses is similar to 1990 estimates. The forb composition is also poor. Undesirable weeds dominate. It appears that tar weed was present in 1985 but was identified as only an unknown forb. In 1990, tar weed was likely present but not counted because it is an annual. Sum of nested frequency of perennial forbs has increased dramatically, however due to the poor composition, trend is considered down slightly.

TREND ASSESSMENT

soil - up

browse - up

herbaceous - down slightly due to increasingly poor composition

HERBACEOUS TRENDS --
Herd unit 03 , Study no: 18

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover % '96
		'85	'90	'96	'85	'90	'96	
G	Agropyron dasystachyum	3	-	1	1	-	1	.00
G	Agropyron spicatum	a-	b11	ab2	-	5	2	.18
G	Bromus japonicus (a)	-	-	328	-	-	96	8.00
G	Bromus tectorum (a)	-	-	29	-	-	10	.29
G	Poa bulbosa	a366	b355	a365	98	100	98	32.20
G	Poa fendleriana	ab5	a14	b-	2	6	-	-
G	Poa pratensis	-	-	5	-	-	2	.03

Type	Species	Nestled Frequency			Quadrat Frequency			Average Cover % '96
		'85	'90	'96	'85	'90	'96	
G	<i>Poa secunda</i>	a ⁻	a ⁻	b ¹⁴	-	-	5	.02
G	<i>Stipa lettermani</i>	a ⁻	a ⁻	b ²⁸	-	-	12	.96
Total for Grasses		374	380	772	101	111	226	41.71
F	<i>Achillea millefolium</i>	a ¹²	ab ¹³	b ³²	5	6	13	.38
F	<i>Agoseris glauca</i>	1	5	3	1	2	1	.00
F	<i>Allium</i> spp.	a ¹²	b ⁻	b ⁻	5	-	-	-
F	<i>Ambrosia psilostachya</i>	a ⁹⁷	b ¹¹	c ¹²⁵	34	6	46	2.45
F	<i>Artemisia ludoviciana</i>	39	24	35	16	12	15	.79
F	<i>Aster chilensis</i>	a ⁻	b ¹²¹	c ¹⁹⁹	-	49	69	4.63
F	<i>Cirsium</i> spp.	-	-	2	-	-	1	.00
F	<i>Collomia</i> spp. (a)	-	-	10	-	-	3	.21
F	<i>Madia glomerata</i>	a ⁻	a ⁻	b ²⁶⁹	-	-	91	3.99
F	<i>Cymopterus</i> spp.	-	-	1	-	-	1	.00
F	<i>Erodium cicutarium</i> (a)	a ¹⁹	b ⁻	a ²⁹	8	-	12	.23
F	<i>Erigeron strigosus</i>	10	-	3	4	-	2	.03
F	<i>Eriogonum umbellatum</i>	-	1	-	-	1	-	-
F	<i>Grindelia squarrosa</i>	a ⁻	a ¹	b ³⁰	-	1	12	.50
F	<i>Isatis tinctoria</i>	-	-	1	-	-	1	.06
F	<i>Lappula occidentalis</i> (a)	-	-	19	-	-	9	.21
F	<i>Lactuca serriola</i>	a ⁻	a ⁻	b ⁴⁵	-	-	21	.20
F	<i>Lomatium</i> spp.	-	5	-	-	3	-	-
F	<i>Machaeranthera canescens</i>	a ⁻	a ⁻	b ¹⁹⁰	-	-	71	1.07
F	<i>Polygonum douglasii</i> (a)	-	-	2	-	-	1	.00
F	<i>Rumex crispus</i>	-	-	2	-	-	1	.03
F	<i>Tragopogon dubius</i>	a ²⁶	b ⁵	c ¹²⁶	15	2	57	1.43
F	Unknown forb-perennial	a ³³⁷	b ⁻	b ⁻	120	-	-	-
F	<i>Verbascum blattaria</i>	a ³	a ⁻	b ³³	1	-	16	.79
Total for Forbs		556	186	1156	209	82	443	17.06

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

BROWSE TRENDS --

Herd unit 03 , Study no: 18

Type	Species	Strip Frequency '96	Average Cover % '96
B	Artemisia tridentata vaseyana	41	2.25
B	Gutierrezia sarothrae	12	.24
Total for Browse		53	2.49

BASIC COVER --

Herd unit 03 , Study no: 18

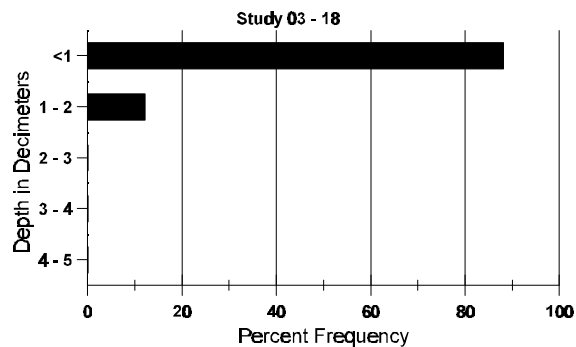
Cover Type	Nested Frequency '96	Average Cover %		
		'85	'90	'96
Vegetation	389	16.75	7.75	62.06
Rock	218	11.25	10.25	11.92
Pavement	146	4.25	4.25	.96
Litter	384	48.50	65.50	35.29
Cryptogams	7	1.00	.25	.04
Bare Ground	139	18.25	12.00	1.08

SOIL ANALYSIS DATA --

Herd Unit 03, Study no: 18

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
5.6	79.8 (4.22)	6.2	44.7	27.0	28.3	3.0	14.5	153.6	.6

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 03 , Study no: 18

Type	Quadrat Frequency '96
Elk	27
Deer	4
Cattle	4

BROWSE CHARACTERISTICS --
Herd unit 03 , Study no: 18

A G E	YR	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches)		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4		Ht.	Cr.	
<i>Artemisia tridentata vaseyana</i>																		
S	85	1	-	-	-	-	-	-	-	-	1	-	-	-	66		1	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
Y	85	7	1	-	-	-	-	-	-	-	8	-	-	-	533		8	
	90	1	1	-	-	-	-	-	-	-	2	-	-	-	133		2	
	96	51	-	-	6	-	-	-	-	-	57	-	-	-	1140		57	
M	85	19	-	-	-	-	-	-	-	-	19	-	-	-	1266	19 22	19	
	90	1	1	-	-	-	-	-	-	-	2	-	-	-	133	12 16	2	
	96	9	18	3	-	-	-	-	-	-	27	-	3	-	600	18 38	30	
D	85	3	-	-	-	-	-	-	-	-	2	-	1	-	200		3	
	90	11	2	-	-	-	-	-	-	-	1	-	-	12	866		13	
	96	4	2	-	-	-	-	-	-	-	3	-	1	2	120		6	
X	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	260		13	
Total Plants/Acre (excluding Dead & Seedlings)											'85	1999	Dec:	10%				
											'90	1132		77%				
											'96	1860		6%				
<i>Gutierrezia sarothrae</i>																		
S	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	3	-	-	-	-	-	-	-	-	3	-	-	-	60		3	
Y	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	96	9	-	-	-	-	-	-	-	-	9	-	-	-	180		9	
M	85	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	90	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- -	0	
	96	28	-	-	-	-	-	-	-	-	28	-	-	-	560	11 16	28	
Total Plants/Acre (excluding Dead & Seedlings)											'85	0	Dec:	-				
											'90	0		-				
											'96	740		-				

SUMMARY

HERD UNIT - 3 - OGDEN

Unit 3 contains a total of 18 trend studies. Thirteen of these sites are from the old deer unit 3 which were established in 1984. One study was originally in deer herd unit 2, but is now part of unit 3. Five additional sites, which were originally part of deer herd unit 7, are now part of unit 3. These 7 sites were established in 1985. During the 1996 season, two sites were dropped from the unit due to poor site placement. These include site #1 East Mantua and #11 Porcupine Dam. All of the other 16 sites were read in 1996 and contain a total of three sampling dates. All sites monitor big game winter ranges.

Unit Wide Trends

A common finding on sites in Unit 3 is the abundance of annual brome grasses, less desirable perennial grasses and weedy forbs in the herbaceous understories. Twelve of the 16 sites on the unit have herbaceous understories dominated by cheatgrass, Japanese brome or bulbous bluegrass and a variety of weedy increaser forbs. Herbaceous trends are down or slightly down on 13 of 16 sites with several showing continual declines in frequency of perennial grasses. The other three sites show stable herbaceous trends but composition is poor on all three.

Forb compositions are poor on most sites due to the abundance of weedy perennial forbs. These include species such as western ragweed, prickly lettuce, yellow salsify, western yarrow, pacific aster, tarweed, curlycup gumweed, thistle, and dyers woad. Twelve of the 16 sites on the unit contain varying amounts of the noxious weed, dyers woad.

Another common finding on the unit is a high average soil temperature. This is usually the result of abundant rock on the surface and in the profile or the result of a steep slope combined with a west or south aspect. The average soil temperature for the 16 sites on unit 3 is 70.6°F at an average depth of 13 inches. This causes total drying of the surface soil horizons by early summer and gives winter annuals like cheatgrass a competitive advantage over more desirable perennial species. Extra care must be used when grazing these ranges during the spring as they can easily be pushed toward an annual grass dominated system.

As a result of the high soil temperatures, abundance of annual grasses and weeds, drought and past heavy use, many sites now support limited browse densities. Fire has burned three sites in the unit and effectively eliminated the browse component. None of these burns were seeded, leaving them vulnerable to future fires and further site deterioration. Overall use of the browse on sites which still support sufficient densities, is currently light to moderate.

A summary table of 1990 and 1996 trends follows.

TREND SUMMARY UNIT - 3 - Ogden

Site	1990			1996		
	Soil	Browse	Grasses & Forbs	Soil	Browse	Grasses & forbs
3-1 East Mantua	down	down	down	Dropped 1996		
3-2 NE Mantua Reservoir	stable	up		up	stable	down
3-3 Clay Basin	stable	stable	stable	up	stable	stable
3-4 Anderson Ranch	stable	up	up slightly	up	stable	down slightly
3-5 Mathias Canyon	stable	stable	stable	up	stable	down
3-6 White's Orchard	stable	up	stable	up slightly	stable	down slightly
3-7 Mouth of Pearson's Canyon	stable	stable	down slightly	up	stable	down
3-8 Facer Canyon	stable	up	down	stable	down	down
3-9 Cooks Canyon	stable	up	up slightly	up	stable	down
3-10 Hyrum Canyon	up slightly	up	down slightly	up	stable	down
3-11 Porcupine Dam	down	down	down	Dropped 1996		
3-12 Three-mile Canyon	stable	down	down slightly	up	stable	down slightly
3-13 Perry Basin	stable	down slightly	up	down slightly	down	stable
3-14 Uintah Junction	stable	down	down slightly	up	stable	stable
3-15 Ogden Canyon	stable	stable	down slightly	up slightly	stable	stable
3-16 Maple Canyon	stable	stable	down slightly	up	down	down
3-17 Middle Fork	stable	stable		up	up slightly	down slightly
3-18 Geertsen Canyon	stable	down	down	up	up	down slightly

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